



## Review Paper

## Physical restraints in intensive care—An integrative review

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## A B S T R A C T

**Background:** Physical restraints (PRs) are commonly used in intensive care units (ICUs) worldwide for the prevention of treatment interference. While PRs are fundamentally used to maintain patient safety, they can negatively impact the experiences of patients and their families and cause moral and ethical dilemmas for ICU nurses.

**Objectives:** The aim of this integrative review was to explore the current literature on the use of PR in intensive care.

**Methods:** This article used an integrative review framework to explore the current literature available on the experiences of PR in ICU. Research published between January 2007 and July 2016 was considered. Databases searched included CINAHL, Proquest, Medline, PubMed, and Cochrane. Inclusion/exclusion criteria were used to screen for eligibility. Methodological quality was evaluated using a quality assessment checklist, adapted from Walsh and Downe, and based on the Critical Appraisal Skills Programme tool. The findings were analysed and synthesised into major themes.

**Results:** Seventeen articles from Europe, Asia, and the United States of America were included. Five major themes emerged: (i) prevention of treatment interference; (ii) nurses' role as primary decision-makers PR application and removal; (iii) adherence to PR protocols; (iv) moral and ethical dilemmas faced by nurses; and (v) experiences of patients and families. The literature identified the prevalence of PR in today's ICUs, the drawbacks of current practice, and the paucity of knowledge of the lived experiences of PR.

**Conclusion:** PR is the first choice in preventing of treatment interference, and most clinicians believe there is a valid place for them in ICU. However, its effectiveness in preventing self-extubation is questionable, and there are obvious flaws within this practice including inconsistencies surrounding PR protocols and the shortage of education and training provided to nurses. Further research into lived experiences of PR to gain deeper insights may lead to possible solutions and improve current practice.

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## 1. Background

Critically ill patients admitted to an intensive care unit (ICU) commonly require an array of invasive procedures and medical

apparatus such as mechanical ventilation, haemodialysis, central venous catheters, and intra-aortic balloon pumps, among others.<sup>1</sup> Despite the necessity of these interventions, they can cause patients a great degree of pain and discomfort. This often leads to restlessness and agitation, which can commonly be exacerbated by other factors such as sleep deprivation, delirium, and their underlying illness.<sup>2</sup>

While nurses strive to deliver care to patients with the moral obligation of non-maleficence (to do no harm),<sup>3</sup> beneficence (to do

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good),<sup>3</sup> and to maintain dignity and autonomy, it is still common practice in many countries to apply physical restraints (PRs) to patients in intensive care.<sup>4</sup> Restraints are often applied to prevent patients from accidentally or purposefully removing medical devices, often termed as “treatment interference,”<sup>5</sup> which can be detrimental for their health, safety, and medical progress and may even result in death.<sup>6</sup>

PRs can be defined as “any limitation on an individual’s freedom of movement or normal access to the body or the use of physical or mechanical device or material on the patient’s body” (p.69).<sup>7</sup> While restraint minimisation policies exist in many ICUs around the world to maintain the fundamental nursing ethics of beneficence and non-maleficence, restraint use can often be considered an unavoidable intervention in ICUs to protect patients and ensure they receive essential treatment.<sup>8</sup> However, PR ultimately encroaches on patient’s autonomy and interferes with the clinician’s ability to preserve patient dignity.<sup>9</sup> Restraints can also cause cutaneous, vascular, and musculoskeletal injuries, delirium, and further agitation and have been associated with a higher risk for the development of post-traumatic stress disorders.<sup>10</sup> Mechanically ventilated patients who are unable to verbally communicate and already experience a great degree of pain, distress, and discomfort are particularly vulnerable.<sup>11</sup> Patients’ families can also be affected by this experience as they are often present during patients’ ICU admissions and witness PR during mechanical ventilation possibly generating greater familial distress.<sup>12</sup>

## 2. Aim

The aim of this review is to explore the use of PRs in the intensive care setting. The following three questions guided the literature review: (i) Why are PRs used in intensive care? (ii) What role do nurses have in implementing the use of PRs in intensive care and what factors affect their experiences of the role? (iii) What are the experiences of patients and families of patients who have been physically restrained during their intensive care stay?

### 2.1. Search methods

The aim of this review was to gain a holistic and comprehensive understanding of the current literature available on PR in intensive care and therefore adopted an integrative review framework because of its inclusive nature.<sup>13</sup> This enabled the researchers to explore not only the practical and clinical issues surrounding PR but also the lived experiences of it as the framework allows the simultaneous exploration and integration of diverse methodologies from experimental and non-experimental research.<sup>13</sup> Articles utilising quantitative, qualitative, and mixed methodologies were therefore included in this review.

### 2.2. Search strategy

The search strategy was restricted to studies published between January 2007 and July 2016 to represent current knowledge and literature on this topic. The search was also limited to the English language. The search terms used were physical restraints, mechanical ventilation, intensive care, nurses, patients, families, and experiences. Boolean operators “AND” and “OR” were used for mechanical ventilation OR intubation, and patients AND families. Databases searched included Cumulative Index of Nursing and Allied Health Literature (CINAHL), Proquest, Medline, PubMed, and Cochrane.

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flow diagram was used to map the search process<sup>14</sup> (see Fig. 1). The database searches initially identified 276

records. A further 11 that were sourced from bibliographies were considered relevant to the review. Eighty-four duplicates were then removed. The remaining 203 articles were screened through their abstracts for their relevance, and a further 89 articles were excluded on the basis of the inclusion and exclusion criteria given below and their relevance to the aim of the review. A further 97 of the remaining 114 articles were excluded after a manual revision of the full-text versions. A total of 17 articles were identified as suitable for inclusion for this integrative review.

### 2.3. Inclusion criteria

This literature review considered peer-reviewed studies that explored either patient, family or nurse experiences regarding the use of PRs in intensive care. The search included all types of adult ICUs. The search included all forms of qualitative, quantitative, and mixed methodologies provided they met the above criteria. The review strictly focused on the experiences of PRs used in the intensive care setting and excluded experiences of PR use from all other clinical settings.

