



## Research Article

# Intention to use physical restraint in paediatric intensive care units and correlated variables: A multicentre and cross-sectional study

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## ARTICLE INFO

## Keywords:

Behaviour

Intensive Care Unit

Nursing

Pediatrics

Physical restraint

## ABSTRACT

**Objectives:** To determine the intention to use physical restraint (PR) and the relationship with sociodemographic and professional variables of the Paediatric Intensive Care Unit (PICU) nurses.

**Research methodology/design and setting:** A multicentre and correlational study was carried out from October 2021 to December 2023 in five paediatric intensive care units from five maternal and child hospitals in Spain. The Paediatric Physical Restraint-Theory of Planned Behaviour Questionnaire was provided. Moreover, sociodemographic and employment variables were registered.

**Results:** A total of 230 paediatric nurses participated in the study. A total of 87.7 % were females with an average age of  $35.5 \pm 9.7$  years and working experience of  $10.5 \pm 8.4$  years. The mean scores obtained were  $21.1 \pm 3.8$  for attitude,  $13.1 \pm 5.0$  for subjective norms,  $14.4 \pm 4.3$  for perceived behavioural control and  $28.0 \pm 6.0$  for intention. The nurses apply more physical restraint to anxious patients, with scarce analgesics and sedation, those affected with pharmacological withdrawal symptoms and those with a high risk of accidental removal of vital support devices or fall from bed. The sex ( $p = 0.007$ ) and type of employment contract ( $p = 0.01$ ) are the variables that are significantly correlated with the intention to use of PR.

**Conclusion:** The paediatric nurses analysed had a moderate attitude, social pressure and perceived behavioural control towards the use of PR.

**Implications for clinical practice:** It is important to know the factors that influence the intention to use physical restraint in order to standardise safe practice for critically ill paediatric and to ensure that patients' rights are

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<https://doi.org/10.1016/j.iccn.2024.103690>

Received 23 October 2023; Received in revised form 31 January 2024; Accepted 17 March 2024

Available online 9 April 2024

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respected by obtaining informed consent and assessing the prescription, continuation and removal of physical restraint.

## Introduction

The PICU is a highly stressful environment for the patient, derived from diverse diagnostic and/or therapeutic procedures, which, apart from causing pain and physical discomfort, also cause a great negative psychological impact on the child and their family. Derived from this fact, the patient's resistance to the therapeutic process due to lack of understanding, sometimes makes it difficult to apply a treatment. It is in this situation when the PR is applied and justified (Folkes, 2005; Kangasniemi & Papinaho, 2014; Demir, 2007; Dorfman & Hardy, 2004).

The physical restraint (PR) continues to be used regularly in the Paediatric Intensive Care Units (PICUs), many times without previous information or verbal or written consent of the minor or their family. Furthermore, there are still concerns regarding its efficiency due to the potential risk of violation of the fundamental rights of critically ill children during the whole assistance process and the stressful effects associated with its use (Hull & Clarke, 2010; De Hert et al., 2011; Folkes, 2005).

Although, sometimes, the nursing staff feels guilty and suffers ethical dilemmas when restraining a child, the literature reports a generalized approval of the use of the PR to carry out invasive painful processes faster and efficiently and as an acceptable resource to guarantee the treatment of the paediatric patient (Folkes, 2005; Jeffery, 2002; McGrath et al., 2002). Moreover, organizing factors are described, such as excessive workload or the lack of sufficient team members, as aspects that also have an impact on the use of the PR (Hull & Clarke, 2011).

The Joint Commission documents up to 128 adverse effects linked to PR, such as physical injuries (laceration, rhabdomyolysis, ecchymosis, ulcers, fractures, oedema and cyanosis in the limbs, food rejection and anxiety) and even the patient's death. (Longo & Miller Hoover, 2016; Ye et al., 2018; Eskandari et al., 2018; Fernández Costa et al., 2020, Demir, 2007).

Furthermore, a recent study showed a direct and significant relationship between higher perceived coercion and posttraumatic stress in children subjected to PR (Guzman et al., 2019). Therefore, it is indicative of good professional practice (Royal Collegue of Nursing, 2003; Brazier & Cave, 2007) that immobilization must always be the last resource to be used in the clinical management of the paediatric patients. (Azeem, et al., 2015).

Health care professionals who work in the PICU must be aware that the benefit and security of PR is widely questioned, and its use implies adverse physical and psychological effects in the paediatric patients, for which preventive and/or alternative strategies must be promoted to achieve the objective of zero restraint (Acevedo Nuevo et al., 2019; Acevedo Nuevo and Via Clavero, 2019; Arias Rivera et al., 2020; Burry et al., 2018; Demir, 2007; Bosch Alcaraz & Via Clavero, 2020), as proposed by Bosch Alcaraz & Via Clavero (2020), which defines prevention, detection and control activities during the use of physical restraint in the paediatric patients. Prior to the implementation of such activities, it is essential to analyse the intention of paediatric nurses to use PR in the PICU, together with the related variables. Derived from the fact that this aspect has only been carried out in Spain in adult critical patients (Via Clavero et al., 2020), in nurses from Malaysia (Eskandari et al., 2017) and in a study in elderly homes (Werner & Mendelsson, 2001), the need for the present research is justified.

## Objectives

To determine the intention to use PR and the relationship with sociodemographic and professional variables of the PICU nurses.

