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Hospitalized patients' vs. nurses' assessments of pain intensity and barriers to pain management

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Abstract

Aims: The aim of the study was to identify if nurses and patients equally assessed pain intensity and patient-related barriers to pain management in hospitalized patients.

Background: Several studies reported poor to moderate agreement between patient- and nurse-reported pain assessment. Many of these studies focused on a specific patient group. So far, no study studied the level of agreement in the assessment of patient-related barriers between patients and nurses.

Design: A cross-sectional study was performed in two hospitals.

Participants: Inclusion criteria for patients were: (1) being at least 18 years; (2) understanding the Dutch language; and (3) giving informed consent. All nurses responsible for the participating patients and present at the time of the survey were invited to participate.

Methods: Data were collected between October 2012 - April 2013. Patients and nurses completed the Numeric Rating Scale to measure pain intensity. Patient-related barriers to pain management were measured using the barriers to pain assessment and management scale developed by Elcigil et al. (*Journal of Pediatric Hematology Oncology* 2011, **33**:S33).

Results: A moderate agreement between patients and nurses was found for the assessment of pain intensity. Multiple logistic regressions showed a significant association between pain intensity reported by patients and the under-, over- and adequate estimation of pain by nurses. Nurses significantly underrated the belief patients had about pain management.

Conclusions: Nurses should be educated about these beliefs and should be encouraged to actively explore patient-related barriers to pain management with their individual patients. Routine pain assessments should also be encouraged and should be explained to patients.

KEYWORDS

assessment, nurse roles, nursing, pain

*Both authors similarly contributed to this manuscript.

1 | INTRODUCTION

Pain has been defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage” (Task Force on Taxonomy of the International Association for the Study of Pain 1994) and as “pain is whatever the experiencing person says it is, existing whenever he says it does” (McCaffery, 1979). These definitions indicate that the patient’s verbal report of pain is the single reliable indicator of pain (Yildirim et al., 2015).

Pain affects the physical, the psychological and the social dimension of patients’ life. Pain is associated with negative changes in sleeping patterns, physical activity and mood and is associated with a decrease in social relations and higher economical costs (Sinatra, 2010; Zhang et al., 2008).

The prevalence of pain at rest in hospitalized patients is high with reported percentages between 33 – 71% (Fabbian et al., 2014; Maier et al., 2010; Sawyer, Haslam, Robinson, Daines, & Stilos 2008; Strohbuecker, Mayer, Evers, & Sabatowski 2005). Maier et al. (2010) measured moderate to severe pain at rest in 29.5% of the surgical patients and 36.8% of the non-surgical patients. Fabbian et al. (2014) measured moderate to severe pain in 41.6% of the patients on an internal ward. More than 50% of patients reported pain during activity (Maier et al., 2010).

1.1 | Background

Nurses play a crucial role in pain management, because they are the main observer of pain and discomfort in patients as they provide direct patient care 24 hr a day (Zhang et al., 2008). The majority of nurses operate as advocate for their patients when it comes to pain and pain management (Blondal & Halldorsdottir, 2009; Ware, Bruckenthal, Davis, & O’Conner-Von 2011). Therefore, to provide adequate pain management, accurate assessment of pain intensity by nurses is important.

Several studies measured the agreement between patient- and nurse-reported pain intensity assessment (Akin & Durna, 2013; Guner, Akin, & Durna 2014; Hall-Lord, Larssen, & Steen 1999; Horton, 2002; Hovi & Lauri, 1999; Klopfenstein, Herrmann, Mamie, Van Gessel, & Forster 2000; Nekolaichuk et al., 1999; Stephenson, 1994; Van Lancker et al., 2015; Yildirim et al., 2015). The results of these studies are conflicting. Two studies focussing on palliative people with cancer found poor to moderate agreement between patients and nurses for pain intensity assessment (Akin & Durna, 2013; Horton, 2002). Hovi and Lauri (1999) focused on pain intensity in people with cancer and found a statistically significant difference between patients’ and nurses’ assessments for the most intense pain and for acceptable pain. No significant difference was found for the assessment of the lowest pain intensity. In case a statistically significant difference was found between patients’ and nurses’ pain assessments, nurses underestimated the pain intensity of older patients (Hall-Lord et al., 1999), patients with cancer (Guner et al., 2014; Hovi & Lauri, 1999) and surgical patients

Why is this research or review needed?

- The prevalence of pain at rest in hospitalized patients remains high.
- Previous studies mainly focused on specific patient groups instead of hospitalized patients in general.
- Knowledge on the level of agreement between patients’ and nurses’ assessments about patient-related barriers to pain management is lacking.

What are the key findings?

- Moderate agreement was found between patients and nurses for the assessment of pain intensity in hospitalized patients.
- A significant association was found between pain intensity reported by patients and the under-, over- and adequate estimation of pain by nurses.
- Nurses significantly underrated the belief hospitalized patients had about pain management.

How should the findings be used to influence policy/practice/research/education?