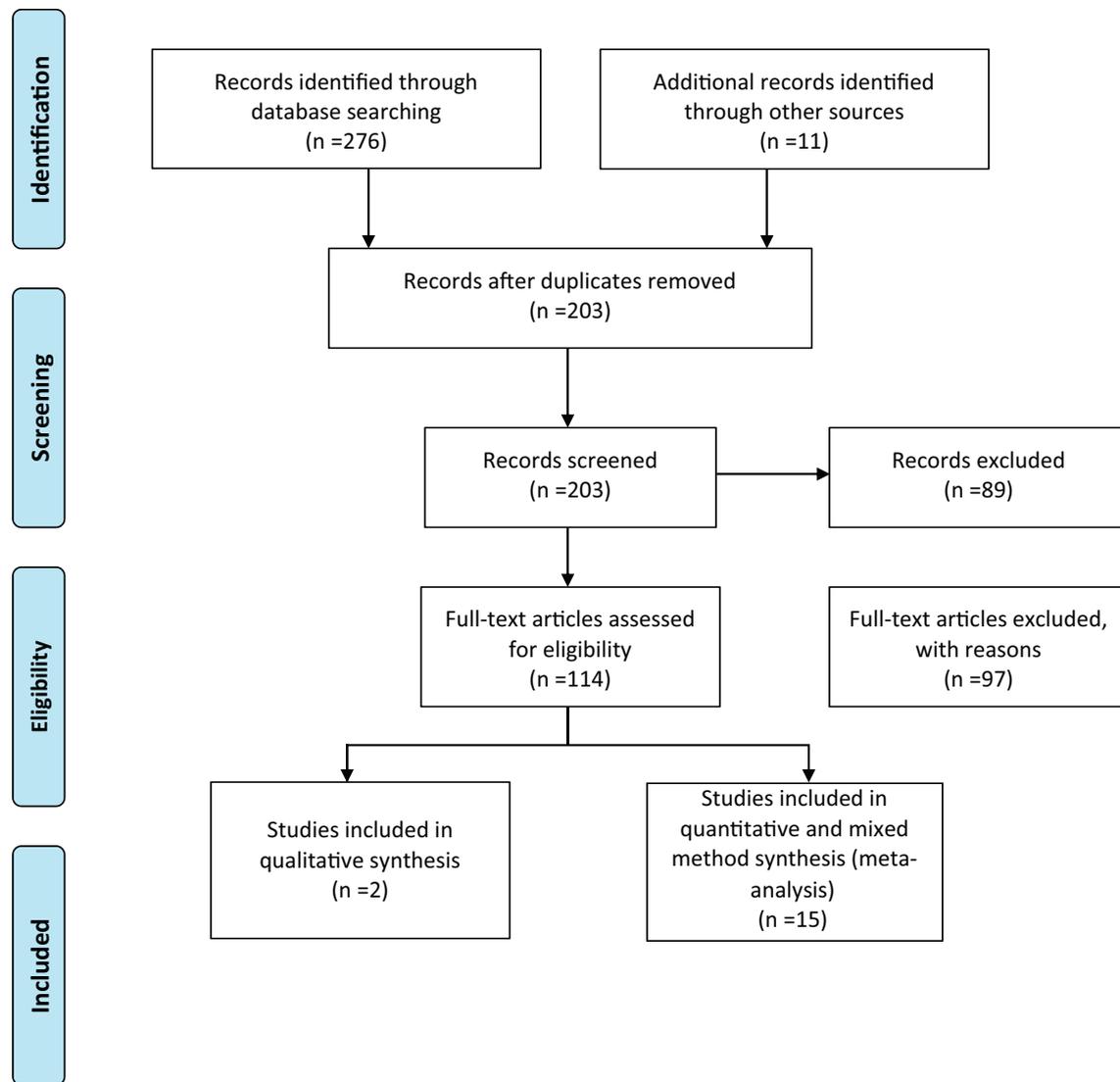
### 2.4. Exclusion criteria

Chemical restraints were not included as sedated patients would have very limited memories of their experiences. Only studies in adult ICUs were considered. All literature regarding paediatric and neonatal ICUs were excluded. This review also excluded literature reviews, commentaries, editorials, and conference abstracts.

### 2.5. Data evaluation

Evaluating the quality of research articles can be complex in integrative reviews because of its diverse sampling frame.<sup>13</sup> Whittmore and Knaf<sup>13</sup> suggested that to ensure the authenticity, methodological quality, and informative value of the included studies, two quality criteria instruments should be used during the evaluation process. The inclusion/exclusion criteria were used to screen the initial articles. This initial evaluation was conducted by the first two authors. However, if there were any disparities in the initial assessment between the first two authors, all authors were then consulted until consensus was reached. The remaining articles were then reassessed using the second quality criteria instrument, the Critical Appraisal Skills Programme (CASP) checklist tool.<sup>15</sup> This framework was used as it facilitated a systematic and rigorous approach to assessing and evaluating the quality of the articles that can be applied to both quantitative and qualitative methodology.<sup>16</sup> The literature was assessed by the three main questions posed by the CASP tool: (i) Is the study valid? (ii) What are the results? (iii) Will the results help locally?<sup>15</sup> Only articles that were deemed to sufficiently answer these three questions were further considered. The remaining articles were re-assessed using the more detailed questions provided by the CASP tool, enabling a rigorous analysis of their quality.