## Methods

### Type and period of study

A cross-sectional, multicentre and correlational study from October 2021 to December 2022 was conducted in five PICUs of five maternal and children's hospitals in Spain (Sant Joan de Déu Hospital; Vall d'Hebron Hospital; La Paz University Hospital; 12 Octubre Hospital and Carlos Haya Regional University Hospital) following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement (von Elm et al., 2014). All participating PICUs provided care for patients with a range of medical conditions, including respiratory, infectious, and oncological illnesses, as well as post-surgical admissions. The hospitals had a policy allowing relatives to visit for 24 h. The infrastructure of the PICUs consisted of a combination of open boxes separated by curtains and individual rooms.

### Study population and sample

Following a probabilistic, convenience, and consecutive sample technique, all nurses who met the following criteria were selected:

#### Inclusion criteria:

- Nurses with proven paediatric training (master's degree, specialty and/or continuous training courses).
- Professionals with a minimum of 2 years working in the PICU.
- Acceptance and signature of informed consent.

#### Exclusion criteria:

- Nurses with < 30 % working days.
- Professionals on sick leave, working disability or leave of absence.

### Study variables

Variables related to the Paediatric Physical Restraint-Theory of Planned Behaviour Questionnaire (PED-PR-TPB) were registered, such as the following sociodemographic and employment variables: (i) sex (female/male); (ii) age (years); (iii) experience as nurse in PICU (years); (iv) highest academic qualification (undergraduate, graduate, post-graduate/master's degree, nursing specialty, PhD); (v) type of contract (permanent, temporary full/part time (weekends), casual or other); (vi) working shift (morning, evening, day (12 h), night (12 h) or rotatory); (vii) combination of the assistance practice with other duties (teaching, research and/or management) and (viii) specific training in PR (yes/no).

### Data collection instrument

The main instrument of the study was the Paediatric Physical Restraint-Theory of Planned Behaviour Questionnaire (PED-PR-TPB), adapted and validated according to the context of paediatric critical patients (Bosch Alcaraz et al., 2024). The questionnaire, based on the one generated by Via et al. (Via-Clavero et al., 2019), is organized into four subscales (attitude, subjective norms (SN), perceived behavioural control (PBC) and intention) subdivided into seven factors and 51 items, valued through a Likert scale from 1 to 7 points. Each subscale is formed by a direct measurement, which influences the intention to apply PR according to the theory of planned behaviour (Ajzen, 1991; Ajzen, 2020; Ajzen & Fishbein, 1980), and an indirect measurement or of beliefs, establishing specific scores for each subscale:

- Subscale attitude: contained 13 items. Four items correspond to the direct attitude (range 4–28 points), and 9 compound items correspond to the behavioural beliefs with a result value (range 9–441 points). Cronbach's  $\alpha$  of 0.73.
- Subscale SN: contained 8 items. Four items are direct SN (range 4–28 points), and 4 compound items correspond to normative beliefs by motivation to accomplish (range 4–196 points). Cronbach's  $\alpha$  of 0.78.
- Subscale PBC: contained 7 items. Three items of the direct PBC (range 3–21 points), and 4 compound items corresponding to the control beliefs by the power of influence (range 4–196 points). Cronbach's  $\alpha$  of 0.69.
- Subscale intention: contained 6 clinical scenarios that evaluate the intention of the nurses to apply PR (range 6–42 points). Cronbach's  $\alpha$  of 0.75.

#### Data collection procedure

First, a two-hour online training was carried out with each collaborator from the 5 centres participating, with the help of a PowerPoint presentation and through the platform Teams®, where the following detailed information was provided: objectives of the research, data collection procedure and detailed information on the questionnaire and data collection document. Afterwards, the collaborator nurses of each centre shared the questionnaire and informed consent (IC) in paper format among the paediatric nurses of the PICU who met the established inclusion criteria and wanted to participate voluntarily in the study. They were given a 7-day period to return the completed questionnaire to the centre manager, who returned them to the main researcher.

#### Statistical analysis

The collected data were stored in a database created with the program Excel by Microsoft®, and its management and statistical analysis were carried out with the software SPSS® v 23.0 (Armonk, NY: IBM Corp.).

The numerical variables were described by statistical descriptors (mean, standard deviation, median and quartiles), and they were represented graphically through the frequencies histogram, and the categorical variables were represented graphically through their frequencies chart with percentages and bar graph.

For the comparison of a numerical variable between paired samples, the Wilcoxon test was used for two samples, and the Friedman test was used for more than two samples. In the case of two independent samples, the Student's *t* test was used, and ANOVA was used for more than two samples. To contrast whether there was dependency between two categorical variables, the Chi Square test was used, and in the case of two numerical variables, the Spearman correlation was used. Backwards stepwise linear regression models were performed to identify variables related to intention, direct factors and sociodemographic nurses' variables. The results were described with beta coefficients ( $\beta$ ), 95 % confidence intervals (CIs) and *p* values.

All data will be considered statistically significant if the *p* value < 0.05.

#### Ethical considerations

Permits by the nurse manager and by the Ethics and Research Committee from the five hospitals where the study was carried out and were obtained.

The principles established by the Helsinki Declaration and the following amendments (2013) were taken into account, as well as the principles established by the Belmont Report (1979).

