



## SCIENTIFIC LETTER

### Respiratory physiotherapy in Spanish Pediatric and Neonatal Intensive Care Units<sup>☆</sup>



### Fisioterapia respiratoria en Unidades de Cuidados Intensivos pediátricas y neonatales españolas

Dear Editor,

Patients admitted to the Pediatric Intensive Care Unit (PICU) or Neonatal Intensive Care Unit (NICU) often suffer respiratory complications<sup>1</sup> and could benefit from respiratory physiotherapy (RP) techniques that can shorten hospital stay.<sup>2</sup> While the international literature has addressed the role of physiotherapy in PICUs/NICUs,<sup>3,4</sup> no such studies have been published in Spain to date. The present study analyzes the situation of RP in Spanish PICUs/NICUs.

An internal validation was carried out involving 6 experts in RP and with training in Intensive Care and Pediatrics, in order to assess the suitability of form and contents. Following due approval from the Teaching and Research Ethics Committee of the University of A Coruña (CEID-UDC-2018-0019), in September 2019 an electronic survey was sent to the 45 Spanish PICUs/NICUs of the registry of the Spanish Society of Pediatric Intensive Care (*Sociedad Española de Cuidados Intensivos Pediátricos*),<sup>5</sup> addressed to the Physiotherapy coordinator at each center. A period of 6 months was allowed for receiving the reply, with a total of three reminders if needed.

A total of 24 hospitals answered the survey (53.3%): 22 public centers (91.7%) and two private centers (8.3%), with  $26.1 \pm 17.4$  staff physiotherapists, of which two (1–3) were in charge of the service in the PICU/NICU (Table 1). The mean number of beds was  $19.3 \pm 12.9$  (range 5–50), with a physiotherapist / bed ratio of 1/8. The implementation of physiotherapy was dependent upon referral by the Department of Rehabilitation or the specialist in Intensive Care in 16 (66.7%) and four (16.7%) hospitals, respectively. In another four centers (16.7%), RP consultation was directly requested from any specialized physician or – in the case of consultation for motor physiotherapy – from the Department

of Rehabilitation. Twenty answers were obtained regarding the percentage of children that received physiotherapy; specifically,  $37.1 \pm 32.1\%$  of the patients received treatment both in the PICU and in the NICU in 15 Units (75%). In three Units (15%), estimates were made for PICU ( $17.1 \pm 4\%$  of the patients) and NICU ( $14.5 \pm 16.3\%$  of the admitted patients). The remaining two Units (10%) considered the seasonal factor: children treated in summer ( $18.4 \pm 2.3\%$ ) and in winter ( $90 \pm 14.1\%$ ). In one of the NICUs, physiotherapy was provided for all infants with a gestational age of under 28 weeks. The duration of the sessions ranged from 10–35 min, with an average of  $22.5 \pm 7.7$  min. The service was available only in the mornings in 19 of the Units (79.2%), and only on working days in 19 Units (79.2%). On the other hand, 70.8% of those surveyed considered that the number of physiotherapists associated to the service was insufficient to cover the care needs. In 22 of the Units (91.7%), the physiotherapists were not exclusively dedicated to work in the Unit; 14 (63.6%) also offered RP to patients in the ward and 9 (19.8%) to ambulatory patients. In addition, 18 (81.8%) performed physiotherapy in patients admitted to the ward and 14 (63.6%) in outpatient clinics.

Academically, the participants had  $20.3 \pm 5.1$  years of general working experience, and 11 (45.8%) had between 3–10 years of experience in the PICU/NICU. For 19 of the participants (79.2%), having specific training in RP in critical pediatric patients was not a requirement for their job position. At present, 19 (79.2%) have training in RP, and of these, 15 (62.5%) have training in pediatric RP; 14 (58.3%) have training in RP in Intensive Care; and 10 (41.7%) have training in RP and in the management of mechanical ventilation. Only 8 participants (33.3%) had training in all three areas. Lastly, 16 of the Units (66.7%) provided clinical practice training at grade or master level (Table 2).