The CASP tool uses an individual set of detailed questions for each specific form of research method used. To simplify this complex process and enhance visualisation of the data to provide an overall quality rating for each article, the articles were entered into a quality assessment checklist which was adapted from that used by Walsh and Downe.<sup>17</sup> This checklist was used as it effectively facilitated a thorough and systematic method of analysing the articles in a clear and succinct manner. This checklist consisted of the following headings: clear aims, methodology, design, recruitment, data collection, reflexivity, ethical considerations, data analysis, and rigour, findings, and value of research.<sup>18</sup> While this



**Fig. 1.** PRISMA flow diagram. From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. doi:10.1371/journal.pmed1000097. For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).

checklist was originally used for the assessment of qualitative research articles, the research team modified the checklist to encompass the relevant criteria detailed in the CASP tool for both qualitative and quantitative methodology. The following headings were therefore added: methods, sampling, validity and reliability, and results. An overall quality score was allocated to each article based on the results of the checklist. The articles were graded as A, B, C or D. Only articles which scored an A or B rating were included. The results of the checklist and overall quality ratings are detailed in [Table 2](#).

### 2.6. Data analysis

The data analysis phase of integrative reviews consists of data reduction, data presentation, and data comparison.<sup>13</sup> A systematic method of analysis enhances the validity and rigour of the review.<sup>3</sup> The phases of data reduction and presentation involve extracting and coding data to be organised into a manageable framework, which will then be displayed to enhance the visualisation of their relationships and patterns.<sup>13</sup> This was achieved by organising and presenting the methodological properties and findings of each article into a table ([Table 1](#)). The constant comparative method was

suggested by Whittmore and Knaf<sup>13</sup> to be used during data comparison of integrative reviews. Systematically categorising the data into patterns, themes, and variations is considered to be an appropriate approach to this review framework because of the varied data from diverse methodologies.<sup>13</sup> The findings from this review will therefore be presented within the major themes that emerged from the literature. [Table 2](#)

### 3. Results

Seventeen articles were deemed suitable for the review and are summarised in [Table 1](#). These included 13 articles utilising quantitative methodology, two utilising qualitative methodology, and two utilising mixed methodology from Asia, Europe, and the United States of America (USA). There were no current Australian studies found on this topic. The quantitative and mixed method studies used one or more forms of data collection which included surveys ( $n = 9$ ), observational data ( $n = 4$ ), and retrospective data from different sources ( $n = 3$ ). The qualitative data collected from the qualitative and mixed method studies used face-to-face interviews. Sample sizes varied between 20 participants to several hundred (refer to [Table 1](#)). The studies included nurses and

**Table 1**  
Summary of reviewed articles, key findings, and limitations.

Article	Purpose	Design	Sample	Key findings	Limitations
Akansel <sup>23</sup> (Turkey, 2007)	To determine the use of physical restraints, ongoing practices and perceptions of physical restraints among ICU nurses.	Quantitative. Questionnaires.	63 ICU nurses from a 1500 bedded university hospital with 9 intensive care units.	<ul style="list-style-type: none"> <li>- PR is most commonly used for patient protection. 90.5% (n = 57) nurses report using PR.</li> <li>- 84.1% (n = 53) of nurses applied PR without a physicians' order.</li> <li>- 93.7% (n = 59) nurses reported they do not document PR in patient notes.</li> </ul>	<ul style="list-style-type: none"> <li>- Conducted in only one hospital in Turkey, limits generalisability of findings, although provides valuable local knowledge.</li> </ul>
Benbenishty, Adam & Endacott <sup>19</sup> (Europe, 2010)	To examine restraint practices across ICUs in Europe.	Point prevalence survey.	Registered nurses and doctors from 34 ICUs from nine European countries.	<ul style="list-style-type: none"> <li>- PR predominantly used to protect patients from pulling/removing ETTs and lines.</li> <li>- Widely varying method of PR practices across ICUs.</li> <li>- Most commonly used form of PR was wrist restraints.</li> </ul>	<ul style="list-style-type: none"> <li>- Due to method of recruitment, response rates were unknown.</li> <li>- Number of ICU facilities unknown.</li> </ul>
Chang, Lui, Huang, Yang & Chang <sup>21</sup> (Taiwan, 2011)	Explores risk factors associated with unplanned ETT self-extubation of hospitalised intubated patients.	Quantitative. Retrospective case-control study.	<u>UESE</u> (unplanned endotracheal self-extubation) group: 21 patients. <u>Control group</u> : 21 patients with controlled extubations.	<ul style="list-style-type: none"> <li>- 80.9% (n = 17) in UESE group had PR in situ at the time of extubation.</li> <li>- 100% in control group were restrained during extubation.</li> <li>- 76.2% (n = 16) of extubations occurred on night shift in UESE group.</li> <li>- Factors contributing to UESE include GCS, time/shift, nursing experience, level of sedation.</li> </ul>	<ul style="list-style-type: none"> <li>- Limited to what was documented in medical records. Unable to consider other factors which influence results that was not documented.</li> </ul>
Chang, Wang, & Chao <sup>20</sup> (Taiwan, 2008)	To evaluate the effect of physical restraint on unplanned extubation (UE) in adult intensive care patients.	Quantitative. Retrospective case-control study. Data collected by reviewing incident reports and medical records of unplanned extubations.	300 participants from a population of 1455 pts receiving mechanical ventilation in an adult ICU over 21 months. <u>Unplanned extubation group</u> : 100 patients <u>Control group</u> : 200 patients with nil reports of unplanned extubations.	<ul style="list-style-type: none"> <li>- PR used on 191 out of 300 patients in the study.</li> <li>- 82 out of 100 UE had PR in situ during the time of extubation.</li> <li>- Factors contributing to UE were physical restraints, GCS nine and above, nosocomial infections.</li> <li>- Patients with GCS nine or above have higher rates of UE regardless of whether patient is restrained or not.</li> </ul>	<ul style="list-style-type: none"> <li>- Limited to what was documented in medical records. Unable to consider other factors which influence results that was not documented.</li> </ul>
Choe, Kang, & Park <sup>30</sup> (Korea, 2015)	To explore and understand moral distress from the perspective of and as experienced by critical care nurses in Korea.	Qualitative. Phenomenology. Face to face interviews.	Purposive sampling. 14 critical care nurses.	<ul style="list-style-type: none"> <li>- Feelings of guilt and ambivalence when using PR even when deemed necessary.</li> <li>- Nurses felt they were violating patients dignity and human rights by using restraints.</li> </ul>	<ul style="list-style-type: none"> <li>- Small sample size of only female nurses.</li> <li>- Did not examine their educational background and its possible influences on their level of moral distress.</li> </ul>
Curry, Cobb, Kutash & Diggs <sup>22</sup> (USA, 2008)	To determine characteristics of patients and nurses and risk factors that affect unplanned extubations.	Retrospective exploratory study. Data collection via hospital quality improvement database.	31 surgical ICU patients who self-extubated.	<ul style="list-style-type: none"> <li>- 87% (n = 27) of UE patients were restrained at the time of extubation.</li> <li>- Most common type of restraints are soft wrist restraints.</li> <li>- Many different factors contribute to self-extubation.</li> </ul>	<ul style="list-style-type: none"> <li>- Small sample size. Only investigated surgical ICU pts, other studies suggest rates of self-extubation may differ depending on the type of ICU. These factors may limit the generalisability of the findings.</li> </ul>
De Jonghe, Constantin, Chanques, Capdevila, Lefrant, Outin, & Mantz <sup>24</sup> (France, 2013)	To characterise the perceived utilisation of physical restraint in mechanically ventilated ICU patients and to identify clinical and structural factors influencing physical restraint use.	Quantitative. Questionnaires.	Questionnaires given to intensivists from 130 out 340 ICU in the French healthcare database. Questionnaires were completed by intensivists (the study encouraged but did not mandate input of one of more senior nursing staff in completing questionnaire).	<ul style="list-style-type: none"> <li>- Physical restraint (PR) use is common among most French ICUs.</li> <li>- Intensivists viewed the decision for PR use is predominantly made by nurses.</li> <li>- 68% of ICUs report that &gt;50% of nurses initiate PR without a written medical order.</li> </ul>	<ul style="list-style-type: none"> <li>- The questionnaires were completed by physicians and nurses were not definitively included despite the article acknowledging nurses to be the primary decision makers in PR application.</li> </ul>