- Nurses should be educated about the belief of hospitalized patients about pain management and should be encouraged to actively explore patient-related barriers to pain management with their individual patients.
- Routine pain assessments should be encouraged and should be explained to patients.

(Klopfenstein et al., 2000; Yildirim et al., 2015). In contrast, other studies did not find a statistically significant difference between patients’ and nurses’ assessment of pain intensity for patients with cancer (Akin & Durna, 2013; Nekolaichuk et al., 1999; Van Lancker et al., 2015) and for surgical patients (Stephenson, 1994). All studies focused on a specific patient group (e.g. people with cancer patients with postoperative pain).

Barriers play a crucial role in the successful implementation of improvement of care (Grol & Wensing, 2011). Several barriers to adequate pain assessment and management have been reported in the literature of which patient-related barriers are one aspect (Elcigil, Maltepe, Esrefgil, & Mutafoglu 2011). Patients’ beliefs such as “pain medication cannot control pain” and “people get addicted easily” are identified as important patient-related barriers to effective pain management (Dawson et al., 2005). Other patient-related barriers are reluctance to take pain medication (e.g. out of fear for an addiction or side effects) (Duignan & Dunn, 2009; Elcigil et al., 2011) and difficulties completing a pain assessment scale (Coker et al., 2010; Elcigil et al., 2011). To our knowledge, no studies have examined the agreement between patients’ and nurses’ assessments about patient-related barriers to pain

management. It is essential that nurses have accurate knowledge of the patient-related barriers to pain management to provide adequate pain-related care and education attuned to patients' perceptions on pain.

2 | THE STUDY

2.1 | Aim

The aim of the study was to assess agreement between nurses and hospitalized patients about pain intensity and patient-related barriers to pain management.

2.2 | Design

A cross-sectional study was performed.

2.3 | Participants

Two centres, one teaching hospital and one general hospital, participated in the study. A total of 39 wards were invited to participate, of which 35 wards (surgical wards $N = 16$, internal medicine $N = 15$, geriatric wards $N = 4$) agreed to participate. Technical wards such as intensive care and emergency rooms, paediatric wards, psychiatric wards and outpatient departments were excluded.

Both patients and nurses were asked to assess pain intensity and patient-related barriers to pain management.

2.3.1 | Patients

Patients were included if they met the following inclusion criteria: (1) being at least 18 years of age; (2) understanding the Dutch language; and (3) being able to provide informed consent. Sedated patients or patients with a cognitive impairment as indicated by the responsible healthcare professional were excluded.

2.3.2 | Nurses

The nurses responsible for the participating patients and present at the time of the survey were invited to participate.

2.4 | Data collection

2.4.1 | Instruments

Pain intensity

Pain intensity was measured by the Numeric Rating Scale (NRS). The patients were asked to give a pain score on a 11-point rating scale, with 0 representing no pain and 10 representing the worst imaginable pain. Williamson and Hoggart (2005) reported the NRS to be as sensitive as the Visual Analogue Scale (VAS), but to have a lower failure rate. The NRS is a valid and reliable scale and is commonly used in clinical practice.

In addition, nurses were asked to indicate the pain score for each specific participating patient they were responsible for during their shift. They were also asked to indicate how they had assessed this pain intensity score for this specific patient: use of a validated scale, use of their expertise/experience or not measured. In case of the latter answer, nurses admitted that they did not assess the patient's pain, but still assumed to know the pain intensity of the patient.

Barriers to pain management

Barriers to pain management on patient level were collected from patients and nurses. In this study, the barriers to pain assessment and management scale developed by Elcigil et al. (2011) was used to measure five patient-related barriers to pain management. The answers were rated on a 5-point Likert scale (1 = strongly agree; 5 = strongly disagree).

Demographic and other variables

Demographic and other variables of patients were: age, gender, level of education, current employment, comorbidity, surgery and health literacy. Health literacy is defined as 'the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways that promote and maintain good health' (World Health Organization 1998). Health literacy was measured by "The Single Item Literacy Screener," developed and validated by Morris, MacLean, Chew, and Littenberg (2006). The one-item "How often do you need to have someone help you when you read instructions of health material?" was translated to Dutch. The answers were rated on a 5-point Likert scale (1 = never; 5 = always).

2.4.2 | Validity, reliability and rigour

Elcigil et al. (2011) developed the barriers to pain assessment and management scale based on questionnaires from previous studies. The scale was translated into Dutch and compared with the results of a qualitative doctorate study which identified barriers and facilitators to pain to evaluate the need for the inclusion of additional items (Berben, Meijs, van Grunsven, Schoonhoven, & van Achterberg 2012), which confirmed the items of the original questionnaire. Content validity was achieved by a two-round Delphi procedure with five experts (two research experts and three clinical experts) in pain management or nursing science. After the second round of the Delphi procedure, all experts agreed on the translated and adapted scale. The reviewed scale was pilot-tested in 10 patients and 10 nurses. After each round of the Delphi procedure and after the pilot-test, sentence constructions were adapted to improve comprehensibility. The internal consistency was measured by the Cronbach's alpha. The translated and reviewed patient-related barriers scale had a Cronbach's alpha of .68 in the present study, which is considered to be acceptable (Polit & Hungler, 1991).

