Despite efforts to improve the management of patients' pain postoperatively with the introduction of guidelines (Wu and Raja 2011) and the branding of pain as the 'fifth vital sign' to raise awareness of the importance of assessment (Campbell 1996; Morone and Weiner 2013), many patients still suffer high levels of postoperative pain (Rockett et al. 2013; Scher et al. 2018). One reason suggested for this is that post-operative pain is complex, involving both inflammation and nerve injury, which requires a complex person-centred management strategy rather than the simple administration of analgesia alone (Pogatzki-Zahn et al. 2017). While most people experience pain after surgery, fewer than half report adequate pain relief (IOM 2011). Poorly managed postoperative pain is a global issue (Wu and Raja 2011). For most patients who report inadequate postoperative pain relief their pain is rated at moderate or higher intensity (IOM 2011). Prevalence rates of such inadequate pain relief vary by country, from 18% in Norway (Johansen et al. 2012) to as high as 62% reported from South Africa (Murray and Retief 2016). Prevalence rates of severe postoperative pain are estimated in the range of 5-10% (Italy) (Sansone et al. 2015) to 12% (United States) at discharge (Buvanendran et al. 2015). In the study by Buvanendran et al. (2015) 13% of patients still reported severe pain at two week post-operatively. The situation is little different in the United Kingdom (UK) where the prevalence of postoperative pain is around 64% (Rockett et al. 2015). Unrelieved postoperative pain is also associated with increased healthcare costs (Joshi and Ogunnaike 2005) and delayed discharge (Klopper et al. 2006) and it negatively impacts on patients' psychological and physical recovery (Gillaspie 2010). It has been demonstrated that under-treatment of early post-operative pain can lead to the development of chronic pain syndromes in some patients. In a prospective study of 30 patients who had a thoracotomy, 52% still had pain after 1.5 years and higher levels of day one post-operative pain was the main predictor for this persistent pain (Katz et al. 1996). Similarly, 58% of 112 patients reported persistent pain three months after knee arthroplasty, and those with more severe day one post-operative pain reported higher levels of pain at three months (Lavand'homme et al 2014). With 10-50% of postoperative patients worldwide progressing to having chronic pain (IOM 2011) this all underscores the crucial importance of effective management in the acute phase to prevent the development of chronic pain (Meissner et al. 2015).

The first step in providing effective pain management is undertaking objective, accurate and routine pain assessments (BPS 2013; Chou et al. 2016). However, pain is subjective, so in large part what the patient is communicating is vulnerable to the healthcare practitioner's interpretation. Interpretation is influenced by the practitioner's values (Fulford et al. 2012) and level of experience (Brant et al 2017), and self-awareness is required to mitigate against the risk of biased judgements (Breivik et al. 2008). It is disappointing that a Care Quality Commission (CQC) survey in the UK found nearly 30% of patients reported feeling staff did not do everything they could to relieve their pain (CQC 2013).

As nurses are the healthcare professionals who spend the most amount of time with patients and usually make the first assessment of a patient's pain and make decisions about analgesia (Melotti et al. 2009) it is important that nurses can assess pain accurately (Klopper et al. 2006). Patient self-report, while open to both practitioner and patient subjectivity, is considered the most accurate measure of pain (DoH 2001). Therefore, this literature review will explore nurses' use of patient self-reporting as part of the pain assessment process and the extent to which this might be a contributing factor towards many patients having a poor experience with pain postoperatively.

Design

A structured search was made of the following databases: Cumulative Index of Nursing and Allied Health Literature (CINAHL), Medline Complete, PubMed Complementary Index, PsychINFO and British Nursing Index (BNI). The different stages of the search are outlined in a PRISMA flowchart (*Figure 1*) (Moher et al. 2009). The search terms used were as follows: (Nurs* AND patient) AND (pain assess* OR pain examin* OR pain manag*) AND (surg* OR postop*). The initial high volume of results was reduced through the application of the following filters to elicit relevant and contemporary research: English language, peer-reviewed and published since 2005. Additional studies were identified using the network method employing the reference lists from studies found in the database search (Timmins and McCabe 2005). The titles of 574 publications were screened for inclusion.

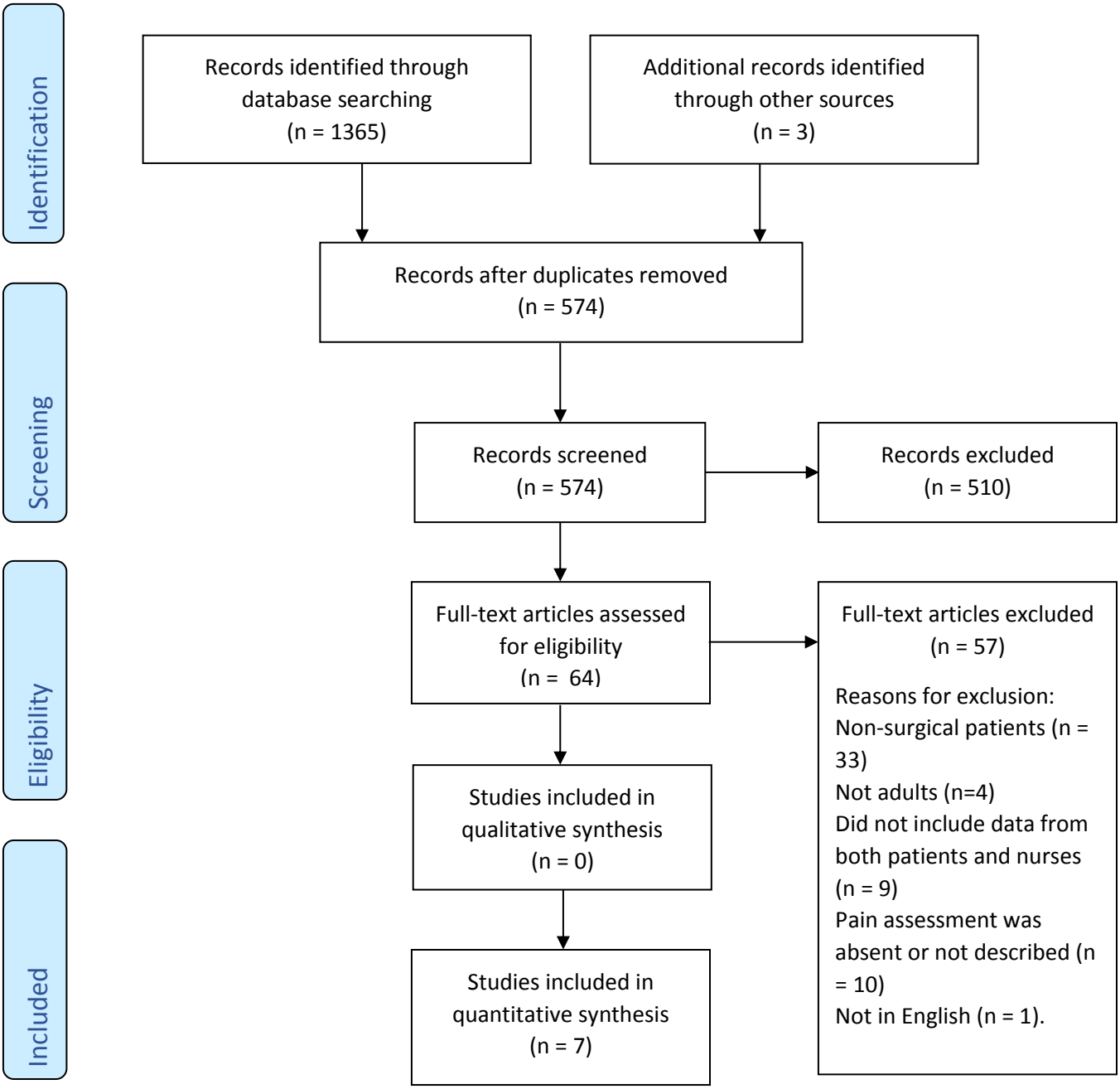

Figure 1. Study flow diagram

This search yielded 64 studies which were then manually searched by abstract for the application of inclusion/exclusion criteria (*Table 1*).