Our results evidence low commitment of the physiotherapist to the PICU/NICU. This is in contrast to the situation found in Brazil, for example, where 21.2% of the staff physiotherapists are exclusively related to the PICU/NICU.<sup>3</sup> Nevertheless, the physiotherapist / bed ratio is better than in the PICUs in Brazil (1:9.3), in the PICUs/NICUs in Korea (1:20),<sup>3,4</sup> and in Spain referred to adult Intensive Care (1:13).<sup>6</sup> In any case, the situation falls short of the recommendations of the European Society of Intensive Care Medicine (ESICM),<sup>7</sup> which advises a ratio of 1:5.

With regard to the patient referral system, our findings are consistent with those corresponding to adult Intensive Care in Spain, with a Department of Rehabilitation referral rate of 65.1%.<sup>8</sup> Likewise, in terms of the mean duration of each session, our data coincide with those recorded in

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**Table 1** General characteristics of the Intensive Care Units participating in the survey.

| Hospital center                        | Region (Autonomous Community) | City       | Type of hospital center | Type of ICU   | No. of beds | No. of physiotherapists in ICU | Physiotherapist dedication in ICU | Weekend availability of physiotherapy | Patient referral to physiotherapy |
|--|-------------------------------|------------|-------------------------|---------------|-------------|--------------------------------|-----------------------------------|---------------------------------------|-----------------------------------|
| H. Materno Infantil de Granada         | Andalucía                     | Granada    | Public                  | PICU and NICU | 16          | 1                              | Part time                         | No                                    | DR                                |
| H. Materno Infantil de Málaga          | Andalucía                     | Málaga     | Public                  | PICU and NICU | 14          | 3                              | Part time                         | No                                    | DR                                |
| H. Regional de Málaga                  | Andalucía                     | Málaga     | Public                  | PICU and NICU | 40          | 3                              | Part time                         | No                                    | DR                                |
| H. Universitario Virgen del Rocío      | Andalucía                     | Sevilla    | Public                  | PICU and NICU | 38          | 2                              | Part time                         | No                                    | Dependent on demand <sup>a</sup>  |
| H. Universitario Marqués de Valdecilla | Cantabria                     | Santander  | Public                  | PICU          | 6           | 1                              | Part time                         | No                                    | DR                                |
| H. Universitario de Burgos             | Castilla y León               | Burgos     | Public                  | PICU and NICU | 15          | 1                              | Part time                         | No                                    | Specialist ICU                    |
| H. Clínico Universitario de Valladolid | Castilla y León               | Valladolid | Public                  | Mixed         | 9           | 1                              | Part time                         | No                                    | DR                                |
| H. Virgen de la Salud de Toledo        | Castilla y la Mancha          | Toledo     | Public                  | PICU and NICU | 12          | 4                              | Part time                         | No                                    | DR                                |
| H. de la Santa Creu y Sant Pau         | Catalonia                     | Barcelona  | Public                  | PICU and NICU | 8           | 1                              | Part time                         | Yes                                   | DR                                |
| H. Sant Joan de Déu                    | Catalonia                     | Barcelona  | Private                 | PICU and NICU | 24          | 2                              | Full time                         | Yes                                   | DR                                |
| H. Universitari Vall d'Hebron          | Catalonia                     | Barcelona  | Public                  | PICU and NICU | 20          | 1                              | Part time                         | No                                    | DR                                |
| H. Universitari Parc Taulí             | Catalonia                     | Sabadell   | Private                 | PICU and NICU | 17          | 2                              | Part time                         | No                                    | Specialist ICU                    |
| H. Universitario General de Castellón  | Valencian Community           | Castellón  | Public                  | Mixed         | 5           | 2                              | Part time                         | Yes                                   | DR                                |
| H. Materno Infantil Badajoz            | Extremadura                   | Badajoz    | Public                  | PICU and NICU | 9           | 2                              | Part time                         | No                                    | DR                                |