2.4.3 | Procedure

All head nurses of the eligible wards were informed about the study by e-mail. The head nurses were contacted by phone after 1 week,

to ask if their ward wanted to participate. Data were collected between October 2012 - April 2013. A list of all eligible patients hospitalized on the participating wards at the day of the survey was provided by a member of the healthcare team. A list of nurses responsible for the eligible patients was provided by one of the nurses on the ward.

The demographic variables, the NRS and patient-related barriers scale were collected from patients by the means of a structured interview with one of the researchers. The data collection was pilot-tested before the study to ensure standardized data collection between the three researchers. The medical record of the patient was consulted to find data on comorbidity and surgery.

The NRS and patient-related barriers scale were completed by the responsible nurse independently from the patient by the means of a structured interview with one of the researchers. On both assessments (patient and nurse), the time of the structured interview was noted to allow a comparison of the time between the two assessments. To ensure linkage between the assessments completed by patients and nurses, the data collection form received an identical anonymized code.

2.4.4 | Ethical considerations

This study was approved by the ethics committees of both hospitals (B/670201214897). The patients and nurses received written and oral information. All participating patients gave written informed consent. All questioned nurses gave oral informed consent.

2.4.5 | Data analysis

SPSS version 19.0 (SPSS Incorporated, Chicago, IL, USA) was used for the data analysis. Descriptive statistics were computed for each item of interest. The data were not normally distributed; therefore, frequencies and medians (Mdn) with interquartile ranges (IQR) are reported.

The Wilcoxon signed-rank test was used to compare the difference at group level between the medians of pain intensity and patient-related barriers to pain management.

Agreement in pain intensity and patient-related barriers to pain management between patients and nurses at individual level was measured using the intraclass correlations coefficient (ICC). The ICC was interpreted according to Landis and Koch (1977): $\leq .20$ indicating slight agreement, $.21-.40$ indicating fair agreement, $.41-.60$ indicating moderate agreement, $.61-.80$ indicating substantial agreement and $\geq .81$ indicating almost perfect agreement. Subgroup analyses were performed for the following subgroups: pain intensity level (no pain, mild pain, moderate pain and intense pain), ward (surgical, internal and geriatric), gender, age (≤ 64 and ≥ 65 years) and the nurse's pain assessment method.

An univariate binary logistic regression was used to explore the association of over-, under- and adequate estimation of pain intensity by nurses and patients' age, patients' gender, patients' highest diploma, patients' current employment, days admitted to the

hospital, comorbidity, surgery, health literacy and pain intensity. Over- and underestimation of pain by nurses was measured calculating the difference score between patient's and nurse's pain intensity. Overestimation was defined as a difference score of -2 or lower. Underestimation was defined as a difference score of 2 or greater. A difference score between -2 and 2 was considered as adequate.

To explore the association between adequate estimation of the five patient-related barriers to pain management reported by nurses and patients' age, patients' gender, patients' highest diploma, patients' current employment, days admitted to the hospital, comorbidity, surgery, health literacy and pain intensity a univariate binary logistic regression was performed. Adequate estimation of patient-related barriers was measured by calculating the difference score between patient's and nurse's assessments. Adequate estimation was defined as a difference score of 0 .

A multiple logistic regression was used to identify the influence of independent variables on the estimation of pain and the five patient-related barriers of pain by the nurse. Independent variables associated with a p -value $\leq .25$ at univariate level were entered in the multiple model. Multicollinearity was explored by means of a correlation matrix before the variables were added to the model. In the first three models, multiple logistic regressions were performed with the binary outcomes under- vs. no underestimation, over- vs. no overestimation and adequate vs. no adequate estimation of pain by the nurse. In the following model, multiple logistic regressions were performed with the binary outcome adequate vs. no adequate estimation of the five patient-related barriers by the nurse. Odds ratios (OR) and 95% CI were reported. The results were considered statistically significant at p -value $\leq .05$.

Those cases where the time interval between the assessment of patients and nurses exceeded 3 hr ($n = 71$ dyads) were excluded from all analyses with pain intensity to avoid biases. In the analysis on the agreement in pain intensity, an additional eight dyads were excluded due to missings.

3 | RESULTS

3.1 | Demographics

A total of 556 patients met the inclusion criteria of which 351 patients agreed to participate in the study (response rate 63.0%). A few more women (54.1%) than men (45.9%) participated. The median age of the patients was 63 years (IQR 28). Of all patients, 45.6% were admitted to a surgical ward, 44.7% to an internal medicine and 9.7% to a geriatric ward (Table 1). Nurses were asked to complete the assessment for all 351 patients of which 70.4% agreed to participate resulting in 247 dyads for all assessments (Figure 1).