Table 1. Inclusion and exclusion criteria	
Inclusion	**Exclusion**
▪ Primary Research (quantitative, qualitative or mixed methods) ▪ Published since 2005 ▪ Peer reviewed ▪ English language ▪ Adult surgical patients	▪ Non-primary research e.g. narrative or systematic reviews ▪ Not peer reviewed ▪ Non-English language ▪ Unpublished articles/ thesis ▪ Adults non-surgical and children

Studies were excluded for the following reasons: where the patient population did not include postoperative patients (n = 33) or adults (n=4); did not include data from both patients and nurses (n = 9); where the form of pain assessment was absent or not described (n = 10); and where studies were not published in English (n = 1). No qualitative studies were identified that included contemporaneous data from both patients and nurses from the same clinical location. This left seven primary research studies that were deemed relevant and met the inclusion criteria and no exclusion criteria. These were critically appraised utilising Understanding Health Research (MRC 2014). All seven studies had an observational design (Idvall et al. 2005; Sloman et al. 2005; Gunningberg and Idvall 2007; Düzel et al. 2013; Alemdar and Aktas 2014; Atkinson and Almahdi 2014; Schreiber et al. 2014). While self-selection or allocation bias always needs to be considered when interpreting the findings from observation studies (Howick 2011) these do often take an approach from which can be drawn conclusions about actual clinical practice. A summary of these seven studies is presented in Table 2.

Results

The literature review identified two key themes:

- Nurses underestimate patients' pain
- Nurses' knowledge and understanding of pain assessment

Nurses underestimate patients' pain

Across all seven studies nurses consistently underestimated post-operative patients' pain compared to the patients' reporting of pain (*Table 2*). In the cross-sectional study by Sloman et al (2005) 95 postoperative patients and 95 nurses in four hospitals, participants completed the Short-form McGill Pain Questionnaire (SF-MPQ) and three visual analogue scales (VAS) to rate overall pain intensity, suffering and satisfaction with pain relief at one point in time. Nurses were found to rate patients' pain significantly lower on all dimension of the SF-MPQ compared to patients. Patient responses on the SF-MPQ were strongly correlated with their responses on the VAS questions lending additional validity to the pain assessment tools. Nurses completed their pain assessment within minutes of patients' self-assessment suggesting recall bias was unlikely to explain this lack of agreement.

In another cross-sectional study the responses of 94 post-operative patients and 47 nurses on the full version of the McGill Pain Questionnaire were compared (Düzel et al. 2013). Patients' scores were significantly higher than nurses on affective, sensory and evaluative sections of the McGill Pain Questionnaire, as were the scores for average pain intensity. There was no significant difference in scores for the timing of pain, however the between-group difference in this subscale, and the overall McGill scores, were not analysed. Researchers were present during data collection which could have introduced reporting bias.

A similar methodology comparing nurses' and patients' pain assessments was employed in the study by Idvall et al (2005) but this time using the Strategic and Clinical Quality Indicators in Postoperative Pain Management questionnaire (SCQIPP) and two numerical rating scales (NRS): worst pain during past 24 hours and satisfaction (Idvall et al. 2005). This was a larger study involving 97 nurses and 286 post-operative patients (general, gynaecological and orthopaedic) but findings were very similar. Patients rated their worst pain in the past 24 hours significantly higher than did nurses. Nurses did not complete their assessments contemporaneously with patients hence the reporting in this study may have been affected by recall bias; however the findings remain consistent with those of Sloman et al (2005) and Duzel et al (2013). Interestingly, patient satisfaction with pain management was rated significantly higher by patients than nurses.

The data collected in one hospital (two surgical departments) of the study by Idvall et al (2005) was further analysed by Gunningberg and Idvall (2007) who reported findings based on responses from 47 nurses and 121 post-operative patients. Patients in general surgery reported significantly higher levels of pain than did thoracic surgery patients, and it was in general surgical patients, not thoracic, that nurses' significantly underestimated patients' levels of pain (Gunningberg and Idvall 2007). What was similar in both departments however was that patients rated their worst pain in the past 24 hours significantly higher than that which was documented in patient records. For a large proportion of patients (38% general surgical, 23% thoracic) no NRS was documented at all.

Atkinson and Almahdi (2014) conducted a prospective audit involving 204 medical and surgical patients over three non-consecutive days in one hospital. Pain scores could have been documented by any member of the multidisciplinary team but is presumed to be largely the domain of nurses. Of the 176 patients for whom a pain score was documented it was in agreement with the observed pain score (when asked by the researcher) in 71% of medical patients (n=117) but only 27% of surgical patients. When results concerning patients who had no pain at the time of the audit were excluded, for the 86 patients who reported any degree of pain the documented and observed pain scores agreed only for two medical patients, and for no surgical patients. While the authors did not state how much time had elapsed between documented and observed pain scores (Atkinson and Almahdi 2014) this association between agreement and the size of the pain score dovetails with the findings of Gunnningberg and Idvall (2007). Unsurprisingly, Atkinson and Almahdi (2014) also found that pain management plans related to the provision of effective analgesia were often inadequate due to the underassessment or poor documentation of many patients' pain.

In another more recent study, a cross-sectional approach was utilised involving post-operative patients (n=145) and nurses (n=36) at one hospital (Alemdar and Aktas 2014). Consistent with the other studies described above patients rated their pain on average, as higher on the NRS than did nurses. However it was not reported whether or not this difference was statistically significant rather, the results of a correlation analysis were reported. This showed no significant correlation between nurses' and patients' NRS ratings of pain. In contrast the correlation between nurses' and patients' rating of pain on the pain subscale of the EQ-5D was found to be significantly correlated. However, in neither case was the r-value reported which is the correlation statistic required to interpret the strength of a correlation (Akoglu 2018). Further, correlation analysis can be misleading, as even high correlation does not mean the two ratings agree (Bland and Altman 1986). The extent to which nurses' and patients' ratings of pain differed or agreed in the study by Alemdar and Aktas (2014) therefore remains unknown.

Nurses' knowledge and understanding of pain assessment

Schreiber et al (2014) conducted a quasi-experimental study to determine the effects of an educational intervention on nurses' assessment of pain. The education intervention consisted of a two day pain management programme. Of 600 nurses invited 203 with between four and ten years' nursing experience agreed to participate along with 30 post-operative hip/knee surgery patients pre-intervention, and another 30 patients post-intervention. Patients were asked to complete pain diaries for two-three days post-operatively and scores were then compared to those documented by nurses. Nurses also completed the Brockopp-Warden Pain Knowledge/Bias Questionnaire (BWPKBQ). Post-intervention it was found that the mean difference between nurses' assessment of pain and patients' had reduced (from mean difference of 2, to 1.3, $p=0.02$), although nurses continued to underestimate pain compared to patients. Despite some nurses exhibiting poor pain management knowledge at baseline according to the BWPKBQ results, this remained unchanged post-intervention, and likewise there was no change in pain-related bias where nurses continued to spend less time managing pain in patients with "non-physical" problems (Schreiber et al. 2014). Overall response rate was poor (23%).

Although the study by Alemdar and Aktas (2014) did not implement an educational intervention, they included nurses' level of education in their survey. Of their sample of 36 nurses just over a half were educated to associate degree (two years) or bachelor's degree (four years) level. The authors suggested that the lack of agreement between nurses' and patients' pain assessments might be related to low educational levels in their sample, although since education was not a focus of this study the suggestion remains speculative. In the study by Duzel et al (2013) a larger proportion of nurses had degrees (just over half of 47 nurses) but educational level was apparently not correlated with incongruent pain assessments. A similar conclusion was reached by Sloman et al (2005). However, these studies were not designed to answer questions related to nurses' level of education and the accurate assessment of patients' pain.

Table 2: Summary of identified studies

Author	Study design, method	Sample, setting	Instruments	Results			Key findings	Comments
Alemdar and Aktas (2014) (Turkey)	Design: Comparative cross-sectional study Method: Comparison of nurses' and patients' postoperative (48 hours) assessments of pain	Convenience sample of 145 general, gynaecological and cardiovascular patients (56% female; mean±SD age: 45±17.5years) 36 nurses (mean±SD age: 25±7.6; mean average nursing experience 5 years) Setting: Surgical clinics of one hospital		*Patients' score, mean(SD)*	*Nurses' score, mean(SD)*	*Significance (p)*	Patients' NRS and EQ-5D ratings of their pain were on average higher than those scored by nurses. Patients' and nurses' ratings on the NRS were not correlated, while scores on the EQ-5D pain subscale were significantly correlated.	Correlation analysis not appropriate. Cross-sectional design was implied but not stated.
			NRS	5.72(2.40)	3.70(2.45)	0.18		
			EQ-5D	1.95(0.65)	1.75(0.64)	0.03		
Atkinson and Almahdi (2014)	Design: Prospective audit, cross-	204 medical and surgical inpatients (44%		*Surgical patients' documented*	*Agreement between documented and observed pain scores*		38% (n=26) of the 69 patients reported	The prevalence of isolated moderate-

