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Summary / *Sumario*

SCIENTIFIC LETTER / *CARTA CIENTÍFICA*

LETTER TO THE EDITOR / *CARTA AL EDITOR*

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EDITORIAL

Mental Health in Pediatric Emergency Departments

Lorena Algarrada Vico[1], Lorena Vázquez Gómez[2] y Grupo de Salud Mental de la SEUP

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In recent years, there has been a steady rise in psychological distress among children and adolescents, contributing to an increased number of diagnosed mental disorders in this population. This trend has led to more visits to mental health and primary care services, as well as a marked increase in psychiatric emergencies and the demand for hospitalization among adolescents. In this context, it can be said that we are facing a true global mental health crisis.

In Spain, a significant deterioration in the mental health of children and adolescents has been observed, particularly since the onset of the COVID-19 pandemic[1]. Studies conducted by various non-governmental organizations, including UNICEF, the ANAR Foundation, and Save the Children, have emphasized the impact of the pandemic. In 2021, Save the Children published a report comparing official data from the 2017 National Health Survey with data collected through a telephone survey of parents in 2021. The findings indicated that anxiety and depressive disorders had nearly quadrupled (from 1.1% to 4% of respondents), while attention-deficit/hyperactivity disorder (ADHD) and other behavioral disorders had tripled (from 2.5% to 7%)[2].

Likewise, an increase in the prevalence of psychosomatic symptoms and a decrease in the mean age of symptom onset have been observed, both in cases of self-injurious behavior and suicide attempts[3], as well as in eating disorders. The latter have become not only more frequent but also more severe compared to the pre-pandemic period[4].

Nevertheless, it should be noted that this trend had already been observed in previous years, particularly since 2017, both at the national and European levels.

At the national level, the 2017 National Health Survey (ENSE)[5] estimated that 13.2% of children between 4 and 14 years of age were at risk of poor mental health, with a prevalence of 15.6% in males and 10.5% in females. Similarly, the 2023 Barometer of Youth, Health, and Well-being[6] indicated that 15.6% of adolescents aged 15 to 19 reported frequently experiencing mental health problems, with a marked sex difference (20.7% in females vs. 13.3% in males). Regarding the most common diagnoses, behavioral and hyperactivity disorders, anxiety disorders, depression, and autism spectrum disorders (ASD) predominated in the 4–14 age group. Among adolescents over 15 years of age, anxiety, depressive disorders, and other mental health conditions were most frequently reported[7].

Another important aspect to highlight is the increase in suicide deaths among children and adolescents in recent years, now considered the leading cause of non-accidental death in this population in our country. According to the Observatory of Suicide in Spain, in 2021, 22 suicide deaths were recorded for the first time among children under 15 years of age, with the number of cases in males doubling compared to 2020 (14 vs. 7). Similarly, in 2022, suicide deaths among adolescents aged 15 to 19 increased from 53 in 2021 to 75 cases. In 2023, suicide deaths in children under 15 declined compared to previous years (10 deaths), with a suicide rate of 0.15%. Notably, and in contrast to previous years, these deaths were more frequent in females than in males (0.22% vs. 0.09%). The opposite pattern was observed in older age groups (15 to 29 years), where the suicide rate rose to 4.63%, with higher rates in males (6.83%) compared to females (2.63%)[8].

At the European level, data from the 2024 UNICEF report indicate that approximately 13% of children under 19 years of age have experienced a mental health disorder, with higher rates among males up to age 14 and greater prevalence among females between ages 14 and 19[9].

In light of the data presented, a key aspect in addressing mental disorders in pediatric emergency departments is the ethical and structural debate regarding the limits of healthcare. As noted by the Psychiatry Working Group of AEPNYA in its recent reflection on child and adolescent mental health emergencies[10], many of the cases presenting to emergency departments do not constitute clinical emergencies in the strict sense, but rather reflect profound distress arising

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from contexts of social vulnerability that are insufficiently addressed. As the members of this Working Group conclude in this report, the lack of resources and poor coordination with social and educational services place a care burden on the health system that exceeds its intended scope. This scenario calls for rigorous analysis and coordinated intersectoral action to establish comprehensive, ethical, and sustainable responses over time[10].

In this regard, with respect to human and structural resources dedicated to mental health in Pediatric Emergency Departments, findings from the preliminary study conducted by our group, presented in May 2025 at the XXIX Meeting of the Spanish Society of Pediatric Emergency Medicine (SEUP), reveal that in 92.3% of participating centers, initial care for minors with psychiatric disorders is provided by a pediatrician, and only 38.4% have spaces specifically equipped for this purpose. Additionally, in 61.5% of centers, access to specialized psychiatric assessment depends on the time of day, and 30.7% lack inpatient beds for minors with mental disorders, necessitating transfer to other facilities. These findings clearly point to a substantial margin for improvement and underscore the need to establish common standards and enhance coordination between care services.

