



# Pain in intensive care unit patients—A longitudinal study

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## Abstract

**Aim:** To assess occurrence of pain during the first 6 days of intensive care unit (ICU) stay and evaluate associations between occurrence of pain and selected patient-related variables.

**Design:** A longitudinal study.

**Methods:** Adult ICU patients from three units were included. Patients' pain was assessed with valid pain assessment tools every 8 hr during their first 6 days in ICU. Possible associations between occurrence of pain and selected patient-related variables were modelled using multiple logistic regression.

**Results:** When pain was assessed regularly with pain assessment tools, 10% of patients were in pain at rest and 27% were in pain during turning. The proportions of patients who were in pain were significantly higher for patients able to self-report pain, compared with patients not able to self-report ( $p < .001$ ). Several predictors were associated with being in pain. It is important to be aware of these predictors in order to improve pain management.

## KEYWORDS

critical care, intensive care units, pain, pain measurement

## 1 | INTRODUCTION

Pain continues to be a commonly reported experience among intensive care unit (ICU) patients (Fink, Makic, Poteet, & Oman, 2015). More than 50% of patients experience pain during their ICU stay (Alasad, Abu Tab ar, & Ahmad, 2015; Demir, Korhan, Eser, & Khorshid, 2013), and the rates of uncontrolled pain still remain unacceptably high (Al Sutari, Abdalrahim, Hamdan-Mansour, & Ayasrah, 2014; Robleda et al., 2016). Patients experience pain from

several causes, such as underlying health condition, catheters, tubes, immobility (Joffe, Hallman, Gelin, Herr, & Puntillo, 2013; Li, Miaskowski, Burkhardt, & Puntillo, 2009), or as a result of care-related procedures (Coutaux et al., 2008; Gelin, 2007; Puntillo et al., 2001; Vazquez et al., 2011). Unrelieved pain can cause insufficient sleep (Jones, Hoggart, Withey, Donaghue, & Ellis, 1979), is a main source of stress (Hweidi, 2007) and is a common traumatic memory for the patients (Rotondi et al., 2002). Pain could also be a problem after ICU discharge, as a study found that 49% of ICU

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survivors reported pain at 3 months, and 38% at 1 year (Langerud, Rustoen, Brunborg, Kongsgaard, & Stubhaug, 2018). A major proportion of survivors develop cognitive, psychiatric and/or physical disability after ICU treatment (Lee et al., 2017; Pun & Dunn, 2007; Schelling et al., 1998), postintensive care syndrome (PICS) (Rawal, Yadav, & Kumar, 2017) and PICS may cause suffering long after ICU discharge. Therefore, providing sufficient pain relief during ICU stay is essential to promote comfort and rehabilitation and to avoid transition from acute to chronic pain (Puntillo & Naidu, 2016).

## 2 | BACKGROUND

To the best of our knowledge, there is no study that evaluated pain in ICU patients several times per day using a number of assessment tools during several consecutive days of ICU stay. This knowledge may help clinicians select interventions to minimize pain in different groups of ICU patients. Previous research has also identified a number of factors that could increase the risk of higher levels of pain in patients such as younger age; having had surgery (Al Sutari et al., 2014); being non-white (Arroyo-Novoa et al., 2008); specific procedures; opioid administration specifically for a procedure; pre-procedural pain intensity; preprocedural pain distress; intensity of the worst pain on the same day, before the procedure; and procedure not performed by nurses (Puntillo et al., 2014). However, a comprehensive assessment of the association between occurrence of pain and patient demographic or disease/ICU stay-related variables has not been well elucidated.

The aims of the present study were to (a) assess occurrence of pain in ICU patients during the first 6 days of ICU stay in both patients able to self-report pain and patients not able to self-report pain; and (b) evaluate associations between occurrence of pain and patient demographic and disease/ICU stay-related variables.

## 3 | METHODS

### 3.1 | Design

This study was a longitudinal study over 6 days.