3.2 | Pain intensity

At the moment of the survey, 35.6% of the patients reported no pain (NRS = 0), 36.8% of the patients reported mild pain (NRS = 1-

TABLE 1 Demographic variables of patients

	N (%)	Median (IQR)
Gender		
Man	161 (45.9%)	
Woman	190 (54.1%)	
Age	351	63 (28)
Comorbidity		
No comorbidity	148 (42.2%)	
Comorbidity	195 (55.6%)	
Missings	8 (2.3%)	
Surgery		
No surgery	141 (40.2%)	
Surgery	206 (58.7%)	
Missings	4 (2.1%)	
Highest diploma		
Primary education	113 (32.2%)	
Secondary education	147 (41.9%)	
Higher education	90 (25.6%)	
Missings	1 (0.3%)	
Current employment		
Employed	107 (30.5%)	
Unemployed	56 (16.0%)	
Retired	188 (53.6%)	
Ward		
Surgical ward	160 (45.6%)	
Internal medicine	157 (44.7%)	
Geriatric ward	34 (9.7%)	
Health literacy		
Never	171 (49.1%)	
Rarely	65 (18.7%)	
Sometimes	69 (19.8%)	
Often	23 (6.6%)	
Always	20 (5.8%)	
Missings	3 (0.9%)	

3) and 27.0% of the patients reported moderate to severe pain (NRS \geq 4) (Table 2). Nurses indicated that 33.9% of the patients had no pain (NRS = 0), 36.8% of the patients had mild pain (NRS = 1–3) and 26.4% of the patients had moderate to severe pain (NRS \geq 4) (Table 2).

3.3 | Nurse's pain assessment method

For 52.3% of the participating patients, the nurses indicated having used a validated scale to assess the pain. The nurses had not assessed the pain for 19.8% of the participating patients. For 28.0% of the participating patients, the nurses used their expertise to assess the pain (Table 2).

3.4 | Patient-related barriers to pain management

Of all patients, 40.7% expressed experiencing difficulties with the assessment of pain intensity. Nurses indicated that 12.6% of the patients experienced difficulties with reporting their pain intensity. Reluctance to report pain was reported by 37.9% of patients compared with the nurses indicating this issue in 10.5% of patients.

Some patients reported being reluctant to take pain medication out of fear of an addiction (37.0%) or side effects (47.0%). Nurses indicated that 5.3% and 7.7% of patients were reluctant to take pain medication out of fear of an addiction and side effects respectively. Almost half of the patients expressed being reluctant to take opioids (51.0%) compared with the nurses indicating this reluctance in 16.6% of patients (Table 3).

3.5 | Agreement in pain intensity

The following results are based on the 176 dyads of assessments included in pain intensity analysis.

The difference between the patients' (Mdn 2.0) and nurses' (Mdn 2.0) pain intensity assessments was not significant at group level ($z = -.26$; $p = .79$). At individual level, a moderate agreement in the assessment of pain intensity was found between patients and nurses (ICC = .43) (Table 2).

Across the four levels of pain, a slight agreement in pain intensity was found between patients and nurses. Higher agreement was found for patients with mild pain (ICC = .19) and for patients with severe pain (ICC = .15) compared with patients with no pain (ICC = .00) and patients with moderate pain (ICC = .08) (Table 2). The subgroup analysis (Table 2) based on type of ward showed a higher level of agreement for patients hospitalized in an internal medicine (ICC = .40) and a surgical ward (ICC = .46) compared with patients hospitalized in a geriatric ward (ICC = .26).

The subgroup analysis based on the assessment method used by nurses to assess pain intensity revealed a higher level of agreement for those nurses using a validated scale (e.g. VAS) to assess pain intensity in patients (ICC = .44) compared with nurses using their expertise to assess the pain (ICC = .36) or nurses who did not assess the pain (ICC = .41).

The subgroup analysis based on patients' age showed a higher level of agreement for patients younger than 65 years (ICC = .53) compared with patients aged 65 years and older (ICC = .29). The subgroup analysis based on patients' gender showed a higher level of agreement for male patients (ICC = .45) compared with female patients (ICC = .40).

Nurses underestimated pain intensity for 13.7% of the patients and overestimated pain intensity for 14.3% of the patients. The multiple logistic regressions (Table 4) showed a significant association between pain intensity reported by patients and the under-, over- and adequate estimation of pain by nurses. The odds to adequately estimate pain by nurses decreased with 24.0% when the pain intensity in patients increased (OR = .76; 95% CI .67–.86). The odds to overestimate pain by nurses decreased with 30.0% when the pain