Another important challenge in pediatric emergency departments is improving the care of patients with ASD. These patients, who are particularly vulnerable to sensory overstimulation and the unpredictable nature of emergency department routines, require adapted care pathways that promote safe and respectful treatment. Currently, significant gaps remain in professional training, the design of physical spaces, and the availability of appropriate clinical protocols, stressing the need to implement structural and educational measures to ensure high-quality care for this population[11].

The Mental Health Working Group of SEUP is promoting several initiatives to better understand the current state of care and to support structural and clinical improvements. Among these, an upcoming national and international survey on the initial care of patients with ASD in Pediatric Emergency Departments stands out, aiming to identify best practices, existing barriers, and priority areas for intervention. In addition, the implementation of a National Observatory of Pediatric Patients with Psychiatric Disorders has been initiated. Its main objective is to collect relevant epidemiological data, identify trends, and inform future strategies for improvement. The creation of this observatory represents a critical step toward more coordinated, evidence-based care tailored to the specific needs of this population.

REFERENCES

1. Vázquez López P. La salud mental en los niños y jóvenes: un reto tras la pandemia COVID. Emerg Pediatr. 2022; 1(1): 1-2. Disponible en: https://seup.org/pdf_public/Revista_EP/R1_1_2_22.pdf
2. Save the Children. Crecer Saludable(mente). Un análisis sobre la salud mental y el suicidio en la infancia y la adolescencia. [Internet]. 2021 [citado 6 May 2025]. Disponible en: https://www.savethechildren.es/sites/default/files/2021-12/Informe_Crecer_saludablemente_DIC_2021.pdf
3. Vázquez López P, Armero Pedreira P, Martínez-Sánchez L, García Cruz JM, Bonet de Luna C, Notario Herrero F, et al. Autolesiones y conducta suicida en niños y adolescentes. Lo que la pandemia nos ha desvelado. An Pediatr. [Internet]. 2023; 98(3): 204-12. Disponible en: https://www.analesdepediatria.org/es-pdf-S1695403322002958
4. Murray Hurtado M, Martín Rivada Á, Pestano García S, Ramallo Fariña Y. Influencia de la pandemia por COVID-19 en la incidencia de trastornos de la conducta alimentaria. An Pediatr [Internet]. 2024; 101(1): 21-8. Disponible en: https://doi.org/10.1016/j.anpedi.2024.04.013
5. Ministerio de Sanidad. Instituto Nacional de Estadística (INE). Encuesta Nacional de Salud (ENSE). Serie de informes monográficos. Salud mental. [Internet]. Madrid; 2017 [citado 2 May 2025]. Disponible en: https://www.sanidad.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2017.htm
6. Kuric C, Sanmartín A, Ballesteros JC, Gómez Miguel A. Barómetro de Juventud, Salud y Bienestar 2023. Madrid: Centro Reina Sofia. FAD Juventud; 2023. [Internet] Madrid; 2023 [citado 2 May 2025]. Disponible en: https://www.consaludmental.org/publicaciones/Barometro-Juventud-Salud-y-bienestar-2023.pdf
7. Vázquez Canales L de M, Guitián Domínguez M. La salud mental infanto-juvenil en Atención Primaria. El relato de este siglo. Rev Clin Med Fam. [Internet]. 2024; 17(2): 92-3. Disponible en: https://dx.doi.org/10.55783/rcmf.170202
8. Fundación Española para la Prevención del Suicidio. Observatorio del Suicidio en España. [Internet] [citado 6 May 2025]. Disponible en: https://www.fsme.es/observatorio-del-suicidio/
9. Unicef. The State of Children in the European Union. [Internet]. Ginebra; 2024 [citado 6 May 2025]. Disponible en: https://www.unicef.org/eu/stories/state-children-european-union-2024
10. Morer Liñán A. Urgencias en Psiquiatría de la Infancia y la Adolescencia: ¿Dónde está el límite?. Rev Psiquiatr Infanto-Juv. [Internet]. 2023; 40(1): 1-3. Disponible en: https://www.aepnya.eu/index.php/revistaaepnya/article/view/1072
11. Wood EB, Halverson A, Harrison G, Rosenkranz A. Creating a sensory-friendly pediatric emergency department. J Emerg Nurs. 2019; 45(4): 415-24. Disponible en: http://dx.doi.org/10.1016/j.jen.2018.12.002

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ORIGINAL ARTICLE

Workplace violence towards healthcare providers in Catalan Pediatric Emergency Departments

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Abstract

Introduction: Healthcare providers often experience aggressive behaviors from users and their relatives in Pediatric Emergency Departments (PEDs). This study aimed to investigate the prevalence, type, and risk factors for experiencing workplace violence in Catalan PEDs.

Methods: A multicenter descriptive study was conducted in January 2023. An anonymous electronic survey was designed based on the validated Healthcare-workers' Aggressive Behavior Scale-Users (HABS-U). It was distributed by email to 894 healthcare providers in 20 PEDs of major hospitals in Catalonia (Spain). The following data were collected: sociodemographic variables, exposure to workplace violence within the last year, type and frequency of these behaviors from patients and their relatives, type of support needed by healthcare workers, and additional training requested by them. Gender, age, working time in the PED, and professional category were analyzed as risk factors.