Table 1 (Continued)

| Hospital center                                    | Region (Autonomous Community) | City                   | Type of hospital center | Type of ICU   | No. of beds | No. of physiotherapists in ICU | Physiotherapist dedication in ICU | Weekend availability of physiotherapy | Patient referral to physiotherapy |
|--|-------------------------------|------------------------|-------------------------|---------------|-------------|--------------------------------|-----------------------------------|---------------------------------------|-----------------------------------|
| H. Universitario Materno Infantil de A Coruña      | Galicia                       | A Coruña               | Public                  | PICU and NICU | 9           | 1                              | Part time                         | Yes                                   | Dependent on demand <sup>a</sup>  |
| H. Clínico Universitario de Santiago de Compostela | Galicia                       | Santiago de Compostela | Public                  | PICU and NICU | 7           | 1                              | Part time                         | No                                    | DR                                |
| H. Nuestra Señora de Candelaria                    | Canary Islands                | Tenerife               | Public                  | PICU and NICU | 16          | 2                              | Part time                         | No                                    | DR                                |
| H. Clínico San Carlos                              | Madrid                        | Madrid                 | Public                  | PICU and NICU | 30          | 2                              | Part time                         | No                                    | Specialist ICU                    |
| H. La Paz  | Madrid                        | Madrid                 | Public                  | PICU and NICU | 50          | 4                              | Full time                         | No                                    | DR                                |
| H. General Gregorio Marañón                        | Madrid                        | Madrid                 | Public                  | PICU and NICU | 35          | 6                              | Part time                         | Yes                                   | DR                                |
| H. Universitario 12 de Octubre                     | Madrid                        | Madrid                 | Public                  | PICU and NICU | 35          | 4                              | Full time                         | No                                    | DR                                |
| H. Universitario Ramón y Cajal                     | Madrid                        | Madrid                 | Public                  | Mixed         | 8           | 2                              | Full time                         | No                                    | Specialist ICU                    |
| H. General Universitario Santa Lucía               | Murcia                        | Cartagena              | Public                  | NICU          | 6           | 1                              | Part time                         | No                                    | Dependent on demand <sup>a</sup>  |
| H. Universitario de Cruces                         | Basque Country                | Vizcaya                | Public                  | PICU and NICU | 24          | 9                              | Full time                         | No                                    | DR                                |

H: hospital; DR: Department of Rehabilitation; NICU: Neonatal Intensive Care Unit; PICU: Pediatric Intensive Care Unit.

<sup>a</sup> If consultation is due to a disorder of respiratory origin, referral is dependent on the specialist in the ICU or the pneumologist, while in the case of disorders of locomotor origin, referral is made by DR.