### 3.2 | The algorithm

The present study used data derived from an intervention study, where a pain management algorithm was developed (Olsen et al., 2015a), implemented (Olsen et al., 2015b) and evaluated in ICU patients (Olsen, Rustoen, Sandvik, Jacobsen, & Valeberg, 2016). The algorithm was used for ICU patients  $\geq 18$  years of age during their ICU stay at two Norwegian hospitals in one medical/surgical ICU, one surgical ICU and one postanaesthesia care unit (Olsen et al., 2015a). The algorithm guided clinicians to assess the patients' pain every 8 hr both at rest and during

turning. Turning was chosen as a painful procedure, as descriptive studies have shown that pain scores when being turned were higher than pain scores at rest (Gelinas, 2007; Puntillo et al., 2001; Vazquez et al., 2011). Three pain assessment tools were included in the algorithm (Olsen et al., 2015a). The algorithm guided nurses to choose the most appropriate pain assessment tool depending on the ICU patients' level of consciousness. If a pain intensity score was higher than the prescribed cut-off (i.e. a pain event), the algorithm guided the nurses to consider increasing pain treatment. If a pain intensity score was below the cut-off (i.e. not a pain event), the algorithm guided nurses to consider whether to decrease or continue pain treatment. The algorithm did not describe specific pain treatments. The focus of the algorithm was on the provision of guidance on whether to increase, decrease or continue each patient's pain management plan. Pain treatment could include the administration of analgesic medications or the use of a variety of non-pharmacologic interventions (e.g. positioning). The algorithm was used over a 22-week period, and the nurses' level of adherence with the algorithm during this period was 75% (Olsen et al., 2015b). Several outcome variables (the number of pain assessments, duration of ventilation and length of ICU stay) were significantly improved after implementation of the pain management algorithm compared with an earlier control period where ICU patients' pain was not assessed with the algorithm (Olsen et al., 2016).

### 3.3 | Data collection

As a part of the present intervention study (Olsen et al., 2015a, 2015b, 2016), data on patients' pain when using the algorithm were collected, but not analysed. In the secondary study reported here, we analyse these data, and assess occurrence of pain in ICU patients during the first 6 days of ICU stay and evaluate associations between occurrence of pain and patient demographic and disease/ICU stay-related variables. A 0–10 numeric rating scale (NRS) was used when patients were able to self-report pain, as the NRS is the easiest, the most accurate, the preferred, and the most discriminative self-report tool in ICU patients able to self-report pain (Chanques et al., 2010). The Behavioral Pain Scale (BPS) was used when patients were mechanically ventilated and not able to self-report pain, as the BPS is valid and reliable when scoring the expression of pain in this patient group (Payen et al., 2001). The BPS-Non Intubated (BPS-NI) was used when non-intubated patients were unable to self-report pain, as the BPS-NI showed exhibited good psychometric properties when assessing pain levels in this patient group (Chanques et al., 2009). Pain assessments (one time per day/evening/night shift, at rest and during turning) were extracted from medical records for up to the first 6 days of each patient's ICU stay (depending on their length of stay). The first 6 days were used, as the median length of stay in the included units was approximately 3 days. All patients were assessed for pain at a maximum of 18 time points (6 days and three

times during each day). Pain scores were dichotomized to “pain events” (NRS > 3 (Chanques et al., 2006; Gerbershagen, Rothaug, Kalkman, & Meissner, 2011), or BPS and BPS-NI > 5 (Chanques et al., 2006, 2009; Payen et al., 2001)), or “not pain events.” The rationale for treating these three different tools as “equivalent” was based on an earlier study evaluating pain, where the same dichotomizing was done (Chanques et al., 2006).

In addition, patient demographic and disease/ICU stay-related variables including patient's age, disease severity (using the Simplified Acute Physiology Score, SAPS II, ranging from 0–163 points) (Le Gall, Lemeshow, & Saulnier, 1993), gender, type of admission (medical/surgical), type of ventilation (mechanical ventilation/non-invasive ventilation), total ventilation time during ICU stay (for patients receiving mechanical ventilation/non-invasive ventilation), length of ICU stay (if patients were enrolled first in the PACU, and then transferred to ICU, the length of stay and ventilation time in these two units were summarized), length of hospital stay; daily use of opioids (Ketobemidone; Fentanyl; Alfentanil; Remifentanil; Morphine; Oxycodone) and sedatives (Propofol; Midazolam; Ketamine); and nursing workload (using the Nine Equivalent of Nursing Manpower Score [NEMS], a score to quantify, evaluate and allocate nursing workload at ICU level, ranging from 0–66 points (highest workload) (Reis Miranda, Moreno, & Iapichino, 1997), were collected from the medical records. The rationale for choosing these potential correlates of pain was based on similar possible correlates in another study having pain as the primary end point (Chanques et al., 2006).