Jiang, Li, Gu & He <sup>9</sup> (China, 2015)	Identify the perceptions and practice of physical restraint in China.	Mixed method. Descriptive study. Qualitative interviews. Quantitative cross-sectional surveys.	18 nurses interviewed. 330 nurses surveyed.	<ul style="list-style-type: none"> <li>- Quantitative findings: PR commonly used for patient safety. More often used in ICU compared to medical-surgical wards. More often used on night shift.</li> <li>- Qualitative findings: Most common reason for PR was staff shortages and heavy workload. Highlights the need for inservicing/ education with use of PR to minimise PR use in China.</li> </ul>	<ul style="list-style-type: none"> <li>- Limited generalisability of findings as sample was taken from only one tertiary hospital in Shanghai, although provides valuable local knowledge.</li> </ul>
Kandeel & Attia <sup>27</sup> (Egypt, 2013)	Investigates the practices of physical restraints among critical care nurses in El-Mansoura City, Egypt.	Descriptive cross-sectional study design with repeated observations.	Convenience sample of two groups. Group 1: 275 adult ICU patients who were physically restrained. Group 2: 153 ICU nurses with at least 1 year experience in one of the ICUs studied.	<ul style="list-style-type: none"> <li>- Patient observations: PR use much more common in Neurology, GIT and chest ICUs than other ICUs. Nurse-patient ratios and nurse workloads highly contribute to the use of PR.</li> <li>- Nurses' perspective: PR use is common practice in most ICUs. Perception that it is a necessary practice to prevent treatment interference and maintain patient safety. 98% reported purpose of PR not documented in patient notes. More experiences nurses documented more often and assessed restrained body parts more often than novice nurses.</li> </ul>	<ul style="list-style-type: none"> <li>- While the study explores the impact of PR on patients, it does not look at the patients' perspectives, emotional and psychological consequences.</li> <li>- While it provides valuable local knowledge, generalisability could be limited as it only studies one geographical area in Egypt.</li> </ul>
Langley, Schmollgruber, & Egan <sup>2</sup> (South Africa, 2011)	To provide a detailed description of the use of restraints in ICU in South Africa.	Mixed method. Quantitative: Observational data. Qualitative: In-depth, conversational, patient directed interviews.	15 nurse and five medical practitioners from three ICUs in South Africa. 219 patients observed.	<ul style="list-style-type: none"> <li>- Qualitative findings: Those for and against PR use all concluded that there is a place for PR use in ICU. Proper PR use is described as a "balancing act" between its advantages and disadvantages. Communication between physicians, patients and families is paramount.</li> <li>- Quantitative findings: different forms and methods of PR used. Nil standardisation or protocols used. 48.9% (n = 106) patients were restrained. 21.26% (n = 59) PR patients were not sedated or being weaned from sedation.</li> </ul>	<ul style="list-style-type: none"> <li>- Small, purposively collected sample meaning the data collected cannot be generalised, although this was not the study's intention.</li> <li>- During the study, there was a country-wide trade union strike which the authors suspected may have affected the findings and increased the use of restraints due to the decrease in staff numbers.</li> </ul>
Leonard, Benoit, & Chandler <sup>25</sup> (USA, 2012)	To determine critical care nurses' knowledge of restraint regulation and effectiveness. To examine the influence that nurses' personal characteristics and perception of potential personal harm have on requesting physical restraints and sedation.	Factorial survey design. Survey instruments assessed hospital site, demographics, restraint knowledge and perception of harm.	Observed 300 nurses from three hospitals. Only ICU data presented in this article (n = 94).	<ul style="list-style-type: none"> <li>- Nurses' variation in use of PR was influenced more by their knowledge and perception of patient harm than their personal characteristics, eg. Age and sex.</li> <li>- Use of PR was also affected by the workplace culture.</li> </ul>	<ul style="list-style-type: none"> <li>- Use of surveys may limit the understanding gained of nurses' knowledge and perceptions of PR as they are restricted to providing information within the confines of the survey questions.</li> </ul>