Participation in the study was voluntary at all times, and the nurses had all the information necessary from the informed consent (IC), both verbally and in written form. All the data were confidential, and the

management of the information was carried out preserving privacy through the coding of every subject, as well as by taking into account the regulation UE 2016/679 of the European Parliament and the Counsel of the 27th of April of 2016, related to personal data protection and the free data circulation and the Organic Law 3/2018 of the 5th of December on Personal Data Protection and digital rights guarantee. The questionnaires were distributed and collected only by the principal investigators at each centre. They are responsible for sending them to the project coordinator, who anonymously enters the information into the database.

## Results

#### Nurses' sociodemographic characteristics

Out of 268 participants, 230 paediatric nurses (85.8 %) completed the questionnaire. A total of 87.7 % (*n* = 201) were female, with a mean age of  $35.5 \pm 9.7$  years and working experience in PICU of  $10.5 \pm 8.4$  years. A total of 30.9 % (*n* = 71) had master's degree qualifications, and 48.3 % (*n* = 111) had a permanent employment contract, with the rotating shift (morning, evening and night) being the most common, with 40.9 % (*n* = 94). A total of 72.5 % (*n* = 173) of the professionals only worked as assistance nurses, and 87.7 % (*n* = 199) did not have specific training in PR. Table 1 shows the characteristics of each variable and its relationship with attitudes, SN, PBC and intention.

#### Obtained scores according to questionnaire factors

##### Attitudes

The global measured scores obtained were  $21.1 \pm 3.8$  over 28, which objectivized a high and favourable attitude towards the use of PR. A moderate agreement was observed in the fact that the use of PR in critical paediatric patients is a safe (60.9 %), necessary (43 %) and acceptable (39.6 %) practice (Table 2).

In relation to behavioural beliefs, 51.7 % of the participants moderately agree that the use of PR prevents self-extubation, 50.9 % self-removal devices and 37.4 % believe that its use avoids falls from bed. A total of 41.7 % considered that the fact that the patient was in the weaning process or decreased sedation increased the use of PR and that anxiety (54.8 %) and the emergence of skin injuries (76.1 %) were the main disadvantages.

##### Subjective norms (SN)

In relation to the direct SN, the global values obtained were  $13.1 \pm 5.0$  over 28, which shows that the nurses perceive that other professionals and relatives expect them to apply PR. A total of 46.1 % of the nurses considered that they did not feel social pressure when using PR, and 31.7 % used it independently from other professionals considering that they must or must not use it. In relation to the normative beliefs, 48.7 %–53.5 % of the participants completely agree that their nurse peers, doctors and supervisors approved the use of PR, while 23.9 % moderately considered that this approval exists on the part of the patients' relatives. There is a moderate agreement (between 20.9 % and 24.3 %) on motivation to keep using PR among professionals (doctors/nurses/supervisors) and relatives. Therefore, the expectations of nurses' peers have a low impact on the use of PR (Table 2).

##### Perceived behavioural control (PBC)

A moderate direct PBC towards the intention to use PR ( $14.4 \pm 4.3$  points over 21) was observed. Moreover, a light agreement was verified in the fact that the nurses who feel confident (24.3 %) consider the decision to apply PR to be easy (23.9 %) and that it exclusively depends on themselves (28.3 %) (Table 2). To a moderate degree, the nurses consider that child cooperation (54.8 %), family participation (45.7 %) and appropriate pharmacological management of withdrawal symptoms (42.2 %) are factors that influence the use of PR.

**Table 1**

Sample characteristics and relation between direct Attitude, Subjective Norms, Perceived Behavioural Control and Intention (n = 230).\*

