



ORIGINAL ARTICLE

Point-of-care ultrasound in Spanish paediatric intensive care units[☆]



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KEYWORDS

Ultrasound;
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Abstract

Introduction: Point-of-care (bedside) ultrasound is being increasingly used by paediatricians who treat critically ill children. The aim of this study is to describe its availability, use, and specific training in Paediatric Intensive Care Units in Spain.

Material and methods: A descriptive, cross-sectional, multicentre study was performed using an online survey.

Results: Of a total of 51 PICUs identified in our country, 64.7% responded to the survey. Just over half (53.1%) have their own ultrasound machine, 25% share it, with other units with the usual location in the PICU, and 21.9% share it, but it is usually located outside the PICU. Ultrasound machine availability was not related to size, care complexity, or number PICU admissions. The ultrasound was used daily in 35% of the units, and was associated with the location of the machine in the PICU ($P = .026$), the existence of a transplant program ($P = .009$), availability of ECMO ($P = .006$), and number of admissions ($P = .015$). 45.5% of PICUs have less than 50% of the medical staff specifically trained in bedside ultrasound, and 18.2% have all their medical staff trained. The presence of more than 50% of medical staff trained was associated with a higher rate of daily use ($P = .033$), and with specific use to evaluate cardiac function ($P = .033$), intravascular volume estimation ($P = .004$), or the presence of intra-abdominal collections ($P = .021$).

Conclusions: Bedside ultrasound is frequently available in Spanish PICUs. Specific training is still variable, but it should serve to enhance its implementation.

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PALABRAS CLAVE

Ecografía;
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Ecografía en el punto de cuidado en las unidades de cuidados intensivos pediátricos españolas**Resumen**

Introducción: La ecografía a pie de cama es cada vez más utilizada por los pediatras que tratan a niños críticos. El objetivo del estudio es describir la disponibilidad, el uso y la formación específica existente para esta técnica en las UCIP de nuestro entorno.

Material y métodos: Se realizó un estudio descriptivo transversal multicéntrico mediante una encuesta en línea.

Resultados: Se identificaron 51 UCIP en nuestro país, el 64,7% respondió a la encuesta. El 53,1% dispone de ecógrafo propio, el 25% lo comparte con otras unidades ubicándose en la unidad y el 21,9% dispone de él pero está ubicado en otra unidad. La disponibilidad de ecógrafo no se relacionó con el tamaño, la complejidad asistencial o el número de ingresos anuales. El 35% emplea la ecografía diariamente; esto se relacionó con la ubicación del ecógrafo en la unidad ($p=0,026$), con la realización de trasplantes ($p=0,009$), la disponibilidad de ECMO ($p=0,006$) y con el número de ingresos anuales ($p=0,015$). El 45,5% tiene menos del 50% de sus médicos con formación específica; el 18,2% ha formado a todos sus médicos. La presencia de más del 50% de médicos formados se asoció con mayor utilización a diario ($p=0,033$) y con su uso para evaluar la función cardíaca ($p=0,033$), la volemia ($p=0,004$) o la presencia de líquido intraabdominal ($p=0,021$).

Conclusiones: La ecografía a pie de cama es una técnica frecuentemente disponible en las UCIP españolas. La formación específica para su uso es hasta el momento heterogénea pero debe servir para potenciar su implantación.

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Introduction

Point-of-care, bedside or clinical ultrasonography is defined as ultrasonography performed by the doctor in charge directly where the patient is for clinical assessment. It is used for addressing specific problems or questions immediately and in real time.¹ Compared to ultrasonography performed by radiologists, which can provide more comprehensive and accurate information, point-of-care ultrasound usually focuses on yes/no questions to facilitate diagnosis and especially on procedural guidance.¹ Furthermore, since it is easily repeatable, it can be used to assess changes in different clinical situations or conditions.

The size of paediatric patients facilitates the access of ultrasound waves to different organs while obtaining high-quality images. This fact, along with the elimination of the risks associated with the use of ionising radiation techniques, is clearly stimulating an increase in the use of ultrasonography.^{2,3} Decreasing costs, decreasing size and improvements in the specifications of ultrasonography systems in recent years have also been essential in the expansion of its use outside radiology units.

It has multiple applications in the field of paediatrics, which are clearly expanding.⁴⁻⁶ This is demonstrated by the increasing availability of ultrasound units in the paediatric emergency departments of some countries, as well as its increasingly frequent inclusion in clinical practice guidelines and training curriculums of different specialties.⁷⁻⁹

Paediatric critical care and emergency care are probably the fields in which the use of bedside ultrasonography

by the paediatrician in charge is becoming most widespread. This is probably due to several factors, such as the immediacy of its use, the possibility of performing serial assessments, and above all the increasing number of clinical applications. More specifically, in the field of intensive care, there is evidence that ultrasonography can be used by critical care physicians to guide the performance of other techniques, such as establishing vascular access^{10,11} or the drainage of effusions in different locations.¹² Furthermore, clinical ultrasonography can be used to answer specific questions regarding multiple organs and systems, and has demonstrated a high sensitivity and specificity in the diagnosis of various lung diseases.¹³ It allows the assessment of different aspects to determine the haemodynamic status of a patient, such as myocardial contractility or blood volume,^{14,15} detect the presence of intra-abdominal lesions¹⁶ or assess changes in blood flow in different vital organs, such as the brain¹⁷ or kidneys.¹⁸

To date, although some studies have found clear evidence of its increasing use in adult intensive care units and paediatric emergency departments,⁷ only one study conducted in the United States has described its availability and the characteristics of its use in paediatric intensive care units (PICUs).¹⁹

The main objective of our study was to characterise the availability and use of point-of-care ultrasonography in Spanish PICUs. More specifically, we sought to identify the most widely used clinical applications. Our secondary objective was to determine the level of training on the use of

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