(continued on next page)

Table 1 (continued)

Article	Purpose	Design	Sample	Key findings	Limitations
Luk, Burry, Rezaie, Mehta & Rose <sup>28</sup> (Canada, 2015)	To describe Canadian ICU nurses' decision-making and practices of PR application and discontinuation, as well as alternative methods attempted prior to their use on critically ill patients.	Prospective, observational study.	2 adult medical—surgical ICUs in Toronto. Total of 141 patients. 71 patients from ICU 1 and 70 patients from ICU 2.	<ul style="list-style-type: none"> <li>- The predominant reason for PR use is agitation and "dangerous behaviours" eg. Pulling ETT and medical devices, striking staff, etc.</li> <li>- Despite both ICUs having <i>Least Restraint Policies</i>, alternative methods were rarely explored.</li> </ul>	<ul style="list-style-type: none"> <li>- Limited to only 2 ICUs, may not be generalisable data.</li> <li>- Poor documentation of restraint application and discontinuation in medical records may have led to inaccurate estimations of restraint duration and reasons for PR discontinuation.</li> </ul>
Stinson <sup>26</sup> (USA, 2016)	To examine the relationship between registered nurses' clinical experience, their practice issues, and their attitudes towards the use of PR in critical care units.	Descriptive correlational study via online Physical Restraint Questionnaire.	419 critical care nurses from across the United States, ranging between the ages of 19–68 (mean 46.5 years).	<ul style="list-style-type: none"> <li>- No significant difference in attitudes towards to use of PR and level of clinical experience, from novice to expert.</li> <li>- Significant level of difference between basic education on PR received by novice nurses in comparison to experienced nurses. Novice nurses received far less education on PR during training than older nurses.</li> </ul>	<ul style="list-style-type: none"> <li>- 88% of the sample population were considered "higher level experts" creating a homogenous sample which may have skewed the results of the study.</li> <li>- 91% were "White" Americans, which may have also skewed results as it only represents one demographics' view on PR in a highly multicultural country.</li> </ul>
Turgay, Sari, & Genc <sup>7</sup> (Turkey, 2009)	To determine ICU nurses' reasons for the application and removal of PR and PR patterns used in Turkey ICUs.	Descriptive, cross-sectional research design. Non-random volunteer sample. Questionnaires.	190 ICU nurses from seven hospitals.	<ul style="list-style-type: none"> <li>- Nurses' attitudes and decision-making abilities are the most important factors, which determine the use of PR in ICUs.</li> <li>- 84.7% of nurses (n = 161) apply PR without a physician's order.</li> <li>- The most common reason for PR (86.8%) is to maintain placement of medical devices.</li> <li>- Most common reason (68.9%) of removal is recovery of mental status.</li> </ul>	<ul style="list-style-type: none"> <li>- All the participants in the study were women, which to some degree limits the generalisability of the findings as the male population is not represented in this study.</li> </ul>
van der Kooi, Peelen, Raijmakers, Vroegop, Bakker, Tekatli, van der Boogaard & Slooter <sup>8</sup> (Netherlands, 2015)	To characterise the use of PR in ICUs. To determine prevalence, adherence to protocols, and correlates of the use of PR.	A prospective, cross-sectional, observational multicentre study with a representative sample of all Dutch ICUs, ranging from local hospitals to academic centres. Each unit visited twice, all 379 patients admitted during these visits were included and examined for the use of PR. Questionnaires given to nurses and physicians from these facilities.	Total of 379 patients from 25 ICUs from 25 different hospitals across the Netherlands ranging from level 1 to level 3 ICUs. 346 nurses and 72 physicians completed the questionnaires.	<ul style="list-style-type: none"> <li>- PR applied on 23% of patients (n = 87).</li> <li>- The most common reason for PR is prevention of catheters and tubes being removed and possible threat to patients' airway.</li> <li>- Only 36% of physicians (n = 26) were aware of which patients in their units were PR.</li> <li>- 92% of hospitals (n = 23) had restraining protocols however only 31% of nurses (n = 108) reported using these protocols.</li> </ul>	<ul style="list-style-type: none"> <li>- Observations were only conducted during morning shifts. Findings may have differed if afternoon and night shifts were also investigated as patients can become more delirious on night shift and nurse to patient ratios may differ after hours.</li> <li>- The article identified nurses may have been aware they were being observed which may also have skewed results.</li> </ul>
Weyant & Roberts <sup>31</sup> (USA, 2012)	Assesses the experience of the patient and family in the ICU when the patient is physically restrained for intubation/mechanical ventilation. Attempts to understand the experience from the patients' and families' perspectives.	Qualitative. Phenomenology. Semi-structured interviews.	Convenience sample from a cardiovascular ICU (n = 14). Group 1: planned intubation/mechanical intubation (received education prior). Group 2: unplanned intubation/mechanical ventilation (received nil education prior).	<ul style="list-style-type: none"> <li>- Communication between nurses and patient/family is the most crucial determinant of patient/family's level of anxiety when it involves the use of PR.</li> <li>- Pain management is considered a more important issue than PR to patients.</li> </ul>	<ul style="list-style-type: none"> <li>- While the article identified there were 14 participants in total, they did not specify how many of these were in Group 1 or Group 2. They also did not specify how many were patients and how many were family members.</li> </ul>

<p>Yont, Korhan, Dizer, Gumus, &amp; Koyuncu<sup>29</sup> (Turkey, 2014)</p> <p>To examine the ethical dilemmas experienced by adult ICU nurses in physical restraint practices.</p>	<p>Descriptive, cross-sectional study. Questionnaires using close-ended questions.</p>	<p>55 ICU nurses from two Turkish hospitals.</p>	<ul style="list-style-type: none"> <li>- 36.4% of nurses (n = 20) have difficulty deciding whether or not to use PR.</li> <li>- Non-maleficence was the highest reported ethical dilemma (76.4%), followed by beneficence (45.5%).</li> <li>- 78.8% of nurses reported they had not received training on dealing with ethical dilemmas.</li> <li>- PR is overall a complex issue resulting from one or more dilemmas (legal, ethical, and practical) that may result in one of more undesirable outcomes.</li> </ul>
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ICU = intensive care unit; ETT = endotracheal tube; GCS = Glasgow Coma Scale.

physicians as their target population. Only one study was found to explicitly explore the patient and family experience of PR in ICU.