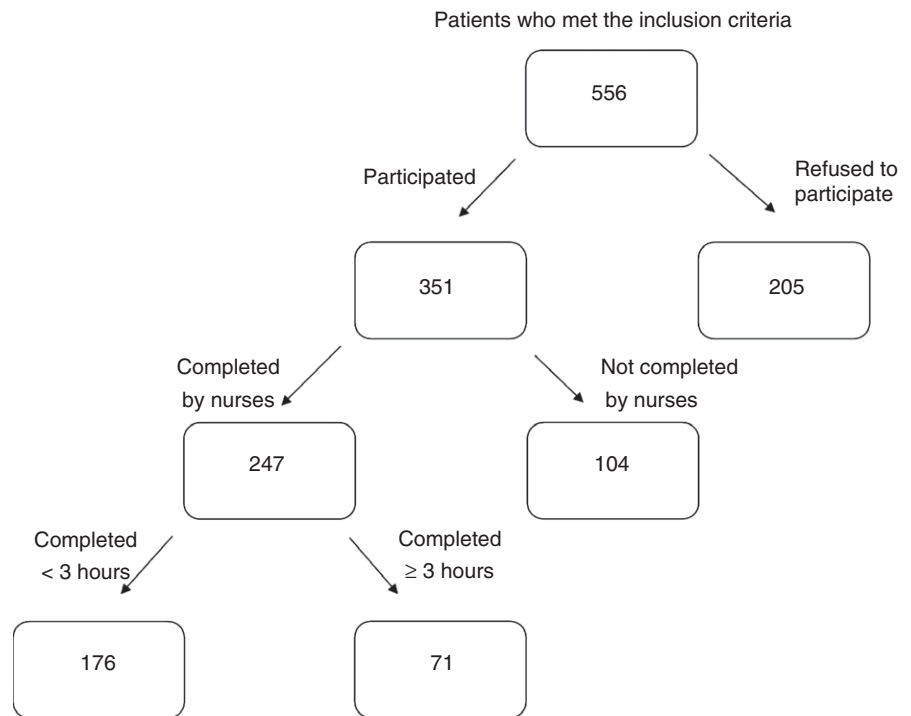


FIGURE 1 Overview of the number of participants

intensity in patients increased (OR = .70; 95% CI .54–.90). The odds to underestimate pain by nurses was 1.93 times more likely in patients with higher pain intensity (OR = 1.93; 95% CI 1.51–2.47).

3.6 | Agreement in patient-related barriers to pain management

The following results are based on all available dyads of assessments ($n = 247$). Nurses indicated that according to them, patients had significantly less difficulties with the assessment of pain intensity (Mdn 4.0) compared with patients (Mdn 2.0) at group level ($z = -11.98$; $p < .001$). Significantly more patients reported a reluctance to pain medication out of fear of an addiction (Mdn 4.0) compared with nurses (Mdn 4.5) ($z = -7.69$; $p < .001$). Significantly more patients were reluctant to pain medication out of fear of the side effects (Mdn 3.0) compared with nurses (Mdn 4.0) ($z = -8.30$, $p < .001$). Patients were significantly more reluctant to report their pain (Mdn 3.0) compared with nurses (Mdn 5.0) ($z = 6.55$; $p < .001$). Nurses indicated that significantly less patients were reluctant to take opioids (Mdn 4.0) compared with patients (Mdn 2.0) ($z = -5.99$; $p < .001$) (Table 3).

A slight agreement was found between patients and nurses for the patient-related barriers at individual level. The different ICCs for the patient-related barriers are reported in Table 3.

The multiple logistic regressions (Table 5) showed a significant association between patient profile (level of education, surgery and gender) and the adequate estimation of three of the patient-related barriers by nurses. The odds to adequately estimate reluctance to pain medication out of fear of the side effects by nurses decreased when patients had an higher level of education (secondary education: OR = .37; 95% CI .18–.77) (higher education: OR = .30; 95% CI

.11–.82). The odds to adequately estimate the reluctance to report pain by nurses decreased with 50% when the patient had not undergone surgery (OR = .50; 95% CI .27–.94). The odds to adequately estimate reluctance to take opioids by nurses decreased with 50% when the patient was a woman (OR = .50; 95% CI .27–.92).

4 | DISCUSSION

4.1 | Pain intensity

The results indicate that 63.8% of the patients reported pain at the moment of assessment. This result is in line with other pain prevalence studies which focused on adult patients admitted on different wards (Fabbian et al., 2014; Maier et al., 2010; Sawyer et al., 2008; Strohbecker et al., 2005).

The present study did not find a difference between the patients' and nurses' pain assessment, and nurses estimated the pain intensity correctly for approximately 70% of the patients. This seems to indicate that nurses overall correctly estimate the pain intensity of patients. However, the agreement at individual level between patients and nurses for pain intensity was moderate (ICC = .43). A moderate agreement suggests that the agreement between the patients' and nurses' pain assessment can be improved. These results are in accordance with the literature focusing on the agreement of pain between patients and nurses in specific patient groups (Akin & Durna, 2013; Goulet et al., 2013; Hall-Lord et al., 1999; Hilarius, Kloeg, Detmar, Muller, & Aaronson 2007; Horton, 2002; Klopfenstein et al., 2000; To, Ying Ong, Rawlings, Greene, & Currow 2012).