| Variable (n/%)                                       | Attitude <sup>a</sup> |          | Subjective norms <sup>a</sup> |         | Perceived behavioural control <sup>a</sup> |         | Intention <sup>a</sup> |         |
|------------------------------------------------------|-----------------------|----------|-------------------------------|---------|--------------------------------------------|---------|------------------------|---------|
|                                                      | Mean ± SD             | P-value  | Mean ± SD                     | P-value | Mean ± SD                                  | P-value | Mean ± SD              | P-value |
| Hospital <sup>a</sup>                                |                       |          |                               |         |                                            |         |                        |         |
| Sant Joan de Déu Hospital                            | 64 (27.8%)            |          |                               |         |                                            |         |                        |         |
| Vall d'Hebron Hospital                               | 51 (22.2%)            |          |                               |         |                                            |         |                        |         |
| 12 Octubre Hospital                                  | 50 (21.7%)            |          |                               |         |                                            |         |                        |         |
| La Paz Hospital                                      | 43 (18.7)             |          |                               |         |                                            |         |                        |         |
| Carlos Haya Hospital                                 | 22 (9.6%)             |          |                               |         |                                            |         |                        |         |
| Sex <sup>a</sup>                                     |                       | n=229    |                               |         |                                            |         | n = 229                |         |
| Female                                               | 201 (87.4%)           | 21.2±3.7 | 0.049                         |         |                                            |         | 28.4±6.0               | 0.007   |
| Male                                                 | 28 (12.2%)            | 20.3±4.3 |                               |         |                                            |         | 25.4±5.3               |         |
| Missing                                              | 1 (0.4%)              |          |                               |         |                                            |         |                        |         |
| Age (years) <sup>b</sup>                             | 35.6±9.7              |          |                               |         |                                            |         |                        |         |
| Experience as nurse in PICU (years) <sup>b</sup>     | 10.5±8.4              |          |                               |         |                                            |         |                        |         |
| Highest academic qualification <sup>a</sup>          |                       |          | n=230                         |         |                                            |         |                        |         |
| Nursing diploma                                      | 119 (51.7%)           |          | 12.4±4.7                      | 0.038   |                                            |         |                        |         |
| Bachelor's degree                                    | 3 (1.3%)              |          | 12.4±4.7                      |         |                                            |         |                        |         |
| Postgraduate / Master                                | 71 (30.9%)            |          | 13.9±5.3                      |         |                                            |         |                        |         |
| Official Master's degree / Nursing specialty         | 37 (16.1%)            |          | 13.9±5.3                      |         |                                            |         |                        |         |
| Doctorate                                            | 0 (0%)                |          |                               |         |                                            |         |                        |         |
| Type of employment contract <sup>a</sup>             |                       | n= 228   | <0.001                        |         | n=228                                      | <0.001  | n=228                  | 0.01    |
| Permanent                                            | 111 (48.3)            | 21.4±3.6 |                               |         | 15.6±4.0                                   |         | 400.6±77.8             |         |
| Temporary full time                                  | 55 (24%)              | 22.3±3.8 |                               |         | 14.8±4.0                                   |         | 421.2±91.5             |         |
| Temporary part time/weekends                         | 3 (1.3%)              | 22.3±3.8 |                               |         | 14.8±4.0                                   |         | 421.2±91.5             |         |
| Casual                                               | 51 (22.2%)            | 19.5±3.8 |                               |         | 12.0±4.2                                   |         | 394.3±76.8             |         |
| Other                                                | 8 (3.4%)              | 18.7±3.7 |                               |         | 10.2±4.1                                   |         | 331.1±54.1             |         |
| Missing                                              | 2 (0.8%)              |          |                               |         |                                            |         |                        |         |
| Working shift <sup>a</sup>                           |                       |          |                               |         |                                            |         |                        |         |
| Morning                                              | 40 (17.4%)            |          |                               |         |                                            |         |                        |         |
| Evening                                              | 25 (10.9%)            |          |                               |         |                                            |         |                        |         |
| Daily of 12 hours                                    | 22 (9.6%)             |          |                               |         |                                            |         |                        |         |
| Night of 12 hours                                    | 49 (21.3%)            |          |                               |         |                                            |         |                        |         |
| Rotatory                                             | 94 (40.9%)            |          |                               |         |                                            |         |                        |         |
| Combination with assistance practice <sup>a</sup>    |                       |          |                               |         |                                            |         |                        |         |
| Only assistance work                                 | 173 (75.2%)           |          |                               |         |                                            |         |                        |         |
| Teaching                                             | 35 (15.2%)            |          |                               |         |                                            |         |                        |         |
| Research                                             | 5 (2.2%)              |          |                               |         |                                            |         |                        |         |
| Teaching and research                                | 15 (6.5%)             |          |                               |         |                                            |         |                        |         |
| Management                                           | 2 (0.9%)              |          |                               |         |                                            |         |                        |         |
| Specific training on physical restraint <sup>a</sup> |                       |          |                               |         |                                            |         |                        |         |
| Yes                                                  | 28 (12.3%)            |          |                               |         |                                            |         |                        |         |
| No                                                   | 199 (87.7%)           |          |                               |         |                                            |         |                        |         |
| Missing                                              | 3 (1.3%)              |          |                               |         |                                            |         |                        |         |

Abbreviations: a = frequency (percentage); b = mean and standard deviation

\*Only statistically significant data is included.

### Intention

The score obtained was  $28.0 \pm 6.0$  points over 42, showing a moderate intention towards the use of the PR in critical paediatric patients. The scores obtained show how the nurses apply more physical restraint to anxious patients, with little analgesic sedation, those affected with pharmacological withdrawal symptoms and those with a high risk of accidental removal of the vital support devices or fall from bed (Table 2).

### Correlation between sociodemographic and employment variables among nurses and direct factors related to attitude, SN, PBC and use intention of PR

A statistically significant relationship was found in the mean scores obtained in attitude according to sex ( $p = 0.049$ ) and type of employment contract ( $p < 0.001$ ); in SN according to academic qualification ( $p = 0.038$ ); in PBC and employment contract ( $p < 0.001$ ); and in intention and the sex variables ( $p = 0.007$ ) and employment contract ( $p = 0.01$ ).

In the multivariate analysis, it is observed that the variables that decreased the attitude towards the use of PR are having postgraduate qualification ( $\beta -0.337$ ;  $p < 0.001$ ), the rotating working shift ( $\beta -0.276$ ;  $p < 0.001$ ) and having training in PR ( $\beta -0.367$ ;  $p = 0.002$ ). In relation to SN, there was a lower perception of having to use PR in

professionals with temporary or weekend employment contracts ( $\beta -0.424$ ;  $p = 0.009$ ) and a higher perception in nurses who work night shifts ( $\beta 0.762$ ;  $p = 0.013$ ). In the PBC, it is observed that women scored lower ( $\beta -0.246$ ,  $p = 0.034$ ), in contrast with professionals with temporary employment contracts, who scored higher ( $\beta 0.364$ ;  $p = 0.025$ ). Finally, the variables that are associated with a lower intention to use PR are temporary or weekend employment contract ( $\beta -0.193$ ;  $p = 0.006$ ), rotating working shift ( $\beta -0.322$ ;  $p = 0.024$ ) and previous training in PR ( $\beta -0.286$ ;  $p = 0.055$ ) (Table 3).