**Table 2** PICUs and NICUs offering university clinical training in physiotherapy.

| Hospital center                            | University   | Academic title                            |
|--|--|---|
| H. Materno Infantil Málaga                 | Universidad de Ciencias de la Salud de Málaga  | Degree in Physiotherapy                   |
| H. Regional de Málaga                      | Universidad de Ciencias de la Salud de Málaga  | Degree in Physiotherapy                   |
| H. Universitario Marqués de Valdecilla     | Universidad Gimbernat de Cantabria (Campus Torrelavega)  | Title not specified                       |
| H. de la Santa Creu y Sant Pau             | Universidad Autónoma de Barcelona  | Title not specified                       |
| H. Sant Joan de Déu                        | Universidad Autónoma de Barcelona (Escuela Universitaria de la Gimbernat)  | Degree in Physiotherapy                   |
| H. Universitari Vall d'Hebron              | Universidad Autónoma de Barcelona (Escuela Universitaria de la Gimbernat)  | Degree in Physiotherapy                   |
|  | Universidad Autónoma de Barcelona (Escuela Universitaria de la Gimbernat) and Escuela Universitaria de Fisioterapia de la ONCE de Madrid | Master not specified                      |
| H. Universitari Parc Taulí de Sabadell     | Universidad Autónoma de Barcelona (Escuela Universitaria de la Gimbernat) and Fundación Universitaria del Bages                          | Master in Thoracic Physiotherapy          |
| H. Materno infantil Badajoz                | Universidad de Extremadura   | Degree in Physiotherapy                   |
| H. Universitario Nuestra Señora Candelaria | Universidad de La Laguna   | Title not specified                       |
| H. General Universitario Gregorio Marañón  | Universidad Complutense de Madrid and Universidad Pontificia de Salamanca  | Title not specified                       |
| H. Clínico San Carlos                      | Universidad Complutense de Madrid  | Degree in Physiotherapy                   |
| H. La Paz                                  | Centro Universitario La Salle, Escuela Universitaria de Fisioterapia de la ONCE de Madrid, Universidad Nebrija                           | Degree in Physiotherapy                   |
| H. Universitario 12 de Octubre             | Universidad Complutense and Universidad Pontificia de Comillas   | Degree in Physiotherapy                   |
| H. Universitario Ramón y Cajal             | Universidad de Alcalá  | Degree in Physiotherapy                   |
| H. General Universitario Santa Lucía       | Universidad Católica San Antonio de Murcia   | Title not specified                       |
| H. Universitario de Cruces                 | Escuela Universitaria de Fisioterapia de la ONCE de Madrid   | Master in Cardiorespiratory Physiotherapy |

H: hospital.

Korea,<sup>4</sup> where 36.2% of the participants reported a duration per session of under 10 min and 29.3% less than 30 min. The same situation was found in adult Intensive Care in Spain, where the mean duration of the rehabilitation sessions was 16–30 min.<sup>6</sup> Thus, the characteristics identified in our study do not comply with the standards and recommendations referred to the quality of Intensive Care published by the Spanish Ministry of Health,<sup>9</sup> which estimate that each patient requires at least 30 min a day of physiotherapy.

On the other hand, the ESICM<sup>7</sup> recommends that physiotherapists who work in the Intensive Care Unit (ICU) should do so full time, with a coverage of 7 days a week. While this objective is not met by the analyzed Spanish PICUs/NICUs, at European level 75% of the adult ICUs have at least one or two physiotherapists with full time dedication.<sup>10</sup> In relation to weekly coverage of the service, our results fall short of those recorded by the hospitals in Barcelona, where the percentage reaches 47%,<sup>6</sup> and of those published in Europe, with a percentage of 83%.<sup>10</sup> Lastly, nocturnal service was inexistent in the Units participating in our study, and very low in the Spanish adult ICUs<sup>8</sup> — while the figure reaches 34% in the European general ICUs.<sup>10</sup>

As limitations of the present study, replies were not obtained from all the hospitals with PICU/NICU, despite the long time allowed for them to reply. In turn, most of the

centers belonged to the Spanish public healthcare system, which might not be representative of the situation of RP in the PICUs/NICUs of private centers.

The present study underscores the need to integrate physiotherapists within the interdisciplinary teams of the Spanish PICUs/NICUs, facilitating direct patient referral to physiotherapy on the part of the specialist in Intensive Care, and with exclusive and full-time dedication.

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### Conflicts of interest

None.

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## Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.medine.2022.04.001>.