The level of agreement between nurses' and patients' pain assessments seems to be slightly higher when nurses used a validated scale to assess the pain. In the participating hospitals, the

TABLE 2 Agreement in pain intensity between patients and nurses

	No pain (NRS = 0)	Mild pain (NRS = 1–3)	Moderate pain (NRS = 4–6)	Severe pain (NRS = 7–10)	Missings	N (%)	ICC*(95%CI)	ICC p-value	Wilcoxon signed-rank test
Pain intensity (N = 168)									
Measured by nurse (N = 247)	33.9% (80)	36.8% (91)	21.1% (52)	5.3% (13)	4.5% (11)	111 (45.7%)	0.43 (0.29 – 0.54)	<.001	p = .79 (z = –0.26)
Measured by patient (N = 351)	35.6% (125)	36.8% (129)	19.1% (67)	7.9% (28)	0.6% (2)	68 (28%)			
Pain assessment method by nurse (N = 243)									
Validated scale (N = 111)						48 (19.8%)			
Expertise/Experience (N = 68)						16 (6.6%)			
Not measured (N = 48)									
Combination validated scale and expertise (N = 16)									
Subgroup analysis									
Pain intensity									
No pain (N = 60)							0.00 (–0.25 to 0.25)	.50	
Mild pain (N = 60)							0.19 (–0.06 to 0.42)	.07	
Moderate pain (N = 32)							0.08 (–0.27 to 0.41)	.33	
Severe pain (N = 16)							–0.15 (–0.59 to 0.36)	.72	
Ward									
Surgical (N = 76)							0.46 (0.26–0.62)	<.001	
Internal (N = 72)							0.44 (0.23–0.61)	<.001	
Geriatric (N = 20)							0.26 (–0.16–0.61)	.119	
Gender patient									
Men (N = 79)							0.45 (0.25–0.61)	<.001	
Women (N = 89)							0.40 (0.21–0.56)	<.001	
Age patient									
18–64 years (N = 89)							0.53 (0.37–0.67)	<.001	
≥65 years (N = 79)							0.29 (0.08–0.47)	<.001	
Pain assessment method by nurse									
Validated scale (N = 83)							0.44 (0.25–0.60)	<.001	
Expertise/Experience (N = 49)							0.36 (0.09–0.58)	.005	
Not measured (N = 35)							0.41 (0.10–0.65)	.005	

*ICC, intraclass correlation coefficient; NRS, Numeric Rating Scale.

TABLE 3 Agreement between the assessment of the patient-related barriers

	Agree* N (%)	Neither agree nor disagree* N (%)	Disagree* N (%)	Missings N (%)	ICC** (95%CI)	ICC p-value	Wilcoxon signed-rank test
The patient is reluctant to take pain medication out of fear for an addiction (N = 214)							
Experienced by nurse	13 (5.3%)	14 (5.7%)	187 (75.7%)	33 (13.4%)	0.12 (-0.01 to 0.24)	.014	p < .001 (z = -7.69)
Experienced by patient	130 (37.0%)	43 (12.3%)	177 (50.4%)	1 (0.3%)			
The patient is reluctant to take pain medication out of fear for side effects (N = 209)							
Experienced by nurse	19 (7.7%)	14 (5.7%)	176 (71.3%)	38 (15.4%)	0.04 (-0.05 to 0.15)	.187	p < .001 (z = -8.30)
Experienced by patient	165 (47.0%)	38 (10.8%)	146 (41.6%)	2 (0.6%)			
The patient is reluctant to report his pain (N = 236)							
Experienced by nurse	26 (10.5%)	7 (2.8%)	203 (82.2%)	11 (4.5%)	0.01 (-0.09 to 0.17)	.432	p < .001 (z = 6.55)
Experienced by patient	133 (37.9%)	46 (13.1%)	171 (48.7%)	1 (0.3%)			
The patient experienced difficulties with the assessment of pain intensity (N = 237)							
Experienced by nurse	31 (12.6%)	5 (2.0%)	201 (81.3%)	10 (4.0%)	0.08 (-0.32 to 0.18)	.071	p < .001 (z = -11.98)
Experienced by patient	143 (40.7%)	21 (6.0%)	187 (53.3%)	0 (0%)			
The patient is reluctant to take opioids (N = 153)							
Experienced by nurse	41 (16.6%)	14 (5.7%)	110 (44.5%)	82 (33.2%)	0.08 (-0.05 to 0.21)	.112	p < .001 (z = -5.99)
Experienced by patient	179 (51.0%)	61 (17.3%)	106 (30.2%)	5 (1.4%)			

*For representation purpose the answer categories were reduced: agree (Likert scale: 1–2), neither agree nor disagree (Likert scale: 3), disagree (Likert scale: 4–5)

**ICC, intraclass correlation coefficient; CI, confidence interval.

TABLE 4 Multiple analyses of adequate, over- and underestimation of pain by the nurse

	Overestimation ^a (R ² = .21)		Underestimation ^a (R ² = .43)		Adequate estimation ^a (R ² = .13)	
	Odds (95% CI)	p-value	Odds (95% CI)	p-value	Odds (95% CI)	p-value
Highest diploma of patient						
Primary education ^a	1		1		1	
Secondary education	0.45 (0.17–1.17)	.10	0.74 (0.20–2.77)	.66	1.41 (0.70–2.86)	.34
Higher education	0.26 (0.06–1.12)	.07	1.51 (0.36–6.37)	.41	1.66 (0.69–3.99)	.25
Age of patient (in groups)						
<65 years ^a	1					
≥65 years	0.79 (0.29–2.16)	.64				
Health literacy	1.01 (0.72–1.42)	.64				
Current employment of patient						
Actively working ^a					1	
Unemployed					1.45 (0.57–3.71)	.44
Retired					0.82 (0.39–1.71)	.59
Pain Intensity	0.70 (0.54–0.90)	.01	1.93 (1.51–2.47)	<.001	0.76 (0.67–0.86)	<.001

^aReference category.

