



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



# medicina *intensiva*

<http://www.medintensiva.org/en/>



## POINT OF VIEW

### Inclusion of protocols for the prevention and management of delirium in PICUs: Emerging challenges in the care of pediatric critical patients

### Inclusión de protocolos para la prevención y manejo del delirium en las UCIP: desafíos emergentes en el cuidado del paciente crítico pediátrico

M. Padilla Lamadrid<sup>a</sup>, C. Durantez-Fernández<sup>b,\*</sup>, M.Á. Barba-Pérez<sup>c,d</sup>

<sup>a</sup> Hospital Universitario Río Hortega, Valladolid, Spain

<sup>b</sup> Departamento de Enfermería, Fisioterapia y Terapia Ocupacional, Facultad de Ciencias de la Salud, Universidad de Castilla-La Mancha, Talavera de la Reina, Toledo, Spain

<sup>c</sup> Hospital Clínico Universitario de Valladolid (HCUV), Valladolid, Spain

<sup>d</sup> Grupo de Investigación en Cuidados de Enfermería (GICE), Departamento de Enfermería, Universidad de Valladolid, Valladolid, Spain

Received 4 April 2022; accepted 30 May 2022

Acute confusional state or delirium is one of the most common complications associated with stays at the intensive care unit (ICU) setting. This disorder affects over half of the critically ill patients admitted to these units, which increases the length of stay (LoS), the annual hospital costs, and is independently associated with a higher mortality risk.<sup>1</sup>

The main challenges associated with this disorder are its prevention, and early detection, and management. Different medical associations like the Society of Critical Care Medicine and the Spanish Society of Intensive and

Critical Care Medicine and Coronary Units claim that especially after the COVID-19 pandemic, the early identification of this disorder in critically ill patients is of paramount importance.<sup>2</sup> Also, they discuss measures like the ABCDEF algorithm as the cornerstone of the pharmacological management of delirium.<sup>1</sup> Despite showing some implementation difficulties, these measures have proven capable of reducing the duration of delirium and the patients' LoS. This was initially exposed in the studies conducted by Ely and Marra et al.<sup>3,4</sup> that discussed the measures that could improve the management of critically ill patients. Among these measures—particularly letter «D» from the ABCDEF algorithm—the authors stress out the importance of assessment, prevention, and management of delirium in adult patients.

The same tendency has arrived at the pediatric setting where specific guides and protocols are scarce, especially in our country. Over the past decade, different scales have

DOI of original article: <https://doi.org/10.1016/j.medine.2022.05.006>

\* Corresponding author.

E-mail address: [carlos.durantez@uclm.es](mailto:carlos.durantez@uclm.es)  
(C. Durantez-Fernández).

<https://doi.org/10.1016/j.medine.2022.05.012>

2173-5727/© 2022 Elsevier España, S.L.U. and SEMICYUC. All rights reserved.

Please cite this article as: M. Padilla Lamadrid, C. Durantez-Fernández and M.Á. Barba-Pérez, Inclusion of protocols for the prevention and management of delirium in PICUs: Emerging challenges in the care of pediatric critical patients, *Medicina Intensiva*, <https://doi.org/10.1016/j.medine.2022.05.012>

**Table 1** Cornell assessment of pediatric delirium.

If RASS score $-4$ or $-5$ (deep sedations/does not wake up) CAPD won't be necessary				
1. Does the child make contact with the caregiver?				
2. Are the child's actions purposeful?				
3. Is the child aware of his/her surroundings?				
4. Does the child communicate needs and wants?				
4 (Never)	3 (Rarely)	2 (Occasionally)	1 (Often)	0 (Always)
5. Is the child restless?				
6. Is the child inconsolable?				
7. Is the child underactive—very little movement while awake?				
8. Does it take the child a long time to respond to interactions?				
0 (Never)	1 (Rarely)	2 (Occasionally)	3 (Often)	4 (Always)
Presence of delirium if overall score $\geq 9$				

been developed and validated for the detection of delirium in the pediatric patient such as the Pediatric Confusion Assessment Method for the Intensive Care Unit or the Sophia Observation withdrawal Symptoms scale, and among them, the Cornell Assessment of Pediatric Delirium (Table 1).<sup>5</sup> Despite of this, different trials conducted recently show how difficult it is for healthcare professionals to identify this disorder—misdiagnosed in up to 71% of the cases—since routine screening is conducted in 2% of the cases only.<sup>6</sup>