(UK)	sectional Method: Comparison of patient reported pain scores with those documented	of sample) during the study timeframe (three non-consecutive days) (54% female; mean age: 68; age range 20-101) Setting: One hospital		*pain score, n (%) of patients*			moderate to severe pain at rest on direct questioning. These ratings did not agree with those documented by staff. 14% (n =10) of patients did not have a pain score documented with their most recent set of observations.	severe pain was far higher than the upper limit of 5% set by the Royal College of Anaesthetists. The specific reasons for pain were not recorded by the audit. The average time between observed pain score and that most recently documented was not stated.
			Researcher designed audit tool	0 (No pain) – 22 (32%)	The observed pain score was in agreement with that documented for 16 of 59 (27%) patients only. Agreement only occurred in patients who scored - 0 (no pain).			
				1 (Mild) – 11 (16%)				
				2 (Moderate) – 20 (29%)				
				3 (Severe) – 6 (9%)				
				Not documented – 10 (14.5%)				
Duzel et al. (2013) (Turkey)	Design: descriptive and comparative, cross-sectional Method: Comparison of nurses'	Convenience sample of 94 general, gynaecological and orthopaedic, urology and plastics patients (63% female;	McGill- Pain questionnaire [Turkish translation]	*Patients'*	*Nurses'*	*Significance*	Patients' affective, sensory, and evaluative scores, and pain tolerability were on average higher than those scored by nurses. These scores were weakly	The presentation of statistics is confusing. 'Gamma relations factor' (presumed to mean Goodman and Kruskall's gamma) is a
			Part 1 [marking of pain on body schema]	Only external pain (n=48)	Agreement with 37 (77.1%) patients	'Gamma relations factor' 0.732 ($p < 0.001$)		

	and patients' postoperative (48 hours) assessments of pain	mean±SD age: 45±15.5years) 47 nurses (mean±SD age: 28±5.3 years; mean average nursing experience 5 years) Setting: Surgical clinics of one hospital		Only internal pain (n=38)	Agreement with 27 (71.1%) patients		significantly correlated. Patients' and nurses' reporting of the timing of pain was in agreement no more than 55% of the time and as low as 8%.	non-parametric statistic that can be used to determine the level of correlation between two variables, and these results are presented within the text, but not in the tables. Only the subscales of the McGill-Pain questionnaire were compared but this is not appropriate when this questionnaire is designed to produce one overall score. Based on this study's methodology the overall
				Both external and internal pain (n=8)	Agreement with 4 (50%) patients			
			Part 2 [20 word groups assessing sensory, affective and evaluative dimensions of pain]	*Mean(SD)* 13.49(8.96) *Median (Range)* 11.5(1 - 46)	*Mean(SD)* 11.01(11.49) *Median (Range)* 7.0(0 - 58)	r = 0.346 (p = 0.001)		
			Part 3/1-1 [pain timing]	Continuous pain (n=61)	Agreement with 32 (52%) patients	'Gamma relations factor' 0.290 (p = 0.063)		
				Persistent pain (n=22)	Agreement with 9 (41%) patients			
				Stable pain (n=11)	Agreement with 6 (55%) patients			

			Part 3/1-2 [pain timing]	Rhythmic pain (n=29)	Agreement with 15 (51%) patients	'Gamma relations factor' 0.380 (p = 0.008)		conclusion that nurses' and patients' pain scores were correlated (positively or negatively?) is therefore erroneous.
				Periodic pain (n=13)	Agreement with 1 (8%) patient			
				Sporadic pain (n=52)	Agreement with 28 (54%) patients			
			Part3/1-3 [pain timing]	General pain (n=45)	Agreement with 24 (53%) patients	'Gamma relations factor' 0.357 (p = 0.007)		
				Momentary pain (n=25)	Agreement with 10 (40%) patients			
				Temporary pain (n=24)	Agreement with 10 (42%) patients			
			Part 3-2 [pain-relieving factors]	Data not provided (most patients indicated medication)	Data not provided (most indicated medication). Authors state that "80% of patients' and nurses' were	Kappa 0.209 (p = 0.031)		

					‘correlated’”			
			Part 3-3 [pain exacerbating factors]	Data not provided (most patients indicated movement)	Data not provided (most indicated movement). Authors state that “the correlation between the scores of patients and nurses…was 78.7%”	Statistic not provided		
			Part 4 [5-item verbal descriptor scale and 6 questions on pain tolerability]	*Mean(SD)* 19.24(3.89) *Median (Range)* 19.0(11 - 28)	*Mean(SD)* 18.94(3.81) *Median (Range)* 19 (9 – 29)	r = 0.346 (p < 0.001)		
Gunningberg and Idvall (2007) (Sweden)	Design: descriptive and comparative, cross-sectional Method:	121 consecutive general (n=61, 51% female; mean±SD age: 60±16.1 years) and thoracic (n=60, 30%		*Patients’ scores [General surgery(GS); Thoracic surgery (TS)]*	*Nurses’ scores* *[General surgery(GS); Thoracic surgery (TS)]*	*Significance (p-value, Wilcoxon matched pairs test)*	Patients in general surgery experienced significantly higher levels of pain than thoracic patients.	General surgery patients included those for elective and emergency surgery, and data was collected two

	Comparison of nurses' and patients' assessments of pain	female; mean±SD age: 64±9.7) surgery patients and 47 nurses (28 general) Setting: Two surgical departments in one hospital		*Mean(SD)*	*Mean(SD)*		While nurses underestimated patients' worst pain in the past 24 hours compared to patients, the difference was significant only for general surgical patients 5.7±2.7 *versus* 4.5±2.3). In both departments patients rated their worst pain in the past 24 hours as significantly higher (by at least one point on the NRS) than that which was documented in their notes. In 38% of general surgery and 23% of thoracic surgery notes no NRS was documented at	days post-op. Thoracic patients were elective only and data was collected from them three days post-op. Questionnaire response rate 87.7% (121 out of 138 patients). Thoracic nurses were significantly older than general nurses (mean±SD age 36±9.3 *versus* 28±5.2 years), but level of surgical experience was similar (median 1 years surgical nursing both groups).
			NRS (worst pain past 24 hours)	GS: 5.7(2.7) TS: 4.2(2.5)	GS: 4.5(2.3) TS: 3.7(1.9)	$p = 0.002$ $p > 0.05$		
			NRS (pain now)	GS: 2.0 (1.9) TS: 1.8(1.9)	No data provided.			
			Satisfaction with overall pain relief (NRS)	GS: 8.8(1.9) TS: 8.9(2.0)	GS: 7.5(2.0) TS: 7.6(1.8)	$p < 0.001$ $p < 0.001$		
			SCQIPP [14-item]					
			Communication subscale (Q1-3) *Q1 [pre-operative information]*	GS: 4.0(1.5) TS: 4.5(1.1)	GS: 3.9(1.2) TS: 4.4(1.0)	$p > 0.05$ $p > 0.05$		
			Q2 [nurses' knowledge of patients' analgesic regime]	GS: 4.3(1.1) TS: 4.5(1.1)	Question deemed relevant to patients only.			
			Q3 [nurses and doctors	GS: 4.6(0.8) TS: 4.5(1.0)	GS: 4.6(0.7) TS: 4.6(0.5)	$p > 0.05$ $p > 0.05$		

			cooperation in treating pain]				all. Thoracic patients were more likely to have received preoperative information about postoperative pain (90% of thoracic versus 53% of general surgery patients, p<0.001).	SCQIPP apparently not designed to produce an overall score. Subscale scores would have been easier to present.
			Action subscale (Q4-7) Q4 [Post-operative influence over treatment]	GS: 4.2(1.3) TS: 4.3(1.0)	GS: 3.6(1.1) TS: 3.9(1.1)	*p* = 0.011 *p* = 0.033		
			Q5 [Help getting comfortable]	GS: 4.4(1.1) TS: 4.6(0.9)	GS: 3.8(1.1) TS: 4.3(0.8)	*p* = 0.008 *p* > 0.05		
			Q6 [Asked about pain-exacerbating factors]	GS: 4.2(1.3) TS: 4.6(0.9)	GS: 3.8(1.3) TS: 4.6(0.6)	*p* > 0.05 *p* > 0.05		
			Q7 [pain intensity regularly assessed]	GS: 3.9(1.4) TS: 3.9(1.3)	GS: 4.1(1.4) TS: 4.6(0.8)	*p* > 0.05 *p* = 0.001		
			Trust subscale (Q8-11) Q8 [Given medication even without asking]	GS: 4.3(1.4) TS: 4.5(1.0)	GS: 4.1(1.3) TS: 4.9(0.3)	*p* > 0.05 *p* = 0.002		