## References

- Morrow CB, McGrath-Morrow SA, Collaco JM. Predictors of length of stay for initial hospitalization in infants with bronchopulmonary dysplasia. *J Perinatol*. 2018;38:1258–65.
- Andersson-Marforio S, Lundkvist Josenby A, Ekvall Hansson E, Hansen C. The effect of physiotherapy including frequent changes of body position and stimulation to physical activity for infants hospitalised with acute airway infections. Study protocol for a randomised controlled trial. *Trials*. 2020;21:803.
- Liberali J, Davidson J, Nunes dos Santos A. Availability of physical therapy assistance in neonatal intensive care units in the city of São Paulo, Brazil. *Rev Bras Ter Intensiva*. 2014;26:57–64.
- Kim ST, Lee J-H. A survey on the current status of neonatal physical therapy in South Korea. *J Korean Phys Ther*. 2020;32:169–76.
- SECIP: Sociedad Española de Cuidados Intensivos Pediátricos [Accessed 3 June 2020]. Available from: [www.secip.com/nosotros/cip-en-espana/ucips-en-espana](http://www.secip.com/nosotros/cip-en-espana/ucips-en-espana), 2010.
- Lathrop Ponce de León C, Castro Rebollo P. Estado actual de la labor de los fisioterapeutas en las unidades de cuidados intensivos de adultos del área metropolitana de Barcelona. *Fisioterapia*. 2019;41:258–65.
- Valentín A, Ferdinande P, ESICM Working Group on Quality Improvement. Recommendations on basic requirements for intensive care units: structural and organizational aspects. *Intensive Care Med*. 2011;37:1575–87.
- Raurell-Torredà M, Arias-Rivera S, Martí JD, Frade-Mera MJ, Zaragoza-García I, Gallart E, et al. Grado de implementación de las estrategias preventivas del síndrome post-UCI: estudio observacional multicéntrico en España. *Enferm Intensiva*. 2019;30:59–71.
- Unidades de cuidados intensivos: estándares y recomendaciones. Madrid: Ministerio de Sanidad y Política Social; 2010. Available from: [www.msc.es/organizacion/sns/planCalidadSNS/docs/UCI.pdf](http://www.msc.es/organizacion/sns/planCalidadSNS/docs/UCI.pdf)
- Norrenberg M, Vincent J-L, with the collaboration of the European Society of Intensive Care Medicine. A profile of European intensive care unit physiotherapists. *Intensive Care Med*. 2000;26:988–94.

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## Comparison of the clinical characteristics and mortality in acute respiratory distress syndrome due to COVID-19 versus due to Influenza A-H1N1pdm09



## Comparación de las características clínicas y mortalidad debidas a Síndrome de Dístres Respiratorio Agudo debido a COVID-19 versus Influenza A-H1N1pdm09

Dear Editor:

Severe pneumonia with the Influenza A-H1N1 virus was first reported in Mexico in April 2009,<sup>1</sup> causing acute hypoxemic respiratory failure (AHRF), acute respiratory distress syndrome (ARDS), with an associated mortality ranging from 25.1–41% at different sites.<sup>2</sup> The World Health Organization estimates that influenza affect 5–10% of adults and up to 20–30% of children, especially in immunosuppressed, at extremes of life, and in persons with comorbidities<sup>3</sup> and causes approximately 390,000 deaths annually.

The outbreak of respiratory infection by the novel SARS-CoV-2 started in December 2019, in Wuhan (Hubei Province),

China.<sup>4</sup> From this city, the outbreak has been spreading to most countries worldwide in a severe pandemic.<sup>5</sup> Up to December 3, 2020, the COVID-19 pandemic has given rise to a total of 62 million cases and 1.4 million deaths around the world,<sup>5</sup> mainly due to respiratory failure, although a long list of complications in various organs and systems have been described. The COVID-19 disease is associated with severe pneumonia, AHRF, and ARDS, requiring intensive care and ventilatory assistance in up to 5% of cases, and with a reported mortality ranging from 30–60% (average 41%) at different sites.<sup>6</sup> We wondered how case-fatality compares between ARDS-COVID-19 and ARDS-Influenza (A-H1N1), adjusting for known prognostic risk factors and obtained clinical chart information from consecutive patients with Influenza H1N1 (October 2019 to February 2020, prior to the COVID-10 outbreak) and patients with COVID-19 (March 2020 to October 2020). All patients had a positive viral RT-PCR test and fulfilled the 2012 Berlin Definition of Acute Respiratory Distress Syndrome. Patients with Influenza received Oseltamivir at 150 mg daily for at least 5 days, and those with COVID-19 received various treatments that frequently included corticosteroids. The study was approved by the institutional ethics committee and informed consent was not required. The identity of the patients was protected.