### Discussion

The study proves a moderate intention ( $28.0 \pm 6.0$  out of 42) and attitude ( $21.1 \pm 3.8$  out of 28) of use of PR in the five PICUs analysed. This is similar to the light to moderate intention ( $12.52 \pm 3.81$  out of 21) and the moderate attitude ( $18.15 \pm 4.5$  out of 28) found in adult nurses (Via Clavero et al., 2019). These results are associated with personal factors of the healthcare professionals as well as those related to critical paediatric patients (He et al., 2023; Hu et al., 2019; Via Clavero et al., 2019; Wener et al., 2001).

Moreover, in our study factors related to the justified use of PR as well as the cooperation and participation of the patient, the appropriate pharmacological management of the sedation and the pharmacological



**Table 2**

Descriptive data of nurses' direct items of attitude, SN, PBC and intention.

| Scale factor                                                                                                                                         | Scores given (%) |      |      |      |      |      |      | Mean (SD) |
|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------|------|------|------|------|------|-----------|
|                                                                                                                                                      | 1                | 2    | 3    | 4    | 5    | 6    | 7    |           |
| Attitude                                                                                                                                             |                  |      |      |      |      |      |      |           |
| Direct attitude                                                                                                                                      |                  |      |      |      |      |      |      |           |
| Item 1 (n=230): In my opinion, the use of physical restraint in critically ill pediatric patients is unsafe/safe                                     | 0.4              | 0.9  | 4.8  | 6.1  | 16.5 | 60.9 | 10.4 | 5.6±1.0   |
| Item 2 (n=228): In my opinion, the use of physical restraint in critically ill pediatric patients is unnecessary/necessary                           | 0.4              | 2.2  | 7.8  | 9.1  | 27.0 | 43.0 | 9.6  | 5.3±1.1   |
| Item 3 (n=229): In my opinion, the use of physical restraint in critically ill pediatric patients is harmful/beneficial                              | 0.0              | 5.7  | 13.9 | 14.8 | 23.5 | 33.5 | 8.3  | 4.9±1.3   |
| Item 4 (n=230): In my opinion, the use of physical restraint in critically ill pediatric patients is unacceptable/acceptable                         | 0.4              | 2.2  | 6.1  | 11.7 | 27.8 | 39.6 | 12.2 | 5.3±1.1   |
| Total (range:4-28)                                                                                                                                   |                  |      |      |      |      |      |      | 21.1 ±3.8 |
| Subjective norms                                                                                                                                     |                  |      |      |      |      |      |      |           |
| Direct subjective norms                                                                                                                              |                  |      |      |      |      |      |      |           |
| Item 21 (n=227): I use physical restraints in critically ill pediatric patients because professionals with whom I work think that they must be used. | 31.7             | 22.6 | 8.3  | 17.4 | 11.3 | 7.4  | 0.0  | 2.7±1.6   |
| Item 22 (n=230): I feel under social pressure when I don't use mechanical restraints in critically ill pediatric patients.                           | 46.1             | 23.9 | 7.8  | 9.1  | 8.3  | 3.5  | 1.3  | 2.2±1.5   |
| Item 23 (n=229): Other professionals in my place use mechanical restraints on pediatric critical patients.                                           | 5.7              | 7.8  | 7.0  | 21.7 | 17.8 | 24.8 | 14.8 | 4.7±1.7   |
| Item 24 (n=229): I am expected to use physical restraints in critically ill pediatric patients                                                       | 22.2             | 20.4 | 7.0  | 19.1 | 13.5 | 11.7 | 5.7  | 3.4±1.9   |
| Total (range: 4-28)                                                                                                                                  |                  |      |      |      |      |      |      | 13.1 ±5.0 |
| Perceived behavioural control                                                                                                                        |                  |      |      |      |      |      |      |           |
| Direct perceived behavioural control                                                                                                                 |                  |      |      |      |      |      |      |           |
| Item 33 (n=230): I am confident that I could use physical restraints in critically ill pediatric patients if I decide to.                            | 14.3             | 16.1 | 10.0 | 24.3 | 19.6 | 12.2 | 3.5  | 3.7±1.7   |
| Item 34 (n=230): It is easy for me to make the decision to use physical restraints in critically ill pediatric patients.                             | 5.2              | 5.2  | 11.7 | 23.9 | 16.1 | 25.7 | 12.2 | 4.6±1.6   |
| Item 35 (n=228): The decision to use physical restraints in critically ill pediatric patients is entirely up to me.                                  | 2.2              | 6.5  | 8.7  | 8.7  | 18.3 | 28.3 | 26.5 | 5.2±1.6   |
| Total (range: 3-21)                                                                                                                                  |                  |      |      |      |      |      |      | 14.4 ±4.3 |
| Intention                                                                                                                                            |                  |      |      |      |      |      |      |           |
| Scenario 1 (n=230): patient with Down Syndrome operated on the auricle-ventricular canal.                                                            | 0.9              | 7.0  | 7.4  | 4.3  | 12.2 | 33.5 | 34.8 | 5.6±1.5   |
| Scenario 2 (n=230): patient admitted in UCIP due to toxins ingestion and 5 metre fall.                                                               | 1.3              | 3.0  | 4.3  | 8.7  | 21.7 | 26.1 | 34.8 | 5.6±1.4   |
| Scenario 3 (n=230): patient with con bronchospasm and non-invasive mechanical ventilation.                                                           | 4.3              | 19.6 | 13.5 | 9.1  | 24.8 | 17.4 | 11.3 | 4.2±1.8   |
| Scenario 4 (n=229): ex premature tracheostomized with severe dehydration.                                                                            | 1.1              | 2.2  | 1.7  | 6.1  | 15.7 | 36.1 | 36.5 | 5.8±1.2   |
| Scenario 5 (n=230): patient suffering bronchiolitis with non-invasive mechanical ventilation.                                                        | 53.9             | 24.8 | 11.3 | 4.8  | 2.2  | 3.0  | 0.0  | 1.8±1.2   |
| Scenario 6 (n=230): patient post ex intubated, with pharmacological withdrawal symptom.                                                              | 3.0              | 10.0 | 10.9 | 8.3  | 25.7 | 28.7 | 13.5 | 4.6±1.6   |
| Total (range 6-42)                                                                                                                                   |                  |      |      |      |      |      |      | 28.0 ±6.0 |