### 3.4 | Analysis

Continuous variables were normally distributed and described with mean and standard deviation (*SD*). Categorical data were presented as counts and percentages (%). A chi-square test was performed to compare pain at rest and pain during turning, and to compare pain between patients able to self-report and patients not able to self-report pain. To account for inter-patient dependencies, possible associations between occurrences of pain (the dependent binary variable) and selected patient-related variables (independent variables) were modelled using multiple logistic regression for repeated measures. We fitted an association model, stratified by being at rest and turning. Entered into the model were patient- and disease-related variables assumed to be clinically relevant for pain; time (measurement point; all patients were assessed for pain at a maximum of 18 time points, or 6 days and three times during each day); type of shift; type of admission; age; gender; disease severity; type ventilation; opioids; and sedatives. When fitting models in medical research, many possible predictors are likely associated with one another. However, we have assessed the model fit and multicollinearity with variance inflation factor, which did not accede two for the multiple models. Thus, the models were considered sufficiently robust. The results were expressed as odds ratios (OR) with 95% confidence intervals (CI).

We used mixed models for repeated measures which is a statistical approach where all available data are used, and no imputation of missing values is necessary. *p*-values <.05 were considered statistically significant, and statistical analyses were performed using STATA, version 14.

### 3.5 | Ethics

The national Regional Ethics Committee (2011/2582D) and the leadership at participating hospitals approved this study. According to the national Regional Ethics Committee, informed consent from the ICU patients was not required, because the data used in this study were anonymous. Patients' names and personal identity numbers were removed and replaced with “patient 1,” “patients 2” and so on. Data were stored according to the hospitals' procedures. The study was registered in ClinicalTrials.gov (NCT01599663).

## 4 | RESULTS

### 4.1 | Patient characteristics

In total, 285 patients with a mean age of 58.9 years (*SD* = 18.5) and who had been treated with the algorithm (Olsen et al., 2015a) were included (Table 1). Two thirds were male (67.0%), and over a half of patients received mechanical ventilation or non-invasive ventilation (51.9%). Mean SAPS II (severity of disease) was 36.9 (*SD* = 19.0) points, and mean NEMS (nursing workload) was 31.9 (*SD* = 10.3) points.

### 4.2 | Pain occurrence and analgesics received the first 6 days of ICU stay

During the first 6 days, pain occurred in 5.0%–31.1% of the patients (Table 2). However, more patients were in pain during turning

**TABLE 1** Patient characteristics (*N* = 285)

Variable	Mean ( <i>SD</i> )
Age (years)	58.9 (18.5)
Severity of disease (SAPS II)	36.9 (19.0)
Nursing workload (NEMS) per day	31.9 (10.3)
N (%)	
Male, gender	191 (67.0)
Type of admission, surgical	209 (73.3)
Mechanical ventilation/non-invasive ventilation (% yes)	148 (51.9)

Abbreviations: NEMS, Nine Equivalent of Nursing Manpower Score; SAPS, Simplified Acute Physiology Score.

**TABLE 2** Pain occurrence and analgesics received the first 6 days of ICU stay

Day of ICU stay	Pain at rest		Pain during turning		p-value	Analgesics received	
	N (%)	Total <sup>a</sup>	N (%)	Total <sup>a</sup>		N (%)	Total <sup>b</sup>
Day 1	33 (13.4)	247	45 (24.2)	186	.004	313 (78.6)	398
Day 2	84 (13.2)	635	141 (27.2)	519	<.001	660 (81.8)	807
Day 3	52 (10.4)	500	132 (29.7)	444	<.001	476 (77.0)	617
Day 4	32 (8.8)	363	105 (31.1)	338	<.001	326 (72.8)	448
Day 5	14 (5.0)	278	69 (25.8)	267	<.001	270 (77.8)	347
Day 6	13 (5.7)	230	48 (22.2)	216	<.001	228 (81.4)	280
The first 6 days (totally)	228 (10.1)	2,253	540 (27.4)	1,970	<.001	2,272 (78.4)	2,897

Note: Pain is defined as NRS > 3, BPS > 5 or BPS-NI > 5.

<sup>a</sup>Total number of shifts a pain score was documented.

<sup>b</sup>Total number of shift patients were enrolled.

compared to at rest (27.4% vs. 10.1%,  $p < .001$ ). Day one was the day that most patients (13.4%) were in pain at rest. During turning, day 4 was the day that most patients (31%) were in pain. The majority of patients received analgesics on all 6 days of their ICU stay (from 72.8%–81.8%). Day 4 was the day that the fewest patients received analgesics (72.8%).