			Q9 [nurse helped until pain relief was satisfactory]	GS: 4.4(1.0) TS: 4.5(1.0)	GS: 4.2(1.0) TS: 4.5(0.6)	$p > 0.05$ $p > 0.05$		
			Q10 [nurses knowledgeable]	GS: 4.6(0.8) TS: 4.5(1.0)	GS: 4.6(0.5) TS: 4.5(0.7)	$p > 0.05$ $p > 0.05$		
			Q11 [Nurses believe me]	GS: 4.8(0.5) TS: 4.5(1.0)	GS: 4.7(0.5) TS: 4.8(0.5)	$p > 0.05$ $p > 0.05$		
			Environment subscale (Q12-14) Q12 [Peace and quiet to sleep]	 GS: 4.4(1.0) TS: 4.1(1.3)	 GS: 3.9(1.1) TS: 4.1(0.9)	 $p = 0.009$ $p > 0.05$		
			Q13 [pleasant room]	GS: 4.6(0.9) TS: 4.6(0.9)	GS: 3.6(1.1) TS: 4.0(0.9)	$p < 0.001$ $p < 0.001$		
			Q14 [Enough nurses on duty]	GS: 4.4(1.0) TS: 4.7(0.9)	GS: 4.4(0.9) TS: 4.4(0.8)	$p > 0.05$ $p = 0.040$		
Idvall et al (2005) (Sweden)	Design: descriptive and comparative, cross-sectional Method:	286 general, gynaecology and orthopaedic post-operative (48 hours) patients and 97 nurses		*Patients' scores* *[Hospital A (HA); Hospital B (HB)]* *Mean(SD)*	*Nurses' scores* *[Hospital A (HA); Hospital B (HB)]*	*Significance*	Patients' NRS ratings for worst pain past 24 hours were on average higher than those scored by nurses; these were moderately	Data were collected across four months at hospital A, two months at hospital B (response rates 95% and 96%

	Comparison of nurses' and patients' assessments of pain	['Hospital A' (209 patients, 61% female; 63 nurses, 94% female, mean±SD age 34±8.9, mean 13 years nursing experience); 'Hospital B' (77 patients, 76% female; 34 nurses, 97% female, mean±SD age 35±9.1, mean 10 years nursing experience)] Setting: One central county 'hospital A'; one university 'hospital B'			*Mean(SD)*		significantly correlated only. Patients' NRS ratings for satisfaction were on average higher than those score by nurses; these were weakly significantly correlated. Correlations between patients and nurses for the SCQUIPP subscales were weak to moderately only.	respectively). In hospital A patients were older on average and significantly more received post-operative epidural analgesia. Only patients in hospital B received patient-controlled analgesia. SCQIPP reported to be valid and reliable, questions had to be modified for answering by nurses. Nurses completed SCQIPP up to three hours after patients did.
			NRS (worst pain past 24 hours)	HA: 5.2(2.7) HB: 5.4(2.4)	HA: 4.5(2.4) HB: 4.8(2.2)	r=0.59 ($p < 0.001$) r=0.57 ($p < 0.001$)		
			Satisfaction with overall pain relief (NRS)	HA: 8.7(1.8) HB: 8.5(1.9)	HA: 7.4(1.9) HB: 6.9(1.8)	r=0.25 ($p < 0.001$) r=0.35 ($p < 0.01$)		
			SCQIPP [14-item]					
			Communication subscale (Q1-3) *Q1 [pre-operative information]*	HA: 4.0(1.4) HB: 4.0(1.5)	HA: 3.9(1.1) HB: 3.6(1.1)	Data not provided		
			Q2 [nurses' knowledge of patients' analgesic regime]	Data not provided	Data not provided			
			Q3 [nurses and doctors cooperation in treating pain]	Data not provided	Data not provided			

			Action subscale (Q4-7) Q4 [Post-operative influence over treatment]	HA:3.4(1.5) HB: 3.2(1.7)	HA: 3.6(0.8) HB: 3.3(0.8)			Correlations calculated only, no agreement statistics.
			Q5 [Help getting comfortable]	HA: 4.3(1.1) HB: 4.3(1.0)	HA: 4.2(0.9) HB: 4.0(0.9)			
			Q6 [Asked about pain-exacerbating factors]	HA: 3.7(1.5) HB: 3.8(1.5)	HA: 4.2(0.9) HB: 4.0(0.9)			
			Q7 [pain intensity regularly assessed]	HA: 2.8(1.8) HB: 2.9(1.7)	HA: 3.3(1.7) HB: 2.9(1.7)			
			Action subscale overall mean (SD)	HA: 3.6(1.1) HB: 3.6(1.1)	HA: 3.6(0.8) HB: 3.3(0.8)	r=0.35 ($p < 0.001$) r=0.26 ($p < 0.05$)		
			Trust subscale (Q8-11) Q8 [Given medication	HA: 4.5(0.9)	HA: 4.4(1.0)			

			even without asking]	HB: 4.4(1.0)	HB: 4.3(1.0)			
			Q9 [nurse helped until pain relief was satisfactory]	HA: 4.5(1.0) HB: 4.5(1.0)	HA: 4.5(0.7) HB: 4.3(0.7)			
			Q10 [nurses knowledgeable]	HA: 4.6(0.7) HB: 4.5(0.9)	HA: 4.5(0.6) HB: 3.9(0.6			
			Q11 [Nurses believe me]	HA: 4.7(0.6) HB: 4.6(0.8)	HA: 4.8(0.4) HB: 4.5(0.7)			
			Trust subscale overall mean(SD)	HA: 4.6(0.6) HB: 4.5(0.7)	HA: 4.6(0.5) HB: 4.2(0.5)	r=0.22 (*p* < 0.01) r=0.11 (*p* 0.36)		
			Environment subscale (Q12-14) Q12 [Peace and quiet to sleep]	HA: 4.3(1.1) HB: 4.1(1.1)	HA: 4.0(0.9) HB: 3.4(0.8)			
			Q13 [pleasant room]	HA: 4.3(1.1) HB: 4.1(1.1)	HA: 3.6(1.1) HB: 3.2(0.9)			
			Q14 [Enough nurses on duty]	HA: 4.7(0.7) HB: 4.6(0.8)	HA: 4.6(0.8) HB: 3.2(1.1)			

			Environment subscale overall mean(SD)	HA: 4.4(0.7) HB: 4.3(0.9)	HA: 3.9(0.7) HB: 3.3(0.7)	r=0.29 (p < 0.001) r=0.26 (p < 0.05)		
Schreiber et al (2014) (USA)	Design: quasi-experimental pre and post-intervention study Method: Nurses completed BWPKBQ before and after attending a two-day pain management educational intervention. Charts were reviewed to check for congruence between	600 medical, surgical and critical care nurses (341 responded to letter invite to participate – most had 4-10 years nursing experience); 60 post-operative knee/hip patients (30 patients pre-intervention, 30 patients six weeks post-intervention). Setting: One Magnet status community hospital		*Pre-education intervention*	*Post-education intervention*	*Significance*	Patients documented their pain scores for two-three days postoperatively. Post-intervention questionnaires were administered at three months. Pre-intervention nurse and patient pain scores were in disagreement by a mean of 2; post-intervention the mean difference was 1.3 (p=0.02). Implied, but not stated, that this meant an improvement in nurses' under-rating of patients'	Assuming all participants who gave post-intervention responses also did pre-intervention questionnaire, 'total' response rate was 23%, not 57% as stated. Misleading to state 341 nurses responded – 203 responded to pre-intervention and of that 203, 138 responded post-intervention. These numbers are not additive [if they were, that would
			BWPKBQ *% of nurses spending little-moderate time managing pain with:*	'Drug abusers' 41.9% 'Suicide attempters' 41.8% 'Frequent readmissions' 36.5% 'Confused elderly' 29.2%	41.3% 37.8% 37.3% 30.6%	p > 0.05 p > 0.05 p > 0.05 p > 0.05		
			Nurses' pain knowledge score, *mean (SD)*	16.53(2.16)	16.94(2.20)	p < 0.08		
			Patient 4-	Data not	Data not	Authors		

	nurse documented and patient documented pain scores.		hourly diary-reported versus nurse documented pain score(NRS)	provided	provided	report a 40% decrease in inconsistency between patient and nurse pain ratings post-intervention.	pain. No statistically significant change in bias post-intervention with nurses continuing to spend less time helping manage the pain of patients with "non-physical" ailments such as "drug abusers". Despite some nurses exhibiting poor pain management knowledge at baseline, this remained unchanged post-intervention.	mean different nurses responded pre and post-intervention rendering the study pointless] Pain scale not stated – NRS assumed. Nurses were selected by their managers. 100% response rate of patients is completely misleading when the 30 patients at pre and post-intervention were different.
Sloman et al (2005) (Israel)	Design: descriptive and comparative cross	Sample: convenience sample of 95 nurses (73 female; mean	Short-form McGill- Pain questionnaire Hebrew translation]	*Patients' scores* [Data not provided]	*Mean difference patients' versus nurses' pain scores*	*Significance (p-value, paired t-test)*	Nurses rated pain significantly lower compared to patients' on all pain questions in	Nurses completed pain assessment within minutes of patients' self-