Abbreviations: SN = subjective norms; PBC = perceived behavioural control; SD = Standard deviation

withdrawal symptoms influence the intention of use. These aspects have also been highlighted by other researchers (Folkes, 2005; Kangasniemi & Papinaho, 2014; Demir, 2007; Dorfman & Hardy, 2004).

Family participation in the care of critically ill paediatric patients care is essential to reduce the use of PR. Research conducted by Demir et al. (2007) demonstrated the impact of family on reducing PR. The study found that patients who were accompanied by their families had a lower use of PR (Demir, 2007). Similarly, Mion (2008) conducted a study in 40 hospitals across the United States and found that the use of PR in PICUs is significantly lower than in adult critical care units due to a preference for increased family accompaniment (Mion, 2008). This suggests that involving families in the care of critically ill paediatric patients can reduce the need for PR. Efficient communication adapted to the child's age has also a positive influence on their reaction (Cum-mings, 2015), which favours their collaboration and can reduce the use of PR (Azeem, 2015).

In the present research, as in other studies (Via Clavero et al., 2019; Langley et al., 2011; Freeman et al., 2015), a higher intention of use of PR to prevent self-extubation, self-removal of devices and falls from bed is still objectivized. The non programmed removal of vital support devices are adverse events present in the PICU (He et al., 2023; Ge et al., 2014; Wang et al., 2016; Yevchak et al., 2012). For this reason, although it is recommended to carry out more research which correlates whether the use of PR prevents the non programmed removal of such devices (Perez et al., 2010), they are still being used as a barrier to prevent it from happening. This fact justifies that the paediatric nurse places the

PR autonomously (Hu et al., 2018; Ting et al., 2019; Hasan and Abulattif, 2019) and that they consider its application is 60.9 % safe, 43 % necessary and 39.6 % acceptable, similar data to a study performed with adult intubated patients where it was observed that more than half of the participants considered the use of PR safe and a third of the participants considered it acceptable. (Via Clavero et al., 2019). The type of employment contract and the qualification are key aspects that correlate with the use of PR. In contrast to another study carried out in 2023, where it was observed that 58.44 % of the polled nurses had received paediatric PR training (He et al., 2023), in the present research, only 12.3 % had, similar training, which resulted in 25.2 % difference (Via Clavero et al., 2019). These data, together with the fact that 23.9 % of the polled nurses consider the decision to use PR easy and that 28.3 % consider that the decision exclusively depends on the nurses themselves, similar data to other studies (Via Clavero et al., 2019; Perez et al., 2010; Hu et al., 2018; Ting et al., 2019; Hasan and Abulattif, 2019), justifies the need to train professionals who work in the PICU on the use of PR (Bosch Alcaraz & Via Clavero, 2020; Perez et al., 2010). A total of 41.7 % of nurses considered that the weaning process or the decrease in sedation increased the use of PR and stated that the patient's anxiety (54.8 %) and the emergence of skin injuries (76.1 %) as the main disadvantages for its application. For this reason, the training programmes in the use of PR should include analgesedation pharmacological and non pharmacological measures that control these effects in the patient, as they have been proven to be effective in reducing the use of PR (He et al., 2023; Johnson et al., 2016).