Five major themes emerged from the literature search regarding PR use in ICU: (i) PR as a method of preventing treatment interference; (ii) nurses' roles as primary decisions-makers; (iii) adherence to PR protocols within ICU; (iv) the moral and ethical consequences of applying PR for nurses; and (v) patient/family experiences of being mechanically ventilated in ICU. The literature found relating to each theme will be discussed below. Refer to Table 1 for a summary of reviewed articles.

### 3.1. Preventing treatment interference

It was evident from the review that PRs are most frequently used for the prevention of treatment interference in an ICU context. A point prevalence study by Benbenbishty et al.<sup>19</sup> investigating PR use across Europe found that the prevention of self-extubation was most often the primary reason for initiating PR and the prevention of the removal of lines and other tubes/drains being the second most common rationale. Therefore, patients who were mechanically ventilated were found to be far more likely to be physically restrained than those who were not.<sup>19</sup> However, it was identified by three retrospective, case-controlled studies, from Taiwan<sup>20,21</sup> and the USA<sup>22</sup>, that a multitude of factors contributed to self-extubation. These included patient comfort, agitation, nursing experience, level of sedation, and staffing shortages, leading to the conclusion that the issue of self-extubation was highly complex and multifactorial.<sup>20–22</sup> Despite this, clinicians often resorted to PRs as the simplest remedy, with wrist ties as the most common form of PR.<sup>19,22</sup>

PRs were however found to be an unreliable and ineffective method in preventing self-extubation.<sup>20–22</sup> The three studies had comparable findings, with greater than 80% of patients from each study able to self-extubate while physically restrained: 87% (n = 27) from Curry et al.<sup>22</sup>; 82% (n = 82) from Chang et al.<sup>21</sup>, and 80.9% (n = 17) from Chang et al.<sup>20</sup> While these studies have relatively low sample sizes, their results were consistent and indicative of the ineffectiveness of PR as the primary solution for the prevention of self-extubation. As the studies highlighted, self-extubation is a highly complex issue, hence it would be difficult to definitively conclude that PR should no longer be used in the intensive care setting. Further research is therefore essential in finding more effective solutions that consider the multitude of contributing factors that lead to its incidence.

### 3.2. Nurses' roles as primary decision-makers in the application and removal of physical restraints

This theme had the largest number of studies within this review (n = 7) with the articles identifying nurses to be the primary decision-makers regarding the application and removal of PR in intensive care. Three of the studies used questionnaires to explore this idea.<sup>7,23,24</sup> The two conducted in Turkey, by Akansel<sup>23</sup> and Turgay et al.<sup>7</sup>, had nurses complete their surveys with 84.1% (n = 53) and 84.7% (n = 161), respectively, admitting that they initiated PR without a written medical order. Nurses from both studies, 93.7% (n = 59)<sup>23</sup> and 59.5% (n = 113)<sup>7</sup>, also admitted to applying restraints without documenting in patient notes, indicating significant inconsistencies in the practice and documentation of PR. Interestingly, the study conducted by De Jonghe et al.<sup>24</sup> in France surveyed physicians and found that they believed >50% of PR was applied without their knowledge, suggesting that nurses believe they initiate PR far more often than physicians are aware of. De Jonghe et al.'s<sup>24</sup> article explored the idea that nurses inherit this role as physicians do not consider PR as an integral part of the patients' medical management, and the application and removal of PR is

**Table 2**  
Quality assessment checklist: an adaptation of the CASP tool.

Article	Clear aims/ purpose	Methodology/ methods	Research design	Recruitment/ sampling	Data collection	Reflexivity	Ethics	Data analysis and rigour/validity and reliability	Findings/ results	Value of research	Overall quality rating
Akansel <sup>23</sup>	✓	✓	✓	✓	✓	n/a	✓	✓	✓	✓	A
Benbenbishty, Adam & Endacott <sup>19</sup>	✓	✓	*	*	*	n/a	✓	✓	✓	✓	B
Chang, Lui, Huang, Yang & Chang <sup>21</sup>	✓	✓	✓	✓	✓	n/a	*	✓	✓	✓	A
Chang, Wang, & Chao <sup>20</sup>	✓	✓	✓	✓	✓	n/a	✓	*	✓	✓	A
Choe, Kang & Park <sup>30</sup> ; Korea	✓	✓	*	✓	✓	✓	✓	✓	✓	✓	A
Curry, Cobb, Kutash & Diggs <sup>22</sup>	✓	✓	*	*	✓	n/a	*	✓	✓	✓	B
De Jonghe, Constantin, Chanques, Capdevila, Lefrant, Outin, & Mantz <sup>24</sup>	✓	✓	✓	*	✓	n/a	*	✓	✓	✓	B
Jiang, Li, Gu & He <sup>9</sup> ; China	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	B
Kandeel & Attia <sup>27</sup>	✓	✓	✓	✓	✓	n/a	✓	✓	✓	✓	A
Langley, Schmollgruber, & Egan <sup>2</sup>	✓	✓	✓	✓	✓	*	✓	*	✓	✓	B
Leonard, Benoit, & Chandler <sup>25</sup>	✓	✓	✓	✓	✓	n/a	✓	*	✓	✓	A
Luk, Burry, Rezaie, Mehta & Rose <sup>28</sup>	✓	*	✓	✓	✓	n/a	*	✓	✓	✓	B
Stinson <sup>26</sup>	✓	✓	✓	✓	✓	n/a	✓	✓	✓	✓	A
Turgay, Sari, & Genc <sup>7</sup>	✓	✓	✓	✓	✓	n/a	✓	*	✓	✓	A
van der Kooi, Peelen, Raijmakers, Vroegop, Bakker, Tekatli, van der Boogaard & Slooter <sup>8</sup>	✓	✓	✓	✓	✓	n/a	✓	✓	✓	✓	A
Weyant & Roberts <sup>31</sup> ; USA	✓	✓	✓	*	✓	X	✓	✓	✓	✓	B
Yont, Korhan, Dizer, Gumus, & Koyuncu <sup>29</sup>	✓	✓	✓	✓	✓	n/a	✓	✓	✓	✓	A

CASP = critical appraisal skills program.