	sectional Method: Comparison of nurses' and patients' assessments of pain	age 33; mean experience 10.5 years) and 95 postoperative (within 48 hours) orthopaedic (38%), thoracic (18%), abdominal (44%) patients (43 female; mean age 50 years) Setting: Four hospitals in the Jerusalem area					the McGill questionnaire. There was no significant difference between patients and nurses cultural/ethnic background nor of their ratings of satisfaction. Patient responses on the SF-MPQ were strongly correlated with patient-reported VAS pain questions.	assessment Overall SF-MPQ scores not calculated for analysis. Level of nurse education (diploma versus degree) and clinical area was not associated with pain assessment findings.
			Pain sensation	-	1.86	*p*= 0.002		
			Pain affect	-	1.42	*p*= 0.000		
			Pain intensity at rest	-	0.4	*p*= 0.001		
			Pain intensity on movement	-	0.65	*p*= 0.000		
			Pain intensity overall	-	0.55	*p*= 0.028		
			Patient suffering	-	1.09	*p*= 0.000		
			Patient satisfaction	-	0.37	*p*= 0.175		

Key to abbreviations: *NRS,* Numerical Rating Scale; *EQ-5D,* Euroquol; *SCQIPP*, Strategic and Clinical Quality Indicators in Postoperative Pain Management' questionnaire; *BWPKBQ*, Brockopp-Warden Pain Knowledge/Bias Questionnaire; *VAS*, Visual Analogue Scale

Discussion

This review concludes that nurses' assessment of pain post-operatively often underestimates pain severity compared to patients' self-assessment. While patient self-report is subjective it remains the most objective measure of pain (DoH 2001) and the consistent underestimation of severity could explain why postoperative pain is often ineffectively managed (CQC 2013). Instances of poor pain assessment and management documentation were also identified in this review (Gunningberg and Idvall 2007; Atkinson and Almahdi 2014). Dovetailing with research into reduced nurse staffing levels this lack of documentation suggests that this essential aspect of care is at times being missed (Ball et al. 2018). Accurate and timely documentation are vital for the appropriate continuity of care between shifts and health professionals; missing documentation risks further mismanagement. Other reasons for ineffective pain management by nurses have been identified such as evidence of a need to improve some nurses' knowledge and attitudes towards pain (Brant et al 2017). These findings are concerning as they highlights failings in one of the fundamental aspects of nursing care. While this review identified only seven studies the findings across all studies were strikingly similar despite the publication dates ranging across a nine year period. Further, the studies provide some insight into nursing care from five countries across three continents suggesting that poor pain assessment may be a problem facing many healthcare systems.

Despite the small number of studies identified, some confidence in this reviews' findings can be gained as they dovetail with those of other similar reviews (Bell 2000; Solomon 2001; Bell and Duffy 2009). Pain assessment has been widely studied, with the consensus that discrepancies between nurses and patients do occur. Both Bell (2000) and Solomon (2001) found severe pain to be more underestimated by nurses, a similar finding to Gunningberg and Idvall (2007). Nurses are the most researched healthcare profession as regards the assessment of pain (Solomon, 2001), and it could be interpreted that nurses are the only health professionals to inaccurately assess patients' pain. However, Marquie et al (2003) found that doctors often underestimate and disagree with patients' self-reporting of pain (Marquie et al. 2003). Poor pain assessment is therefore a multi-disciplinary problem and perhaps in acknowledgement of that guidelines stipulate all health professionals involved in patient care, not just nurses, have a responsibility to accurately assess pain (Chou et al. 2016).

The studies included within this literature review represent many countries and so provide a wider perspective on the problems with pain assessment. Sweden's healthcare system, like many others, has been under financial and political pressure (Anell 2005). Further studies conducted in Greece (Chamaidi 2012) and Switzerland (van Ransbeeck et al. 2018), reputed to be the 4th best system in

the world (Legatum-Institute 2016) also found consistently poor pain assessment suggesting that it is by no means a problem confined to one healthcare system or country. While poor pain assessment might be prevalent across cultures it does need to be borne in mind that nurses increasingly assess patients from many different cultures, with the UK as but one example of a country that is more ethnically diverse as a result of globalisation (White 2012). People from different places might express pain in culturally different ways which creates an added risk of misinterpretation by healthcare professionals. Support for this comes from an Australian study where nurses did not take into consideration the cultural differences of Aboriginal patients, which resulted in poor pain assessment and unsafe practice (Fenwick 2006). In the studies identified by this present review the cultural backgrounds of patients and nurses were largely overlooked as factors that could promote or inhibit the management of post-operative pain, suggesting a considerable gap in the literature. In the one study that did consider cultural background, cultural factors of nurses and patients were documented and found not to be statistically significant between-groups (Sloman et al. 2004). However between-participant differences (i.e. between any particular patient and the nurse with main caring responsibility for them) were not examined. Further, any one patient may have come into contact with staff from varied cultural backgrounds during any one day. Therefore, while Sloman et al. (2004) were surprised that cultural factors were not associated with the lack of congruence between patients' and nurses' assessment of pain, a between-participant analysis may have been more appropriate to examine this.

In terms of improving nurses' (and other healthcare professionals') assessment of pain the role of pain education was highlighted by Schreiber et al (2014). While the educational intervention they employed did seem to reduce the discrepancy between nurses' and patients' ratings of pain some nurses' knowledge of pain remained poor despite the intervention. Tellingly, bias remained largely unchanged post-education intervention with some nurses continuing to spend less time managing the pain of patients with "non-physical" ailments such as "drug abusers", "suicide attempters", patients who were "frequently readmitted" and "confused elderly" (Schreiber et al. 2014). These findings align with those of Brockopp et al. (2003) who found critical care and medical-surgical nurses and student nurses would apparently devote less time and energy to managing pain in "suicide attempters", "substance abusers" and elderly patients compared to those patients with AIDS or cancer. A study exploring the attitudes of doctors from a variety of specialities found it to be common for negative attitudes to be expressed with respect to patients who were drug users, and a reluctance to prescribe strong opioids for fear of addiction or misuse (Baldacchino et al. 2010). Reluctance to give patients opioids due to fears of creating dependence has also been identified in a study of nurses caring for older patients (Manias 2012). That study also highlighted that nurses'

communication when assessing pain in older patients was not always effective for example, not adapting to different levels of communication needs (Manias 2012). A recent review of the literature identified similar communication problems in the context of pain management in patients with dementia (Chandler et al. 2017).

The observational nature of the study by Scheiber et al. (2014) means that conclusions cannot be drawn as to cause and effect of the intervention. However it might be that the method of delivery of the education package, largely didactic, was in itself of limited effectiveness. A more recent study of critical care nurses suggested that bias towards vulnerable groups such as drug users might be improved by implementing an educational intervention in small groups (Lewis et al. 2015). Future studies ought to focus more on active learning methods which appear to facilitate deeper learning (Hew and Lo 2018) and a randomised controlled design is needed to determine effectiveness.

A root problem of nurses' lack of knowledge is that the topic of pain appears to be neglected at the undergraduate level. A survey of undergraduate healthcare curricula, including medicine, physiotherapy, nursing and others, found pain education in the UK to be inadequate, with only 12 hours on average pain content in the programmes surveyed (Briggs et al. 2011). The findings from a more recent exploration of pain education in undergraduate nursing curricula in the UK would suggest the situation is little improved, with the word 'pain' hardly featuring in programme documents and web resources (MacIntosh-Franklin 2017). Difficulties improving nurses' pain knowledge are likely to remain when adequate foundations of knowledge and understanding are apparently not being provided at the undergraduate level. Since adequate pain management necessitates an interprofessional team approach, a suggested advance is an interprofessional approach to pain education (Gordon et al. 2018). Interprofessional education (IPE) can be difficult to operationalise for example due to the logistics of managing many students and staff across multiple curricula (Gordon et al. 2018) However, a recent IPE study found an e-learning package was effective for students' learning across seven healthcare programmes with positive student evaluations (Watt-Watson et al. 2019), suggesting that many logistical barriers might be overcome utilising technology. However it is delivered, undergraduate or postgraduate, pain must be given sufficient prominence, and any pain education needs to effectively target prejudiced practice to avoid unnecessary suffering by vulnerable groups of patients.