**Table 3**

Multivariable models assessing factors associated with direct attitude, SN, PBC and intention.

| Variables                                                | Attitude |                  |              | Subjective norms |                  |              | Perceived behavioural control |                  |              | Intention |                  |              |
|----------------------------------------------------------|----------|------------------|--------------|------------------|------------------|--------------|-------------------------------|------------------|--------------|-----------|------------------|--------------|
|                                                          | $\beta$  | 95 % CI          | P-value      | $\beta$          | 95 % CI          | P-value      | $\beta$                       | 95 % CI          | P-value      | $\beta$   | 95 % CI          | P-value      |
| <b>Age (+1 year)<sup>b</sup></b>                         | 0.137    | −0.018 to 0      | 0.060        | −0.012           | −0.049 to 0.025  | 0.535        | 0.012                         | −0.004 to 0.028  | 0.149        | 0.000     | −0.021 to 0.021  | 0.999        |
| <b>Years of experience in PICU (+1 year)<sup>b</sup></b> | 0.009    | −0.003 to 0.021  | 0.141        | 0.020            | −0.004 to 0.044  | 0.099        | 0.005                         | −0.013 to 0.022  | 0.599        | −0.011    | −0.038 to 0.016  | 0.435        |
| <b>Sex</b>                                               |          |                  |              |                  |                  |              |                               |                  |              |           |                  |              |
| Male                                                     | –        | –                | –            | –                | –                | –            | –                             | –                | –            | –         | –                | –            |
| Female                                                   | −0.095   | −0.238 to 0.048  | 0.194        | −0.107           | −0.565 to 0.352  | 0.648        | −0.246                        | −0.475 to −0.018 | <b>0.034</b> | 0.165     | −0.044 to 0.373  | 0.121        |
| <b>Academic qualification:</b>                           |          |                  |              |                  |                  |              |                               |                  |              |           |                  |              |
| Nursing diploma / Bachelor's degree                      | –        | –                | –            | –                | –                | –            | –                             | –                | –            | –         | –                | –            |
| Postgraduate degree/ Master's degree /Specialty / PHD    | −0.337   | −0.452 to −0.223 | <b>0.000</b> | 0.094            | −0.201 to 0.39   | 0.531        | 0.237                         | 0.045 to 0.429   | <b>0.015</b> | −0.003    | −0.155 to 0.149  | 0.970        |
| <b>Type of employment contract</b>                       |          |                  |              |                  |                  |              |                               |                  |              |           |                  |              |
| Permanent                                                | –        | –                | –            | –                | –                | –            | –                             | –                | –            | –         | –                | –            |
| Temporary full time/part time/weekends                   | 0.024    | −0.101 to 0.15   | 0.704        | −0.424           | −0.742 to −0.106 | <b>0.009</b> | 0.145                         | −0.105 to 0.395  | 0.256        | −0.193    | −0.331 to −0.055 | <b>0.006</b> |
| Eventual                                                 | 0.088    | −0.059 to 0.235  | 0.241        | −0.380           | −0.855 to 0.096  | 0.117        | 0.364                         | 0.046 to 0.683   | <b>0.025</b> | 0.000     | −0.276 to 0.277  | 1.000        |
| Other                                                    | −0.259   | −0.565 to 0.046  | 0.096        | −0.391           | −1.29 to 0.508   | 0.394        | −0.476                        | −0.904 to −0.049 | <b>0.029</b> | −0.097    | −0.475 to 0.281  | 0.615        |
| <b>Working shift</b>                                     |          |                  |              |                  |                  |              |                               |                  |              |           |                  |              |
| Morning                                                  | –        | –                | –            | –                | –                | –            | –                             | –                | –            | –         | –                | –            |
| Evening                                                  | 0.098    | −0.132 to 0.327  | 0.404        | 0.017            | −0.834 to 0.867  | 0.969        | −0.135                        | −0.441 to 0.171  | 0.387        | 0.039     | −0.17 to 0.249   | 0.712        |
| 12 h                                                     | 0.029    | −0.158 to 0.216  | 0.762        | 0.085            | −0.458 to 0.628  | 0.759        | −0.062                        | −0.409 to 0.286  | 0.728        | −0.193    | −0.711 to 0.325  | 0.466        |
| Night                                                    | 0.039    | −0.206 to 0.284  | 0.754        | 0.762            | 0.164 to 1.361   | <b>0.013</b> | −0.016                        | −0.423 to 0.391  | 0.938        | −0.030    | −0.322 to 0.263  | 0.842        |
| Rotatory                                                 | −0.276   | −0.422 to −0.129 | <b>0.000</b> | 0.415            | −0.274 to 1.105  | 0.237        | −0.057                        | −0.374 to 0.261  | 0.725        | −0.322    | −0.601 to −0.043 | <b>0.024</b> |
| <b>Combination with assistance practice</b>              |          |                  |              |                  |                  |              |                               |                  |              |           |                  |              |
| Management                                               | –        | –                | –            | –                | –                | –            | –                             | –                | –            | –         | –                | –            |
| Teaching                                                 | 0.455    | −0.019 to 0.929  | 0.060        | 0.711            | −1.198 to 2.621  | 0.465        | −0.354                        | −0.98 to 0.273   | 0.268        | 0.210     | −0.068 to 0.488  | 0.139        |
| Research                                                 | 0.514    | 0.067 to 0.961   | <b>0.024</b> | 0.682            | −1.383 to 2.747  | 0.517        | 0.348                         | −0.073 to 0.77   | 0.105        | −0.123    | −0.559 to 0.313  | 0.580        |
| Only assistance                                          | 0.222    | −0.147 to 0.59   | 0.239        | 0.804            | −1.107 to 2.714  | 0.410        | −0.247                        | −0.724 to 0.23   | 0.310        | 0.072     | −0.366 to 0.51   | 0.747        |
| Teaching and research                                    | 0.296    | −0.162 to 0.754  | 0.205        | 1.035            | −0.832 to 2.901  | 0.277        | 0.111                         | −0.374 to 0.597  | 0.653        | −0.199    | −0.793 to 0.395  | 0.512        |
| <b>PR training</b>                                       |          |                  |              |                  |                  |              |                               |                  |              |           |                  |              |
| No                                                       | –        | –                | –            | –                | –                | –            | –                             | –                | –            | –         | –                | –            |
| Yes                                                      | −0.367   | −0.603 to −0.132 | <b>0.002</b> | 0.212            | −0.083 to 0.508  | 0.159        | −0.027                        | −0.507 to 0.453  | 0.912        | −0.286    | −0.577 to 0.006  | <b>0.055</b> |