Key to ratings: ✓ = Detailed coverage of screening question; \* = Screening question covered but not detailed; X = Screening question not addressed. Overall quality rating: A = Nil or few flaws, the study credibility, transferability, dependability, and confirmability is high; B = some flaws, unlikely to affect the credibility, transferability, dependability, and/or confirmability of the study; C = some flaws which may affect the credibility, transferability, and/or confirmability of the study; D = significant flaws which are very likely to affect the credibility, transferability, dependability and/or confirmability of the study.<sup>17,18</sup> This checklist was adapted from Walsh and Downe<sup>17</sup> and based on the CASP tool.<sup>15</sup>

largely based on the initiative and practical judgement of the nursing staff. While this study identified nurses to have the most influential role in PR practice, only physicians were asked to complete their surveys with a suggestion that they consult senior nursing staff.<sup>24</sup> However, it may have been more beneficial if nurses were definitively included in the study.

It is evident from the literature that nurses' perception of patient harm and workload pressures profoundly influenced their role as primary decision-makers in this context.<sup>9,25</sup> A mixed-method study conducted in China by Jiang et al.,<sup>9</sup> found that with the country's higher patient–nurse ratios, nurses felt it was necessary to apply PR for patient safety because of the high demand of their workload. Leonard and Chandler,<sup>25</sup> who observed 300 nurses from three hospitals in the USA, had similar results where nurses' decisions were determined by their knowledge and perceptions of patient harm rather than personal characteristics such as age and sex. Nurses also considered the potential of patient harm greater in ICUs than regular wards as ICU patients are critically ill and require more invasive treatment.<sup>9</sup> The prevention of self-extubation was again the most common rationale for PR application,<sup>9</sup> consistent with the findings under the sub-heading *Prevention of Treatment Interference*.

It was also found that nurses' decision-making abilities regarding PR application were greatly affected by their level of experience, education, and training.<sup>26,27</sup> A descriptive correlational study conducted in the USA by Stinson<sup>26</sup> explored the relationship between the critical care nurses' clinical experience, practice issues, and attitudes towards PRs with their decision-making processes. The findings showed no significant difference between the attitudes of novice and experienced nurses. However, novice nurses received less education and training than more experienced nurses regarding PR practices which affected their ability to appropriately assess both the need for and implications of PR application. This is supported by a study in Egypt, by Kandeel and Attia,<sup>27</sup> whose study found that more experienced nurses documented PR use more often than novice nurses and assessed restrained body parts more

frequently. This emphasises the significant difference between the basic education on PR between novice nurses and experienced nurses as highlighted by Stinson.<sup>26</sup>

The literature presented in this theme highlights the difficulties nurses face within this role. While they may have positive intentions to maintain patient safety, their workload pressures and lack of education and training have led to inconsistencies within PR practice. More research is needed to find solutions for these issues.

### 3.3. Adherence to protocols

Restraint minimisation policies are put in place to maintain a safe and standardised level of care to those who are physically restrained, while minimising their use only to when absolutely necessary.<sup>28</sup> The literature however, reveals a poor level of adherence to existing protocols. A Canadian study by Luk et al.<sup>28</sup> observed the decision-making skills and practices of nurses regarding PR application and discontinuation from two adult ICUs in Toronto. Both ICUs had restraint minimisation policies in place which encouraged the exploration of alternative strategies, mandated a physician's order prior to application, and required a minimum hourly assessment and documentation on the restrained patient's physical, emotional, and psychological health. However, only 46 out of the 141 (33%) restrained patients observed were cared for by nurses who considered other alternatives prior to PR.<sup>28</sup> Similarly, a large multicentre study conducted in the Netherlands by van der Kooi et al.<sup>8</sup> observed 379 patients from 25 ICUs and collected survey data from 346 nurses and 72 physicians to explore restraint minimisation protocol adherence. While 23 of the ICUs (92%) had restraint minimisation protocols in place, only 31% (n = 108) of nurses reported using them.<sup>8</sup> The protocols were often breached by failure to document PR in the medical records, failure to obtain consent from patients and/or relatives, and failure to obtain a written medical order.<sup>8</sup> While the figures from both studies revealed poor adherence, the reasons behind these findings were not explored.

Unlike the studies by Luk et al.<sup>28</sup> and van der Kooi et al.,<sup>8</sup> Langley et al.<sup>2</sup> conducted a mixed-method study on three hospitals in South Africa that did not have restraint minimisation policies in place. The absence of protocols led to a lack of clinical guidance on PR management resulting in widely varying methods of administration, from very firmly applied PR to restraints that were inadequate and ineffective, where patients were able to reach their endotracheal tubes.<sup>2</sup> These findings were concerning as they directly impacted on the safety of critically ill patients. However despite the negative aspects of PR, the in-depth interviews of 15 nurses and five medical practitioners revealed that clinicians still believe there is a valid place for restraints in the ICU setting and it comes down to balancing the these negative aspects and its necessity.<sup>2</sup>

#### 3.4. Moral and ethical dilemmas faced by nurses—consequences of physical restraints

Moral and ethical dilemmas can occur for nurses who initiate the application of PR in ICU as they are confronted with the dilemma between compromising patient dignity and autonomy and the more urgent need to protect those in their care against treatment interference.<sup>29</sup> Yont et al.<sup>29</sup> used close-ended questionnaires to examine the ethical dilemmas of 55 adult ICU nurses in PR practices in Turkey. The article described the application of PR as a complex issue which can lead to not only ethical dilemmas but also to legal and practical ones. It was reported by 76.5% of nurses that the ethical principle of non-maleficence was the most common ethical dilemma associated with PR application. Other ethical principles that were of concern for nurses around PR use were beneficence, respect of the individual and autonomy. The study revealed that while 85.5% of these nurses received training on ethics, 78.8% reported they did not receive training on dealing with ethical dilemmas which resulted in nurses being inadequately prepared to cope with these dilemmas in their workplace.