### 4.3 | Differences in pain occurrence in patients able- or not able to self-report pain

Both at rest and during turning, the proportions of patients who were in pain were significantly higher for patients able to self-report pain, compared with patients not able to self-report pain (at rest, 20.8% vs. 3.1%,  $p < .001$ ; during turning, 39.1% vs. 21.5%,  $p < .001$ ; Table 3). Additional analyses showed that ventilated patients unable to self-report pain who were assessed with the BPS had the lowest occurrence of pain (0.9% at rest and 16.1% during turning) compared to patients able to self-report pain and non-ventilated patients unable to self-report pain. This patient group also received more sedatives compared with patients able to self-report pain and non-ventilated patients unable to self-report pain (87.5% vs. 18.2% and 35.6%, respectively). In addition, more ventilated patients unable to self-report received analgesics (87.5% vs. 70.8% and 72.2%) than did self-reporting patients and non-ventilated patients unable to self-report.

### 4.4 | Associations between pain occurrence and patient- and disease/ICU stay-related variables

Table 4 shows results from the logistic regression models for repeated measurements.

For patients at rest, when taking all measurement points into consideration and when adjusted for possible confounders (such as time (measurement point); type of shift; type of admission; age; gender; disease severity; type of ventilation; opioids; and sedatives),

disease severity, type of ventilation, and administration of opioids and sedatives were statistically significantly associated with patients having pain. Specifically, patients were less likely to be in pain at rest if being ventilated compared to not being ventilated, OR = 0.65, 95% CI (0.43–0.97), and if they were not receiving opioids compared to receiving opioids OR = 0.34, 95% CI (0.24–0.49). Conversely, patients were almost three times more likely to be in pain if they were not receiving sedatives rather than receiving sedatives OR = 2.95, 95% CI (2.07–4.20). Interestingly, the higher SAPS, the less likely were the patients to be in pain, OR = 0.96, 95% CI (0.94–0.97).

For patients being turned, when adjusting for the same possible confounders as above, the same four patient- and disease/ICU stay-related variables as at rest were statistically significantly associated with having pain. Disease severity and being ventilated revealed an association with lower odds of being in pain OR = 0.97, 95% CI (0.96–0.98) and OR = 0.66, 95% CI (0.49–0.88). That is, during turning, patients with a higher disease severity and those being ventilated were less likely to be in pain. Also, patients were less likely to be in pain during turning if they were not receiving opioids compared to those receiving opioids (OR = 0.59, 95% CI [0.47–0.74]). Yet, patients not receiving sedatives were more likely to be in pain during turning (OR = 1.69, 95% CI [1.35–2.10]). In addition, during turning, time (measurement points) and type of shift were statistically significantly associated with being in pain. That is, patients were more likely to be in pain the longer their ICU stay: each successive shift was associated with 1% increase in odds of reporting pain, OR = 1.01, 95% CI (1.00–1.02). Finally, patients were less likely to be in pain during evening/night shifts compared to day shift, OR = 0.68, 95% CI (0.54–0.85).

## 5 | DISCUSSION

The main finding in the present study is that during most of the shifts on the first 6 days of ICU stay, the majority of patients were not in pain. For many decades, ICU patients have identified pain as one of their greatest concern (Jones et al., 1979). In a survey from 1990, 70% of patients recalled pain during treatment in medical/surgical ICUs,

**TABLE 3** Patient groups that are in pain

Patient groups	Pain at rest		Pain during turning	
	N (%)	Total N <sup>a</sup>	N (%)	Total N <sup>a</sup>
Patients able to self-report pain (i.e. using the NRS)	186 (20.8)	894	260 (39.1)	665
Patients not able to self-report pain (i.e. using the BPS or the BPS-NI)	42 (3.1)	1,359	280 (21.5)	1,305
	<i>p</i> -value < .001		<i>p</i> -value < .001	

Note: Pain is defined as NRS > 3, BPS > 5 or BPS-NI > 5.

<sup>a</sup>Total number of shifts a pain score was documented.