Abbreviations:  $\beta$  = beta coefficient; CI = confidence interval.<sup>a</sup> Mixed-effects model with hospitals as a random effect and considering a negative binomial distribution and a log link function.<sup>b</sup> “+1” means a one-unit increase on the scale in the independent variable (i.e., going from 1 to 2, 2 to 3, etc.).

The study proves a predisposition for applying more PR in staff with temporary employment contracts and night shifts. Professional inexperience, changes in the health condition of critical paediatric patients and an increase in nurse/patient ratio imply a higher application of PR to ensure that the quality of assistance is compromised by work overload (Perez et al., 2010; He et al., 2023).

It is important for nurses to recognise that paediatric patients should not be treated as smaller versions of adults. Therefore, it is necessary to adapt to their needs, reasoning capacity, develop communication and negotiation skills. This can be achieved through strategies such as play and with the help of allies such as the family. By doing so, care procedures can be carried out safely while respecting their rights, promoting humanised care at all times and avoiding the use of PR.

### Limitations

The main limitations are found in the selection of the convenient sample type, in not having correlated whether the PICU structural variables might influence the intention of use of the PR, in the derivation of the study type carried out and in the inability to prove a cause effect relationship.

### Conclusions

The paediatric nurses analyzed had a moderate attitude, social pressure and control of the perceived behaviour towards the use of the PR. Moreover, their intention of use is high, the main factors being the patient's anxiety, the scarce analgesic sedation, children affected with pharmacological withdrawal symptoms and patients with a high risk of vital support device removal and fall from bed. Sex, type of employment

contract, academic qualification and PR training are the variables that most influence the intention to use PR. Future research should focus on establishing protocols for the use of the PR ensuring respect for the patients' rights by obtaining informed consent by the patient/legal representative and the constant evaluation of their prescription, continuity and removal. At the same time, it could be interesting to develop multicomponent intervention programmes aimed at changing the culture of professionals and organisations towards the visualisation of PR and modifying attitudes, practices and behaviours.

## Ethical statement

Permits by the nurse manager and by the Ethics and Research Committee from the five hospitals where the study was carried out were obtained: Sant Joan de Déu Children's Hospital (ethical approval number: PIC-176-21; approved date: 04 November 2021); Vall d'Hebron Hospital (ethical approval number: PR(AMI)07/2022; approved date: 28 January 2022); La Paz University Hospital (ethical approval number: PI-5146; approved date: 10 February 2022); 12 October Hospital (ethical approval number: 22/016; approved date: 17 January 2022) and Carlos Haya Regional University Hospital (ethical ratification/acceptance of the coordinating centre (Sant Joan de Déu Hospital) on 24 November 2021).

## CRedit authorship contribution statement

**Alejandro Bosch Alcaraz:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Writing – original draft, Writing – review & editing. **Jesús Corrienero Alegre:** Data curation, Investigation, Supervision, Writing – review & editing. **Sonia Gil Domínguez:** Data curation, Investigation, Supervision, Writing – review & editing. **Patricia Luna Castaño:** Investigation, Supervision, Writing – review & editing. **Pedro Piqueras Rodríguez:** Data curation, Investigation, Supervision, Writing – review & editing. **Sylvia Belda Hofheinz:** Investigation, Supervision, Writing – review & editing. **Data curation. M. Angeles Saz Roy:** Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Esperanza Zuriguel Pérez:** Investigation, Methodology, Writing – review & editing. **Rocío Fernández Lorenzo:** Investigation, Supervision, Writing – review & editing. **María Mata Ferro:** Investigation, Supervision, Writing – review & editing. **Ainhoa Martín Gómez:** Investigation, Supervision, Writing – review & editing. **Marta Serradell Orea:** Investigation, Writing – review & editing. **Marta Martínez Oliva:** Investigation, Writing – review & editing. **Susana González Rivas:** Investigation, Writing – review & editing. **Nerea Añanos Montoto:** Investigation, Writing – review & editing. **María José Espildora González:** Investigation, Writing – review & editing. **Elena Martín-Peñasco Osorio:** Investigation, Writing – review & editing. **Eva Carracedo Muñoz:** Investigation, Writing – review & editing. **Eduardo López Fernández:** Investigation, Writing – review & editing. **Gema Lozano Almendral:** Investigation, Writing – review & editing. **Maria Victoria Ureste Parra:** Investigation, Writing – review & editing. **Alicia Gomez Merino:** Investigation, Writing – review & editing. **Alexandra García Martínez:** Investigation, Writing – review & editing. **David Morales Cervera:** Investigation, Writing – review & editing. **Laura Frade Pardo:** Investigation, Writing – review & editing. **José Miguel García Piñero:** Investigation, Supervision, Writing – review & editing, Data curation.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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