The studies and surveys conducted so far show the need to train pediatric intensive care units (PICU) personnel on the management of delirium, especially in the identification and control of the risk factors that can eventually trigger it.<sup>6,7</sup> Similarly, they focus on a certain paradigm shift and greater safety perception from the PICU staff after being trained on the management of delirium and, especially, after the adoption of guidelines on the multidisciplinary management of this entity. The use of these guidelines improves communication among the different health professionals involved and, implicitly, the management of pain and sedation in children.<sup>8</sup>

Following this multidisciplinary line of work and in compliance with the evidence reviewed, the prevention and management of this disorder in children is based on controlling the modifiable risk factors involved which, added to the patient's underlying disease, can trigger delirium. These risk factors include pharmacological and non-pharmacological elements, so they need the participation of different health professionals for a holistic approach of these patients. Therefore, the evidence available to this date confirms the need to include measures aimed not only at preventing and assessing delirium, but also at detecting its possible causes. The use of different acronyms helps here like those collected by different working groups like I WATCH DEATH or BRAIN MAPS that reveal some of the causes that can lead to the appearance of this disorder.<sup>9,10</sup> At this point, a distinction should be made regarding symptom overlap between delirium and abstinence syndrome or pharmacological withdrawal. In this case, more than a limitation for the early detection of delirium, deprivation syndrome can be among the causes of acute confusional state, which is why some

authors say that the goal here is to determine and treat the cause of delirium rather than somehow «segment» its approach.<sup>11</sup> On the other hand, there is no doubt that sedation and analgesia protocols are of paramount importance to reduce the use of benzodiazepines and overdosing in children. However, a universal sedation protocol has not been established yet. As a matter of fact, this is one of the main challenges posed by the management of delirium in children.

Over the last few years, different working groups have conducted pre- and postoperative studies to determine the room for improvement associated with the use of measures to assess and control this disorder, and the possible difficulties involved while trying to implement them. These studies have been promising reducing the prevalence of delirium—especially in children under 5—and increasing compliance regarding the screening of delirium by healthcare professionals.<sup>9,12</sup> Although there are different variables like the LoS at the ICU setting, results have been inconclusive.<sup>10</sup>

One of the most common complaints made by the health professionals after implementing these measures is how difficult it is to balance the management of patients and the observance of scales and delirium prevention measures due to working load constraints and the limited amount of time available for each patient. Another aspect that seems to prevent the proper development of screening is the fact that the hours selected for this purpose are not the most suitable ones since they coincide with the heaviest working loads during the shifts.<sup>13</sup> Simplifying these measures or adding them to easy-to-read algorithms would favor the implementation and observance of these measures by the health professionals. In this context, one of the scales that seems to reduce the time of screening because of how easy it is to use, and because it has shown a high correlation and reliability compared to other scales that study sedation in critically ill children is the Richmond Agitation Sedation Scale<sup>14</sup> (Table 2). On this regard, the use of the algorithm included in Fig. 1 is suggested. This algorithm includes measures aimed at prevention, early detection, and management of delirium based on a review of the current evidence available.