ICC = intraclass correlation coefficient.

nurses are advised to use a validated tool to assess pain intensity (e.g. VAS, NRS) once per shift and whenever the patient is in pain. However, the findings indicate that in almost half of the patients, nurses do not use a validated tool to assess pain intensity. This could explain the moderate agreement between patients and nurses for pain intensity.

The use of a validated scale to measure pain would allow nurses to assess their patients' pain in a more systematic way

which allows them to better identify the patient's pain (de Rond, de Wit, van Dam, & Muller 2000). The effect of the use of a validated pain scale by nurses on the agreement between patients' and nurses' assessment of pain intensity needs to be explored in further research. Nevertheless, nurses should be encouraged to use a validated scale to assess pain intensity in patients to improve the agreement between patients' and nurses' assessment of pain intensity.

TABLE 5 Multiple analyses of adequate estimation of patient-related barriers by nurses

	Addiction		Side effects		Report pain		Opioids	
	Odds (95% CI)	p-value	Odds (95% CI)	p-value	Odds (95% CI)	p-value	Odds (95% CI)	p-value
Highest diploma of patient								
Primary education ^a	1		1		1		1	
Secondary education	0.65 (0.32–1.32)	.64	0.37 (0.18–0.77)	.008	1.39 (0.54–3.57)	.49	0.64 (0.31–1.31)	.22
Higher education	0.65 (0.28–1.5)	.31	0.30 (0.11–0.82)	.02	0.53 (0.15–1.86)	.32	0.57 (0.22–1.47)	.24
Age of patient (in groups)								
<65 years ^a	1				1			
≥65 years	1.17 (0.62–2.21)	.64			1.46 (0.75–2.86)	.27		
Health literacy								
					0.99 (0.76–1.31)	.97		
Current employment of patient								
Actively working ^a								
Unemployed								
Retired								
Gender of patients								
Man ^a	1				1		1	
Woman	1.69 (0.92–3.09)	.09			0.95 (0.91–1.00)	.06	0.50 (0.27–0.92)	.03
Comorbidity								
No ^a					1			
Yes			1.40 (0.67–2.93)	0.38	1.45 (0.75–2.78)	.27		
Days admitted to the hospital								
					0.95 (0.91–1.00)	.06	1.01 (0.99–1.03)	.43
Surgery								
Surgery ^a								
					1			
No surgery								
					0.50 (0.27–0.94)	.03		

^aReference category.

When nurses use their experience to assess a patient's pain, the question rises if the patient has been asked about pain. Research has indicated that nurses are influenced by their own beliefs which clouds an accurate assessment (Benner, Tanner, & Chesla 2009; McCaffery, Ferrell, & Pasero 2000).

The level of agreement between nurses' and patients' pain assessments was lower for older patients (admitted to a geriatric ward or aged 65 years and older). A possible explanation could be that nurses assume that older people are not able to use a pain scale (Blondal & Halldorsdottir, 2009). In some situations, the assessment of pain in older patients can be challenging due to for instance cognitive impairment, sensory impairments, dysphasia and aphasia (Herr, 2011). Nevertheless, this is not the case in every older patient and therefore the self-report of pain remains the priority (Herr, 2011). When self-report is not possible, an observational pain behaviour tool can be used (Herr, 2011).

4.2 | Patient-related barriers to pain management

High level of differences was observed between the assessment of pain-related barriers to pain management by nurses and patients. Nurses significantly underrated the belief patients had about pain management. This underestimation could be due to a lack of

knowledge (Rejeh, Ahmadi, Mohammadi, Anoosheh, & Kazemnejad 2008) and the use of different frames of reference by nurses (McCull, 2004). Nurses who do not actively question their patients about their belief about pain management will not be able to adequately determine patients' belief and anticipate on those beliefs (Rejeh et al., 2008).

Literature indicates that patients are reluctant to talk about pain and barriers to pain management (Duignan & Dunn, 2009; Elcigil et al., 2011; de Rond et al., 2000). Possible explanations for these reluctances are a lack of knowledge (Yates et al., 2002), misconceptions such as opioids result in addiction (Borneman et al., 2010) and the lack of a good nurse-to-patient relation (Lindberg & Engström, 2011; Rejeh et al., 2008).