The challenge of improving pain assessment through education appears within wider literature too. Wickstrom et al (2008), who implemented a six-month educational programme to nurses and investigated the impact two years later, found no significant improvement in the ability to accurately assess patients' pain (Wickstrom et al. 2008), a finding echoed in reviews (McCaffery et al. 2000; Bell

and Duffy 2009). This is a significant challenge especially given the findings of a report by the Royal College of Anaesthetists that nurses' inadequate knowledge contributed to the failure to meet patient satisfaction in pain management (Rockett et al. 2015). With standards now stipulating that pain management needs improving healthcare professionals need to have on-going education on pain assessment (ASA 2012; Rockett et al. 2015). However, due to cost pressures in healthcare systems, educational programmes are not always implemented and nurses are often not afforded the time or resources to attend (Iacobucci 2017). Without sufficient support for post-graduate learning poor pain management is less likely to change.

Inaccurate pain assessment leads to poorer treatment of pain, resulting in patients not receiving adequate analgesia (Sloman et al. 2005). UK standards now recommend that patients in significant pain must be treatment within 30 minutes and reassessed after an appropriate amount of time (Rockett et al. 2015). If this does not happen the result is suffering that ought to have been prevented and this violates one of the ethical tenets of healthcare practice: to do no harm. Unrelieved pain can considerably affect a patients' recovery, as it reduces mobilisation (Strassels et al. 2004) which subsequently increase the risk of complications such as venous thrombosis (Chung and Lui 2003). The repercussions of this can be unnecessary distress and anxiety and delaying wound healing time (Pinto et al. 2016). This also leads to increased length of stay in care settings with associated excess costs (Shang and Gan 2003).

Although not solely due to postoperative pain, delayed discharges are reported to cost the UK's National Health Service £100 million per year, 1.2 million bed days and cancellation of many elective operations (Rojas-García et al. 2018). Poor pain assessment is an avoidable contributing factor to these excess socioeconomic costs. The management of pain in hospitals can be particularly challenging due to the shift from inpatient to day-case surgery (Breivik et al. 2006) placing time pressures on management decisions. Time pressures are problematic in the context of patients with communication difficulties which add time to patient encounters as can be more common in older patients (Manias 2012). An aging population also means an increase in the number of elderly surgical patients with severe medical co-morbidities which adds to the complexity of post-operative pain management (Rockett et al. 2015). Acute pain services exist to provide specialist multidisciplinary support to some extent throughout the NHS (Rockett et al. 2015). However, the provision of these services is variable with most providers surveyed between 2014 and 2016 not offering the service overnight or at weekends (Rockett et al. 2017). Therefore, timely specialist input may not be available for some patients.

In line with The Code (NMC 2015), nurses should always respond to the physical and psychological needs of their patients. If nurses do not accurately assess pain they are failing to uphold their duty of care. Contrastingly, Grinstein-Cohen et al. (2009) and Manias (2012) found nurses were fearful of overmedicating patients with opioids due to the risk of addiction (Grinstein-Cohen et al. 2009; Manias 2012). It may be that some nurses feel they are upholding their duty of care by reducing the chances of patients developing a drug addiction, further supporting the need for effective education in both pain assessment and management. To address such pain education needs, a hospital in Australia created the 'pain resource nurse' role whose remit was to facilitate evidence-based change across their hospital (Allen et al. 2018). Eight years after implementation of this role, while documentation of pain assessments had significantly improved, a survey of pain resource nurses identified a remaining knowledge gap in respect of the risk of inducing opioid dependence (Allen et al. 2018), underscoring the need for ongoing training and education. Qualitative studies are needed to explore why such pain beliefs might persist, in both nurses and patients, and elucidate what might help to change those beliefs.

There were some important methodological weaknesses in the studies identified by this review. None of the studies described the pain assessment approach used by the nurses. This limits confidence in the findings and the ability to replicate studies or make comparisons between studies. Some studies did not analyse data for between-group differences i.e. between nurses and patients, instead they analysed for correlations which are not the same as assessing for agreement or statistically significant differences between groups. Further, only Duzel et al. (2013) used (in one instance) a reliability statistic such as the kappa coefficient which gives a more accurate determination of agreement between ratings on scales such as the NRS (Sim and Wright 2005). Finally, all studies required nurses to rate patients' pain which is of questionable validity when pain is a subjective phenomenon. This nurse assessment does not reflect actual clinical practice which involves eliciting patients' self-reporting of their pain. However these studies do provide powerful insight into the vulnerability of patients' self-reporting being misinterpreted by healthcare professionals, as confirmed by the audit of patient records by Atkinson and Almadi (2014). The study by Atkinson and Almadi (2014) also highlights the need for ongoing audit not only to identify deficiencies but to evidence improvement (or otherwise) in response to any interventions implemented to correct deficiencies.

To accurately assess pain, guidelines (BPS 2013) suggest a multi-dimensional approach where associated factors are also taken into consideration when assessing pain. The biopsychosocial theory of pain suggests that the experience of pain is best understood when viewed in relation to biological, psychological and social factors (Wright 2014). This highlights that pain cannot be treated effectively

by one approach alone. Indeed a combination of pharmacological and non-pharmacological interventions does appear to offer patients the greatest amount of pain relief (Racz and Noe 2012). In acknowledgement of this, multidimensional approaches to pain management are a feature of enhanced recovery after surgery (ERAS) guidelines (Ibrahim et al. 2013; Feldheiser et al. 2015). A driver for ERAS has been to reduce the length of stay, and therefore healthcare costs, for patients after surgery (Ibrahim et al. 2013). The accelerated turnover of patients has provided a challenge to the amount of time nurses can spend with each patient and this against the backdrop of reduced nurse staffing levels (Griffiths et al. 2016). Across many countries low nurse staffing levels have been associated with necessary nursing care being missed, including pain management (Ball et al. 2018). In a systematic review on patients' experiences of ERAS a common theme reported by patients was inadequate time to absorb information and ask questions at their pre-admission appointment (Sibbern et al. 2016). An RCT of 760 patients randomised to receive written information or not, found that providing written preoperative information improved patients' knowledge about postoperative complications related to severe pain, but not their beliefs about pain management such as concerns about opioid addiction (van Dijk et al. 2017). Patients ought to be given sufficient time for discussion as well as being provided information as pre-operative expectations of high levels of pain can put patients at increased risk of moderate-severe pain post-operatively (Bayman et al. 2019). However, there is also evidence that a large proportion of nurses hold erroneous views about the risk of postoperative opioid addiction (Manias 2012; van Dijk et al. 2017) which can only serve to reinforce any patients' pre-existing erroneous beliefs. In the cross sectional component of the study by van Dijk et al. (2017) which included 1184 nurses, the better the nurses' pain education the higher their knowledge and, crucially, the more positive were their pain-management beliefs. This again reinforces that ongoing pain education for nurses is a crucial aspect of improving patients' postoperative pain management.

In the systematic review by Sibbern et al. (2016) another important theme was patients sometimes felt nurses were too rigidly adhering to a standardised protocol which was seen as a barrier to person-centred care (Sibbern et al. 2016). Some of the studies identified by this present review did use the McGill Pain Questionnaire to facilitate a multidimensional assessment (Sloman et al. 2005; Düzel et al. 2013). Yet the findings from these studies were no different to those of Alemdar and Aktas (2014) who simply used a numerical pain scoring tool, a one-dimensional approach to assessing pain (Morone and Weiner 2013). This emphasises that any pain assessment tool is only as good as the decisions made by the healthcare professional using it.

Conclusion

This literature review has identified that incongruence between nurses' and patients' assessment of post-operative pain remains a problem internationally. This suggests that worldwide some patients are suffering from avoidably high levels of pain which presents a strong ethical challenge to healthcare systems and healthcare professions, notably the nursing profession. Pain management knowledge gaps have been identified in some nurses but so far educational interventions seem only to be of modest benefit. Biased attitudes have also been identified in some nurses towards the management of pain in some vulnerable groups of patients which also need to be addressed if poor care is to be avoided. Future randomised controlled trials are needed to determine the effectiveness of different educational interventions at improving nurses' (and that of other members of the multidisciplinary team) knowledge and attitudes towards the effective assessment and management of patients' pain post-operatively. Key to supporting any educational interventions is greater knowledge of nurses' and other healthcare professionals' and patients' pain beliefs, elucidation of what might change those beliefs, and a greater emphasis on pain education across all undergraduate healthcare disciplines.

Key Points
• Evidence suggests that nurses consistently underestimate how much pain a patient is experiencing post-operatively • The underestimation of pain by nurses is likely to be a significant factor in many patients continuing to suffer from high levels of pain post-operatively • Observational studies suggest that some nurses' knowledge of pain management is poor, and biased attitudes have been identified towards the treatment of pain in some patients • Educational interventions to improve nurses' management of post-operative pain have so far been of limited effectiveness • A greater understanding of the barriers to improving pain management is needed, including beliefs surrounding pain held by both health professionals and patients • Randomised controlled trials are needed to determine the effectiveness of educational interventions aimed at improving knowledge and attitudes regarding pain management. Postgraduate education needs to be supported by the adequate provision of pain education at the undergraduate level for all healthcare professionals

Declaration of interest: none

References

Akoglu, H., 2018. User's guide to correlation coefficients. *Turkish Journal of Emergency Medicine* 18 (3), 91-93.