**TABLE 4** Associations between occurrence of pain and patient demographic and disease/ICU stay-related variables

Variables	At rest		During turning	
	OR (95% CI)	<i>p</i> -value	OR (95% CI)	<i>p</i> -value
Assessment time point <sup>a</sup>	0.98 (0.96–1.00)	.178	1.01 (1.00–1.02)	.038
Evening/night shift (ref = day shift)	0.78 (0.56–1.08)	.147	0.68 (0.54–0.85)	.001
Surgery admission (ref = medical)	1.28 (0.73–2.23)	.380	1.09 (0.83–1.43)	.524
Age	1.00 (0.98–1.01)	.922	1.00 (0.99–1.00)	.445
Male gender (ref = female)	1.38 (0.96–1.98)	.075	0.80 (0.63–1.00)	.058
Disease severity (SAPS)	0.96 (0.94–0.97)	<.001	0.97 (0.96–0.98)	<.001
Ventilated (mechanical/non-invasive) (ref = non-ventilated)	0.65 (0.43–0.97)	.036	0.66 (0.49–0.88)	.005
Not receiving opioids (ref = receiving opioids)	0.34 (0.24–0.49)	<.001	0.59 (0.47–0.74)	<.001
Not receiving sedatives (ref = receiving sedatives)	2.95 (2.07–4.20)	<.001	1.69 (1.35–2.10)	<.001

Abbreviations: CI, confidence interval; OR, odds ratio; SAPS, Simplified Acute Physiology Score.

<sup>a</sup>Patients were assessed for pain at a maximum of 18 time points (6 days and three times during each day).

and 63% rated pain as moderate/severe (Puntillo, 1990). Seventeen years later, results by another research team were strikingly similar: 77% of patients from surgery ICUs recalled pain, and 64% rated pain as moderate/severe (Gelinas, 2007). More recently, Puntillo and colleagues found that only 40% of patients at high risk of dying self-reported experiencing pain (Puntillo et al., 2010). However, in the present study, 10% were in pain at rest and 27% were in pain during turning during the first 6 days of ICU stay. Additionally, in a qualitative study, where critically ill patients were treated according to analgesia, even if patients experienced discomfort, pain was not a major concern (Berntzen, Bjork, & Woien, 2018). Admittedly, these studies differed according to type of patient, patient acuity, prospective versus retrospective design and different data collection methods. Yet, findings suggest that there might currently be a trend to better pain treatment of ICU patients. One important explanation for the finding may be the use of the pain management algorithm in this study (Olsen et al., 2015a). The algorithm guided clinicians to assess pain regularly and systematically with valid pain assessment tools and to give pain treatment based on these pain assessments. This way of assessing and managing pain is recommended in clinical guidelines (Barr et al., 2013), and is associated with decreased pain and agitation in ICU patients (Chanques et al., 2006).

Another finding was that the proportion of patients who were in pain was significantly higher for patients able to self-report pain, compared with patients not able to self-report pain. It is a bit surprising that more self-reporting patients experienced pain, as one may think that clinicians are better able to relieve pain in these patients. Therefore, it is important to highlight that clinicians need to use these self-report assessments in the pain management process. It is worth noting that one study found that overall correlation between self-report and BPSs was poor (Bouajram et al., 2018). However, in that study (Bouajram et al., 2018), pain was not assessed during procedures and more than half their patients had chronic pain, which could have acted as a confounder. Others have noted that observer-based evaluation often underestimates the pain, particularly in the case of high NRS values ( $\geq 4$ ) rated by the patient (Ahlens et al., 2008). Therefore, even if the tools used in this study are recommended and demonstrate great psychometric properties (Devlin et al., 2018), one may ask under what circumstances do BPSs inaccurately reflect the degree of self-reported pain in critically ill patients?

In the present analysis, more patients were in pain during turning compared with at rest. This finding regarding procedural pain is similar to other studies (Gelinas, 2007; Puntillo et al., 2001; Vazquez et al., 2011). Our data also show that day 4 was the day that most

patients were in pain during turning. Interestingly, it is the same day, when the smallest number of patients (albeit 73%) received analgesics. The finding may suggest that, in the present study, ICU patients did not receive appropriate analgesics before turning after staying longer in the ICU. One speculation for this finding could be that clinicians think that patients need less analgesics and have less pain after staying some days in the ICU. However, it is important to highlight that after some days in the ICU, patients are frequently mobilized and exposed to many painful procedures as a part of the rehabilitation process, which may increase the incidence of procedural pain. We do not have more detailed data about medications or other patient activities that could help further elucidate the relationship between turning pain and analgesics (i.e. whether they were administered or not). However, an earlier study reported that fewer than 25% of ICU patients received analgesics before painful procedures (Puntillo et al., 2001). Therefore, clinicians need a good pain management plan that also includes pain treatment actions before painful procedures like turning throughout the patient's ICU stay.