4.3 | Recommendations for nursing practice and research

The accurate identification of barriers is crucial in the successful implementation of change in care (Duignan & Dunn, 2009; Grol & Wensing, 2011). Nurses should be able to identify patient-related barriers to pain management, to reduce these barriers and consequently optimize pain management for patients. Nurses should be educated about these beliefs in patients and should be encouraged

to actively explore these barriers with their individual patients (McColl, 2004; Rejeh et al., 2008). The use of a structured questionnaire to assess barriers to pain management in patients may facilitate the assessment (McColl, 2004).

When the nurse knows which barriers are present in a patient, he/she could educate the patient to reduce these barriers (Duignan & Dunn, 2009). Literature has indicated that educational programmes and motivational interviewing in people with cancer are effective in terms of decreasing pain intensity and barriers to pain management (Martorella, Côté, Racine, & Choinière 2012; Thomas et al., 2012; Yildirim, Cicek, & Uyar 2008). The effectiveness of these interventions in other patient groups needs to be clarified in further research.

Apart from the active exploration of patient-related barriers to pain management by nurses, routine patient-centred pain assessments should also be encouraged. This is because a lot of patients do not always report pain, unless asked (Helfand & Freeman, 2009) and the possible personal bias of nurses about the true experience of patients (Benner et al., 2009; McCaffery et al., 2000). To improve uniformity, wards or even hospitals should choose a single pain scale and instruct their nurses about the use of this scale. The consistent use of one pain scale allows comparison and evaluation of pain management and may decrease confusion in patients. Nurses should also pay more attention to the assessment of pain in older patients. They should be educated about how they adequately assess pain in this population by using specifically designed and validated tools.

4.4 | Strengths and limitations of the study

A strength of this study is the large sample size. For pain intensity and patient-related barriers to pain management, 176 dyads and 247 dyads could be formed respectively. Although no a priori sample size calculation was performed, a large sample was included in this study. In addition, a heterogeneous sample of patients was included to obtain a true representation of clinical practice. Also, patients hospitalized in different wards in one teaching hospital and one general hospital were included to account for institution-bounded factors. A limitation of the study is the response rate of 63%. The response rate among nurses is 70.4%. A possible reason for the non-response among nurses could be the lack of time perceived by nurses to participate in research.

To our knowledge, it is also the first study to link patients' and nurses' assessment of patient-related barriers to pain management. Patients with cognitive disability or sensory impairment were excluded from the study because the measurement of pain in these patients require other assessment methods (Coker et al., 2010; Rantala, Kankkunen, Kvist, & Hartikainen 2014). Therefore, the results for pain intensity of this study could be too optimistic, what could be seen as a limitation.

A validated scale was used to assess pain intensity. The scale of Elcigil et al. (2011) was compared with the results a qualitative doctorate study that identified the barriers and facilitators to pain management (Berben et al., 2012), and the scale was translated and

subjected to five experts to assess the face and content validity. The reliability showed acceptable internal consistency. The data collection was standardized. These aspects minimize the risk of measurement bias.

In the present study, the time of assessment between patients and nurses varied with a maximum of 3 hr between both raters. Pain is known to fluctuate with time and could explain the low to moderate ICC. Further research should take into account the time between nurses' and patients' assessment of pain intensity.

In addition, other confounding factors such as nurse-related characteristics and data about moments of assessments (e.g. nurses shifts) could explain the under-, over- and adequate estimation of pain by nurses. Further research could explore if nurse-related characteristics and data about moments of assessments explain the under-, over- and adequate estimation of pain by nurses or explain the adequate estimation of patient-related barriers by nurses.

Pain intensity scores were not excluded from the statistical tests to calculate the ICC when nurses admitted that they did not assessed the patient's pain. Nurses could be influenced by their own beliefs (Benner et al., 2009; McCaffery et al., 2000). This can have an influence on the results, what can be seen as a limitation of this study.

In this study, a multiple binary logistic regression was used to explore the association of over-, under- and adequate estimation of pain intensity by nurses' and patients' age, patients' gender, patients' highest diploma, patients' current employment, days admitted to the hospital, comorbidity, surgery, health literacy and pain intensity. In further research, a multinomial regression with one outcome with three levels could be considered.

5 | CONCLUSION

Moderate agreement was found between patients and nurse for the assessment of pain intensity. The subgroup analyses showed lower level of agreement for older patients aged 65 years or older compared with patients younger than 65 years old. The level of agreement was higher when nurses used a validated scale to assess pain compared with nurses who did not use an instrument. Nurses significantly underrated the belief patients had about pain management.

Nurses should be educated about these beliefs and should be encouraged to actively explore patient-related barriers to pain management with their individual patients. When the nurse knows which barriers are present in a patient, he/she could educate the patient to reduce the barriers of the patient. Routine pain assessments should also be encouraged, because a lot of patients do not always report pain, unless asked. Nurses could also instruct patients in how to use pain assessment scales and wards, or even hospitals, could choose one pain scale and instruct their nurses on its use.

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CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

AUTHOR CONTRIBUTIONS

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (<http://www.icmje.org/recommendations/>)]:

- substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

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