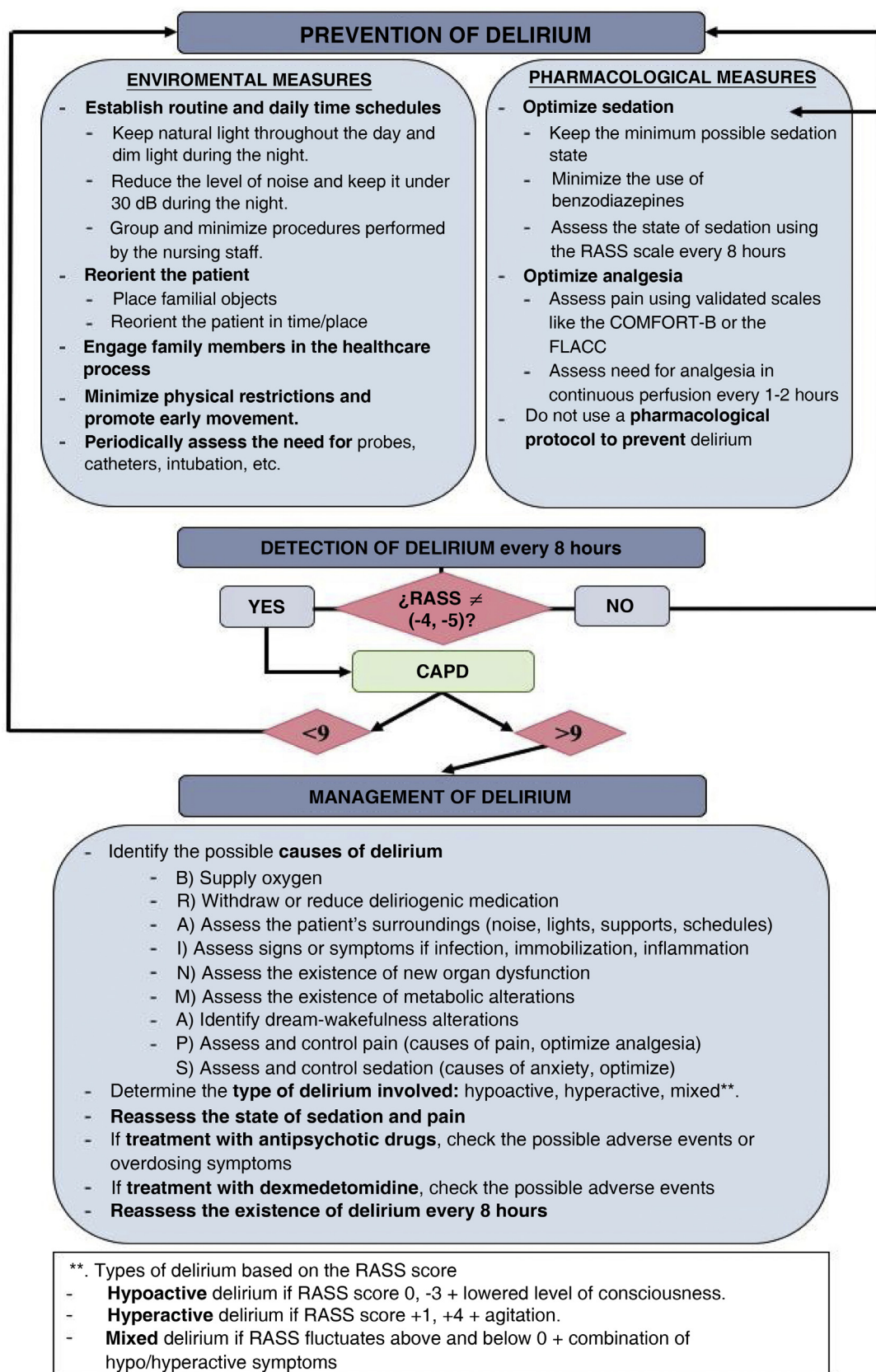


Figure 1 Algorithm for the prevention, detection, and management of pediatric delirium.

**Table 2** Richmond agitation sedation scale.

4	Combative	Overtly combative, violent, immediate danger to staff
3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive
2	Agitated	Frequent non-purposeful movement, fights ventilator
1	Restless	Anxious but movements not aggressive vigorous
0	Alert and calm	
-1	Drowsy	Not fully alert but has sustained awakening. Eye-opening/eye contact +10 s
-2	Light sedation	Briefly awakens with eye contact to voice. Eye-opening/eye contact -10 s
-3	Moderate sedation	Movement or eye opening to voice (but no eye contact).
-4	Deep sedation	Unresponsive to voice, but movement or eye opening to physical stimulation
-5	Unarousable	Unresponsive to voice or physical stimulation

There is no question that raising awareness on the importance of all that surrounds the critically ill patient improves this culture of care at the ICU setting in our country. However, more effort and dedication are needed to develop and implement protocols and measures to ease the management of pediatric critically ill patients. Another possible line of work here could be to detect the difficulties we face and recognize the areas of knowledge where those in charge of these patients still find barriers or limitations. Training, motivation, and the involvement of different health professionals are essential to improve care and bring pharmacological and non-pharmacological strategies to terms regarding the management of pediatric delirium.