Alemdar, D. K. and Aktas, Y. Y., 2014. Comparison of Nurses' and Patients' Assessments of Postoperative Pain. *International Journal of Caring Sciences*, 7 (3), 882.

Allen, E., Williams, A., Jennings, D., Stomski, N., Goucke, R., Toye, C., Slatyer, S., Clarke, T. and McCullough, K., 2018. Revisiting the pain resource nurse role in sustaining evidence-based practice changes for pain assessment and management. *Worldviews on Evidence-based Nursing* 15 (5), 368-376.

Anell, A., 2005. Swedish healthcare under pressure*,* S237.

ASA, 2012. *Practice Guidelines for Acute Pain Management in the Perioperative Setting (American Society of Anesthesiologists*

Atkinson, V. J. and Almahdi, B., 2014. A prospective audit project into the adequacy of pain assessment in the medical and surgical wards in a North London District General Hospital. *British Journal Of Pain*, 8 (2), 78-83.

Baldacchino, A., Gilchrist, G. Fleming, R. and Bannister, J., 2010. Guilty until proven innocent: a qualitative study of the management of chronic non-cancer pain among patients with a history of substance abuse. *Addictive Behaviours* 35 (3), 270-272.

Ball, J., Bruyneel, L., Aiken, L.H., Sermeus, W., Sloane, D.M., Rafferty, A.M., Lindqvist, R., Tishelman, C., Griffiths, P. for the RN4Cast Consortium, 2018. Post-operative mortality, missed care and nurse staffing in nine countries: A cross-sectional study. *International Journal of Nursing Studies* 78, 10-15.

Bayman, E.O., Parekh, K.R., Keech, J., Larson, N., Vander Weg, m and Brennan, T.J., 2019. Preoperative patient expectations of postoperative pain are associated with moderate to severe acute pain after VATS. *Pain Medicine* 20 (3), 543-554.

Bell, F., 2000. A review of the literature on the attitudes of nurses to acute pain management*,* 64.

Bell, L. and Duffy, A., 2009. Pain assessment and management in surgical nursing: a literature review*,* 153.

Bland, J.M. and Altman, D.G., 1986. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet* 8(1), 307-310.

BPS, 2013. *Guidelines for Pain Management Programmes for adults. An evidence-based review prepared on behalf of the British Pain Society (BPS)*.

Brant, J.M., Mohr, C., Coombs, N.C., Finn, S. and Wilmarth, E., 2017. Nurses' knowledge and attitudes about pain: Personal and professional characteristics and patient reported pain satisfaction. *Pain Management Nursing*, 18 (4), 214-223.

Breivik, H., Collett, B., Ventafridda, V., Cohen, R. & Gallacher, D., 2006. Survey of chronic pain in Europe: prevalence, impact on daily life, and treatment. European Journal of Pain 10, 287-333.

Breivik, H., Borchgrevink, P. C., Allen, S. M., Rosseland, L. A., Romundstad, L., Hals, E. K. B., Kvarstein, G. and Stubhaug, A., 2008. Assessment of pain. *British Journal Of Anaesthesia*, 101 (1), 17-24.

Briggs, E.V., Carr, E.C., Whittaker, M.S., 2011. Survey of undergraduate pain curricula for healthcare professionals in the United Kingdom. *European Journal of Pain* 15 (8), 789-795.

Brockopp, D.Y., Ryan, P. and Warden, S., 2003. Nurses' willingness to manage the pain of specific groups of patients. *British Journal of Nursing* 12 (7), 409-415.

Buvanendran, A., Fiala, J., Patel, K. A., Golden, A. D., Moric, M. and Kroin, J. S., 2015. The Incidence and Severity of Postoperative Pain following Inpatient Surgery. *Pain Medicine*, 16 (12), 2277-2283.

Campbell, J. N., 1996. APS 1995 Presidential address. *Pain Forum*, 5 (1), 85-88.

Chamaidi, S., 2012. Assessment and undertreatment of postoperative pain. Myth or reality? *Rostrum of Asclepius / Vima tou Asklipiou*, 11 (2), 154-170.

Chandler, R.C., Zwakhalen, S.M.G., Docking, R., Bruneau, B., Schofield, P., 2017. Attitudinal & Knowledge Barriers Towards Effective Pain Assessment & Management in Dementia: A Narrative Synthesis. *Current Alzheimer Research* 14 (5), 523-537.

Chou, R., Gordon, D. B., de Leon-Casasola, O. A., Rosenberg, J. M., Bickler, S., Brennan, T., Carter, T., Cassidy, C. L., Chittenden, E. H. and Degenhardt, E., 2016. Management of Postoperative Pain: A Clinical Practice Guideline From the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council*,* 131.

Chung, J. W. Y. and Lui, J. C. Z., 2003. Postoperative pain management: study of patients' level of pain and satisfaction with health care providers' responsiveness to their reports of pain. *Nursing & Health Sciences*, 5 (1), 13-21.

CQC, 2013. *National findings from the 2013 Inpatients survey*. London.

DoH, 2001. *The Essence of care 2010. [electronic resource]: benchmarks for the fundamental aspects of care (Department of Health)* [Electronic document]. [Great Britain] : Department of Health, 2010.

Düzel, V., Aytaç, N. and Öztunç, G., 2013. A study on the correlation between the nurses' and patients' postoperative pain assessments. *Pain Management Nursing: Official Journal Of The American Society Of Pain Management Nurses*, 14 (3), 126-132.

Feldheiser A., Aziz O., Baldini, G., Cox, B.P.B.W., Fearon, K.C.H., Feldman, L.S., Gan, T.J., Kennedy, R.H., Ljungqvist, O., Lobo, D.N., Miller, T., Radtke, F.F., Ruiz Garces, T., Schricker, T., Scott, M.J., Thacker, J.K., Ytrebo, L.M., Carli, F., 2015. Enhanced recovery after surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice. *Acta Anaesthesiologica* 60 (3), 289-334.

Fenwick, C., 2006. Assessing pain across the cultural gap: Central Australian Indigenous peoples' pain assessment. *Contemporary Nurse*, 22 (2), 218-227.

Fulford, K. W. M., Peile, E. and Carroll, H., 2012. *Essential Values-Based Practice: Clinical Stories Linking Science with People*. Cambridge: Cambridge University Press with Warwick Medical School.

Gillaspie, M., 2010. Better Pain Management After Total Joint Replacement Surgery: A Quality Improvement Approach*,* 20.

Gordon, D., Watt-Watson, J., Hogans, B.B., 2018. Interprofessional pain education—with, from, and about competent, collaborative practice teams to transform pain care. *PAIN Reports* e663.

Griffiths, P., Ball, J., Drennan, J., Dall'ora, C., Jones, J., Maruotti, A., Simon, M., 2016. Nurse staffing and patient outcomes: strengths and limitations of the evidence to inform policy and practice. A review and discussion paper based on evidence reviewed for the National Institute for Health and Care Excellence safe staffing guideline development. *International Journal of Nursing Studies*. 63, 213-225.

Grinstein-Cohen, O., Sarid, O., Attar, D., Pilpel, D. and Elhayany, A., 2009. Improvements and Difficulties in Postoperative Pain Management*,* 232.

Gunningberg, L. and Idvall, E., 2007. The quality of postoperative pain management from the perspectives of patients, nurses and patient records*,* 756.

Hew, K. F. and Lo, C. K., 2018. Flipped classroom improves student learning in health professions education: a meta-analysis. *BMC Medical Education*, 18 (1), 38-38.

Howick, J., 2011. *The Philosophy of Evidence-Based Medicine*. Oxford: Wiley.

Iacobucci, G., 2017. NHS bosses soften cost cutting plans in response to concerns. *BMJ (Clinical Research Ed.)*, 357, j3187-j3187.

Ibrahim, M.S., Khan, M.A., Nizam, I. and Haddad, F.S., 2013. Peri-operative interventions producing better functional outcomes and enhanced recovery following total hip and knee arthroplasty: an evidence-based review. *BMC Medicine* 11: 37.

Idvall, E., Berg, K., Unosson, M. and Brudin, L., 2005. Differences between nurse and patient assessments on postoperative pain management in two hospitals. *Journal Of Evaluation In Clinical Practice*, 11 (5), 444-451.