The logistic regression revealed that the higher the disease severity, the less likely patients were to report being in pain or to demonstrate pain behaviours, both at rest and during turning. To the best of our knowledge, this finding is not shown in other studies. Yet, this finding, while statistically significant, may not be clinically relevant since the odds ratios were so close to 1.0. It could be that nurses had more time to assess and manage pain in patients who were more ill since the nurses were caring for fewer patients. In another paper from the present study, bivariate analyses showed that patients with a lower disease severity had their pain assessed significantly less frequently than patients with a higher disease severity (Olsen et al., 2016). Therefore, it is important to be aware of pain in patients with a low disease severity, and give these patients more attention regarding both pain assessment and pain treatment.

Our data also show that patients were less likely to be in pain if being ventilated. This can indicate that ventilated patients receive proper pain treatment. However, as written earlier, more ventilated patients received sedatives compared to other patient groups, and one may wonder if deep sedation may lead to ventilated patients not being able to express pain. As much research about pain in ICU patients is done in ventilated patients (Faust et al., 2016; Rijkenberg, Stilma, Bosman, van der Meer, & van der Voort, 2017; Stephens, Dettmer, Roberts, Fowler, & Fuller, 2017), further research should be on pain in non-ventilated patients, to gain more knowledge about pain in this patient group.

We also found that patients were less likely to be in pain if not receiving opioids compared to receiving opioids. This may indicate that patients that not are in pain do not receive medications and could indicate that pain treatment is individualized to each patient. This finding is opposite to another study, where pain medication was a predictor of pain during procedures (Puntillo et al., 2014).

Each successive shift of ICU stay was associated with a 1% increase in odds for patients reporting pain during turning; that is, patients were more likely to be in pain during turning the longer their ICU stay. Recently, there has been a shift towards the use of lighter sedation;

so patients may have felt pain during the turning procedure (Devlin et al., 2018). The e-CASH approach (early Comfort using Analgesia, minimal Sedatives and maximal Humane care) is predicated on the early achievement of pain relief and the maintenance of comfort with minimal sedation to facilitate natural sleep, early mobilization and engagement with caregivers and relatives (Vincent et al., 2016). A good pain management plan is therefore essential, in all phases of ICU stay.

Nurses working bedside with ICU patients play a central role regarding pain management. To achieve early pain relief and maintenance of patient comfort, it is important that nurses identify pain and distinguish pain from other symptoms such as anxiety, agitation and delirium (Vincent et al., 2016). However, an algorithm has some limitations. First, an algorithm may be too simple in some situations and too restricted to guide pain management for all ICU patients in all types of situations. For example, if a patient will be undergoing major surgery in the near future, their pain treatment should perhaps not be decreased even if their pain intensity scores are below the cutoffs, as it would be expected that their pain would increase after surgery. Second, the tools used in this algorithm are one-dimensional (i.e. limited to pain intensity) and in that way may not cover the complexity of pain experience: differentiating between chronic pain and acute pain, nociceptive and neuropathic pain, or between pain related to injury versus illness. These limitations may challenge the role of nurses regarding pain assessment. However, it is important that nurses are aware of these limitations and that the algorithm should be used as a guide together with interdisciplinary collaboration in order to give these patients good patient-centred care.

## 5.1 | Limitations

The present study is innovative, as other longitudinal studies evaluating pain several times per day during several days of ICU stay, to our best knowledge, are absent. Other strengths are the relatively large sample size ( $N = 285$ ) and the inclusion of patients both able and unable to self-report pain. While only the first 6 days of ICU stay were used in the statistical analyses, patient ICU stay varied from 1–62 days, with a median length of stay of 3.2 days. Patient pain experiences, when in ICU for a longer period of time, could differ from our sample. In addition, we were limited in that we only had access to data about medications per day, not doses. Thus, we are not able to draw a relationship between pain occurrence and amount of medication administration in the present study.

## 6 | CONCLUSIONS

Findings from this study indicate that when pain was assessed regularly with valid pain assessment tools, most patients did not self-report or did not express pain behaviour during most of the shifts during the first 6 days of ICU stay. However, clinician diligence is required to continue to improve pain management. An increased focus should be on pain management during nursing procedures and

throughout the patient's ICU stay. Knowledge about which factors are associated with increased risk for pain in ICU patients is important for clinicians to understand.

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## CONFLICT OF INTEREST

The authors do not have any ethical conflicts or financial interests to disclose.

## DATA AVAILABILITY STATEMENT

Data that support the findings of this study are available from the corresponding author open request.

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