A phenomenological study by Choe et al.<sup>30</sup> explored the moral distress and ethical dilemmas experienced by critical care nurses in Korea. One aspect of this study focused on the moral distress associated with the application/use of PR in ICU when PR was deemed necessary for procedures such as intubation and insertion of lines. PR application resulted in guilt and ambivalent feelings for nurses. One participant described that she felt the experience of applying restraints as a violation of human rights, however still felt PR was imperative to provide the therapeutic care that patients required. This article was the only recent qualitative study that explored the moral distress of nurses who apply PR in critical care. However, the primary focus of the study was to explore the factors which contributed to moral distress among critical nurses as a whole, not exclusively moral distress relating to PR in ICU. Nevertheless, along with Yont et al.'s<sup>29</sup> study, it provided valuable data and highlights gaps in the literature regarding moral and ethical dilemmas associated with application of PR in ICU.

#### 3.5. Experiences of ICU patients and their families

Only one recent qualitative study on the experiences of patients, who are physically restrained and mechanically ventilated, and their families was found through this review of the literature. Weyant and Roberts<sup>31</sup> used phenomenological methods to interview two groups. The first group included patients who had planned intubations and along with their families received education about the procedure prior to it occurring. The second group were patients who had unplanned intubations and along with their families had not received any education about the procedure. However, a limitation of the article was that it did not discuss its results in depth. Findings highlighted that the anxiety levels of

patients and families were greatly affected by nurses' ability to effectively communicate to explain the procedure and the reasons for the application for PR. The patients described their overall experience as intense and, however, had fewer memories of the event than their families. The families felt a greater sense of reassurance when they were better informed of the processes of intubation and PR.

## 4. Discussion

The review of the current literature provides evidence of the prevalent use of PR in ICUs worldwide.<sup>2,19,22</sup> The three questions posed to guide the aim of the review were answered and discussed throughout the article. It was identified that the primary rationale for PR use in ICUs is for the prevention of treatment interference, more specifically for the prevention of self-extubation.<sup>21</sup> The studies presented in the review demonstrated that PR can often be an ineffective method to combat against treatment interference despite being used as the simplest remedy.<sup>20–22</sup> The figures showing the high incidence of self-extubation of patients who have been restrained is concerning as patient safety is compromised rather than enhanced despite its fundamental purpose of preventing treatment interference. However, simply removing them from current practice will not provide us with a complete solution as this is a multifaceted issue.<sup>21</sup> It is evident that the lack of consistent presence and adherence to PR protocols is a major contributor to this issue.<sup>28</sup> This has led to widely varying methods of administration, maintenance, and documentation of PR which has led to the compromise of patient safety and care regarding the prevention of treatment interference for patients who are mechanically ventilated.<sup>2</sup> While the reasons behind the lack of adherence to protocols were not explored by the articles, it could be suggested that the lack of education and training nurses receive on PR,<sup>26</sup> as evidenced by the literature, is a crucial contributing factor. Providing nurses, who are at the forefront of patient care in ICU, with the knowledge and skills to assess when PR use is warranted, provide care for patients who are restrained, and accurately document PR use, may be more effective in encouraging adherence to protocols and enhancing patient safety. Improving assessment skills on the need for PR can potentially reduce its prevalence in ICUs which may positively impact on the patient's overall experience.

The study also highlighted paucity in knowledge of the lived experience of PR from the perspectives of patients, families, and nurses as only one qualitative study was found.<sup>31</sup> Without knowledge of these experiences, it is not possible to have a truly holistic understanding of PR; therefore, further research is essential. This knowledge has the potential to generate evidence-based solutions to guide and improve clinical practice.

#### 4.1. Implications for nursing practice

The current literature draws attention to the significant role nurses play as the primary decision-makers in the application and removal of PR. While this is evident, the literature also highlights the necessity of education and training for nurses, particularly novice nurses, on the appropriate use of PR. This can encourage improved education and in-servicing on the appropriate of methods implementing alternative strategies to PR and assessing the need for PR in the intensive care setting, potentially easing the moral and ethical dilemmas nurses face. In addition, this review highlights a shortage of current literature on the experiences of moral and ethical dilemmas of ICU nurses who initiate PR. This is significant as nurses have been identified as the primary decision-makers in the application and removal of PR and may encourage

further research in this area. In addition, as the review also brings to light the discernible inconsistencies in PR protocols among most ICUs, it has the potential to encourage policy development in this area to improve overall practice.

Lastly, it is evident that PR use in ICUs is highly prevalent worldwide. Currently, there is limited literature available on the experiences of both mechanically ventilated patients who have been physically restrained and their families. This review highlights a gap in the literature that necessitates further exploration. Exploring these issues can potentially aid clinicians in improving the care provided to patients who are physically restrained and mechanically ventilated.

## 5. Conclusion

PR use is highly prevalent in ICUs worldwide for the prevention of treatment interference which makes this a current and relevant topic that may need further investigation. While most clinicians agree there is a genuine relevance for PR in intensive care, their use can negatively impact nurses, patients, and their families. There is a lack of sufficient education and training for nurses who are the primary decision-makers in the application and removal of PR, as well as significant inconsistencies regarding PR protocols among most ICUs. Overall, not enough information is known about the experience of those patients who are physically restrained in intensive care, their family members who journey through their ICU stay with them, or the nurses who are responsible for their care. Further research is essential to inform strategies that may minimise the use of restraints in ICU and enhance the experiences of patients, families, and nurses.

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