IOM, 2011. The National Academies Collection: Reports funded by National Institutes of Health. *Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research.* Washington (DC): National Academies Press (US) National Academy of Sciences.

Johansen, A., Romundstad, L., Nielsen, C. S., Schirmer, H. and Stubhaug, A., 2012. Persistent postsurgical pain in a general population: prevalence and predictors in the Tromso study. *Pain*, 153 (7), 1390-1396.

Joshi, G. P. and Ogunnaike, B. O., 2005. Consequences of Inadequate Postoperative Pain Relief and Chronic Persistent Postoperative Pain*,* 21.

Katz, J., Jackson, M., Kavanagh, B. and Sandler, A., 1996. Acute pain after thoracic surgery predicts long-term post-thoracotomy pain. *The Clinical Journal of Pain*, 12 (1), 50-55.

Klopper, H., Andersson, H., Minkkinen, M., Ohlsson, C. and Sjöström, B., 2006. Strategies in assessing post operative pain--a South African study. *Intensive & Critical Care Nursing*, 22 (1), 12-21.

Legatum-Institute, 2016. The Legatum Prosperity Index.

Levand'homme, P., Grosu, I., France, M-N. and Thienpont, E, 2014. Pain trajectories identify patients at risk of persistent pain after knee arthroscopy: An observational study. *Clinical Orthopaedics and Related Research*, 472 (5), 1409-1415.

Lewis, C.P., Corely, D.J., Lake, N., Brockopp, D. and Moe, K., 2015. Overcoming barriers to effective pain management: The use of professionally directed small group discussions. *Pain Management Nursing* 16 (2), 121-127.

MacIntosh-Franklin, C., 2017. Pain: A content review of undergraduate pre-registration nurse education in the United Kingdom. *Nurse Education Today* 48, 84-89.

Manias, E., 2012. Complexities of pain assessment and management in hospitalised older people: A qualitative observation and interview study. *International Journal of Nursing Studies* 49, 1243-1254.

Marquie, L., Raufaste, E., Lauque, D., Marine, C., Ecoiffier, M. and Sorum, P., 2003. Pain rating by patients and physicians: evidence of systematic pain miscalibration*,* 289.

McCaffery, M., Ferrell, B. R. and Pasero, C., 2000. Nurses' personal opinions about patients' pain and their effect on recorded assessments and titration of opioid doses. *Pain Management Nursing: Official Journal Of The American Society Of Pain Management Nurses*, 1 (3), 79-87.

Meissner, W., Coluzzi, F., Fletcher, D., Huygen, F., Morlion, B., Neugebauer, E., Pérez, A. M., Pergolizzi, J., Pérez, A. M. and Montes, A., 2015. Improving the management of post-operative acute pain: priorities for change. *Current Medical Research & Opinion*, 31 (11), 2131-2143.

Melotti, R. M., Samolsky Dekel, B. G., Carosi, F., Ricchi, E., Chiari, P., D'Andrea, R. and Di Nino, G., 2009. Categories of congruence between inpatient self-reported pain and nurses evaluation. *European Journal Of Pain (London, England)*, 13 (9), 992-1000.

Moher, D., Liberati, A., Tetzlaff, J. and Altman, D. G., 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med*, 6 (7), e1000097.

Morone, N. E. and Weiner, D. K., 2013. Pain as the Fifth Vital Sign: Exposing the Vital Need for Pain Education*,* 1728.

MRC, 2014. *Understanding Health Research. A tool for making sense of health studies (Medical Research Council)* [online]. Available from: http://www.understandinghealthresearch.org [Accessed 3rd November].

Murray, A. A. and Retief, F. W., 2016. Acute postoperative pain in 1 231 patients at a developing country referral hospital: incidence and risk factors. *Southern African Journal of Anaesthesia and Analgesia*, 22 (1), 19-24.

NMC, 2015. *The Code: Professional standards of practice and behaviour for nurses and midwives*. Nursing and Midwifery Council.

Pinto, A., Faiz, O., Davis, R., Almoudaris, A. and Vincent, C., 2016. Surgical complications and their impact on patients' psychosocial well-being: a systematic review and meta-analysis. *BMJ Open*, 6 (2), 1.

Pogatzki-Zahn, E. M., Segelcke, D. and Schug, S. A., 2017. Postoperative pain—from mechanisms to treatment (2. pp. e588): Lippincott Williams and Wilkins.

Racz, G. and Noe, C., 2012. *Pain Management- Current Issues and Opinions* [online]. London: Intech.

Rockett, M.P., Simpson, G., Crossley, R. & Blowey, S., 2013. Characteristics of pain in hospitalised medical patients, surgical patients, and outpatients attending a pain management centre. *British Journal of Anaesthesia*, 110, 1017-1023.

Rockett, M., Brandner, B., Duncan, F., and Quinlan, J., 2015. *Acute Pain Services. In: Core Standards for Pain Management Services in the UK.* . Royal College of Anaesthetists.

Rockett, M., Vanstone, R., Chand, J., and Waeland, D., 2017. A survey of acute pain services in the UK. *Anaesthesia* 72 (10), 1237-1242.

Rojas-García, A., Turner, S., Pizzo, E., Hudson, E., Thomas, J. and Raine, R., 2018. Impact and experiences of delayed discharge: A mixed-studies systematic review. *Health Expectations: An International Journal Of Public Participation In Health Care And Health Policy*, 21 (1), 41-56.

Sansone, P., Pace, M. C., Passavanti, M. B., Pota, V., Colella, U. and Aurilio, C., 2015. Epidemiology and incidence of acute and chronic Post-Surgical pain. *Ann Ital Chir*, 86 (4), 285-292.

Schreiber, J. A., Cantrell, D., Moe, K. A., Hench, J., McKinney, E., Preston Lewis, C., Weir, A. and Brockopp, D., 2014. Improving Knowledge, Assessment, and Attitudes Related to Pain Management: Evaluation of an Intervention*,* 474.

Shang, A. B. and Gan, T. J., 2003. Optimising Postoperative Pain Management in the Ambulatory Patient*,* 855.

Sibbern, T., Sellevold, V. B., Steindahl, S.A., Dale, C., Watt-Watson, J. and Dihle, A., 2016. Patients' experiences of enhanced recovery after surgery: a systematic review of qualitative studies. *Journal of Clinical Nursing* 26, 1172-1188.

Sloman, R., Rosen, G., Rom, M. and Shir, Y., 2005. Nurses' assessment of pain in surgical patients. *Journal Of Advanced Nursing*, 52 (2), 125-132.

Solomon, P., 2001. Congruence between health professionals' and patients' pain ratings: a review of the literature*,* 174.

Strassels, S. A., McNicol, E., Wagner, A. K., Rogers, W. H., Gouveia, W. A. and Carr, D. B., 2004. Persistent postoperative pain, health-related quality of life, and functioning 1 month after hospital discharge*,* 95.

Timmins, F. and McCabe, C., 2005. How to conduct an effective literature search. *Nursing Standard (Royal College Of Nursing (Great Britain): 1987)*, 20 (11), 41-47.

van Dijk, J.F., Schuurmans, M.J., Alblas, E.E., Kalkman, C.J., van Wijck A.J., 2017. Postoperative pain: knowledge and beliefs of patients and nurses. *Journal of Clinical Nursing* 26 (21-22), 3500-3510.

van Ransbeeck, A., Budilivski, A., Spahn, D. R., Macrea, L., Giuliani, F. and Maurer, K., 2018. Pain Assessment Discrepancies: A Cross-Sectional Study Highlights the Amount of Underrated Pain. *Pain Practice: The Official Journal Of World Institute Of Pain*, 18 (3), 360-367.

Watt-Watson, J., McGillion, M., Lax, L., Oskarsson, J., Hunter, J., MacLennan, C., Knickle, K., Victor J.C., 2019. Evaluating an Innovative eLearning Pain Education Interprofessional Resource: A Pre-Post Study. *Pain Medicine* 20 (1), 37-49.

White, E., 2012. *Ethnicity and National Identity in England and Wales* [online]. Office for National Statistics. Available from: https://www.ons.gov.uk/peoplepopulationandcommunity/culturalidentity/ethnicity/articles/ethnicityandnationalidentityenglandandwales/2012-12-11 [Accessed 20th January].

Wickstrom, K., Nordberg, G., Bergh, I., Johansson, F. G. and Sjostrom, B., 2008. Postoperative pain management - the influence of surgical ward nurses. *Journal of Clinical Nursing*, (15), 2042.

Wright, S., 2014. *Pain management in nursing practice* [Non-fiction]. Los Angeles : SAGE, 2014.

Wu, C. L. and Raja, S. N., 2011. Treatment of acute postoperative pain, 2215.