## Conflicts of interest

None whatsoever.

## References

1. Mart MF, Williams S, Salas B, Pandharipande PP, Wesley E. Prevention and management of delirium in the Intensive Care Unit. *Semin Respir Crit Care Med.* 2021;42:112–26, <http://dx.doi.org/10.3389/fped.2022.826259>.
2. Giménez-Esparza C, Alcántara S, García M. Delirium y COVID-19. Aspectos prácticos de una frecuente asociación. *Med Intensiva.* 2022;46:336–40, <http://dx.doi.org/10.1016/j.medin.2021.12.013>.
3. Ely EW. The ABCDEF bundle: science and philosophy of how ICU liberation serves patients and families. *Crit Care Med.* 2017;45:321–30, <http://dx.doi.org/10.1097/ccm.0000000000002175>.
4. Marra A, Ely EW, Pandharipande PP, Patel MB. The ABCDEF bundle in critical care. *Crit Care Clin.* 2017;33:225–43, <http://dx.doi.org/10.1016/j.ccc.2016.12.005>.
5. Traube C, Silver G, Kearney J, Patel A, Atkinson TM, Yoon MJ, et al. Cornell Assessment of Pediatric Delirium: a valid, rapid, observational tool for screening delirium in the PICU\*. *Crit Care Med.* 2014;42:656–63, <http://dx.doi.org/10.1097/CCM.0b013e3182a66b76>.
6. Bryant KJ. Pediatric delirium in the cardiac intensive care unit: identification and intervention. *Crit Care Nurse.* 2018;38:1–7, <http://dx.doi.org/10.4037/ccn2018947>.
7. McGetrick ME, Lach C, Mullen JE, Muñoz Pareja JC. Assessing nursing and pediatric resident understanding. *Crit Care Nurs Clin North Am.* 2019;31:481–8, <http://dx.doi.org/10.1016/j.cnc.2019.07.003>.
8. Staveski SL, Wu M, Tesoro TM, Roth SJ, Cisco MJ. Inter-professional perception of care delivery after implementation of a pediatric pain and sedation protocol. *Crit Care Nurse.* 2017;37:66–76, <http://dx.doi.org/10.4037/ccn2017538>.
9. Simone S, Edwards S, Lardieri A, Walker LK. Implementation of an ICU bundle: an interprofessional quality improvement project to enhance delirium management and monitor delirium prevalence in a single PICU. *Pediatr Crit Care Med.* 2017;18:531–40, <http://dx.doi.org/10.1097/PCC.0000000000001127>.
10. Michel J, Schepan E, Hofbeck M, Engel J, Simma A, Neunhoffer F, et al. Implementation of a delirium bundle for pediatric intensive care patients. *Front Pediatr.* 2022;10:826259, <http://dx.doi.org/10.3389/fped.2022.826259>.
11. Ista E, van Dijk M. We can not compartmentalize our patients! Overlapping symptoms of iatrogenic withdrawal syndrome, pediatric delirium, and anticholinergic toxidrome. *Pediatr Crit Care Med.* 2017;18:603–4, <http://dx.doi.org/10.1097/pcc.0000000000001163>.
12. Di Nardo M, Boldrini F, Broccati F, Cancani F, Satta T, Stoppa F, et al. The LiberAction Project: implementation of a pediatric liberation bundle to screen delirium, reduce benzodiazepine sedation, and provide early mobilization in a human resource-limited pediatric intensive care unit. *Front Pediatr.* 2021, <http://dx.doi.org/10.3389/fped.2021.788997>.
13. Franken A, Sebbens D, Mensik J. Pediatric delirium: early identification of barriers to optimize success of screening and prevention. *J Pediatr Health Care.* 2019;33:228–33, <http://dx.doi.org/10.1016/j.pedhc.2018.08.004>.
14. Tapia R, López-Herce J, Arias A, del Castillo J, Mencía S. Validity and reliability of the Richmond Agitation-Sedation Scale in pediatric intensive care patients: a multicenter study. *Front Pediatr.* 2022, <http://dx.doi.org/10.3389/fped.2021.795487>.