Results: Among those asked, 268 healthcare providers answered the survey (a response rate of 31.4%). Of them, 92.1% claimed to have suffered from workplace violence in the past year; verbal aggression was more frequent than physical. Being a nurse or an administrative employee was a risk factor for suffering violence, compared to being a physician. Support from colleagues and friends was more common than institutional support. Of the respondents, 43.7% of the respondents felt adequately prepared to deal with these behaviors, while 68.3% emphasized the need for additional training.

Conclusion: This study reveals a high prevalence of workplace violence in Catalan PEDs. The most common behavior is verbal aggression from relatives. Physicians suffer less frequently from workplace violence compared to the rest of healthcare staff.

CONDUCTAS HOSTILES DE LOS USUARIOS HACIA EL PERSONAL SANITARIO EN LOS SERVICIOS DE URGENCIAS PEDIÁTRICAS DE CATALUÑA

Resumen

Introducción*: Los profesionales sanitarios son víctimas a menudo de conductas hostiles (CH) por parte de pacientes y cuidadores en los Servicios Pediátricos de Urgencias (SUP). El objetivo de este estudio fue investigar la prevalencia, tipos y factores de riesgo para sufrir este tipo de conductas en los SUP de Cataluña (España).*

Métodos*: Se realizó un estudio descriptivo multicéntrico en enero 2023. Se diseñó una encuesta electrónica anónima, a partir de la Escala de Conductas Hostiles hacia Profesionales de la Salud-Usuarios (ECOH-U) validada. La encuesta fue distribuida por*

correo electrónico entre 894 profesionales de 20 SUP de hospitales de Cataluña (España). Se recogieron variables demográficas, y datos sobre la exposición a conductas hostiles en el último año, tipo y frecuencia de estas conductas por parte de pacientes y cuidadores, apoyo para los trabajadores y necesidades de formación. Se analizaron como factores de riesgo el sexo, la edad, el tiempo trabajado en el SUP y la categoría profesional.

Resultados*: Se recibieron 268 encuestas (tasa respuesta 31,4%). El 92,1% de los sanitarios habían sufrido una CH en el último año. Las CH verbales fueron más frecuentes que las físicas. El personal enfermero y administrativo tuvieron más riesgo de sufrir conductas violentas. El personal recibió el apoyo de amigos (88,4%), y compañeros (95,2%). El 43,7% se sintió correctamente preparado para afrontar estas situaciones, el 68,3% manifestó necesitar más formación.*

Conclusión*: Este estudio pone de manifiesto una elevada prevalencia de conductas hostiles en los SUP catalanes. La conducta más frecuente fue la agresión verbal por parte* de familiares. El personal médico sufre menos violencia respecto a otros colectivos.

INTRODUCTION

Workplace violence against healthcare providers in the pediatric emergency department is considered a growing problem and has become a global public health concern. Suffering violence at work can have significant consequences for the individuals who experience it[1-3].

According to the World Health Organization, workplace violence is defined as "incidents involving work-related abuse, threats or assaults among health workers including physical, sexual, verbal and psychological abuse and workplace harassment which explicitly or implicitly endanger their safety, well-being or health"[4].

These aggressive behaviors can be divided into physical and psychological. Physical violence includes the use of any force which produces physical, material, and/or sexual damage. Psychological violence includes verbal abuse, intimidation, harassment, and threats. Workplace violence can lead to consequences such as anger, fear, depression, anxiety, and sleep disturbance, as well as reduced enthusiasm and efficiency[5-7]. According to several studies, psychological violence is the most frequent kind of aggressive behavior in healthcare settings[3,8].

It is difficult to establish the real prevalence of workplace violence, because such behaviors are not well defined and reporting systems are often not appropriate. Nevertheless, workplace violence is frequent in healthcare settings; its prevalence, defined as a worker having experienced some kind of aggression in the last year, ranges between 50% and 80% depending on the study[9-11].

The staff who work in emergency departments are four times more likely to be exposed to workplace violence than other healthcare providers[12,13]. Although violence can affect all healthcare staff, it has been shown that nurses are the most frequently exposed providers[6,13].

While several studies have been performed in adult Emergency Departments, fewer studies have focused on aggressions against personnel working in Pediatric Emergency Departments (PEDs). Therefore, this study aimed to determine the frequency of violence in Catalan PEDs, to describe the most frequent aggressive behaviors, and finally, to determine any risk factors for suffering from workplace violence.

MATERIALS AND METHODS

Study design and population

A multicenter observational study was carried out. An electronic survey, based on a validated questionnaire about workplace violence towards healthcare providers, was performed.

Healthcare providers from 20 PEDs in Catalonia (Spain) were asked to voluntarily and anonymously answer the survey. Physicians, nurses, nursing assistants, and administrative staff were included. No kind of compensation was offered for participating in the study.

Survey

To assess violence towards professionals, the researchers used an adapted version of the Healthcare-workers' Aggressive Behavior Scale-Users (HABS-U), translated from English to Spanish7,14. This validated questionnaire was designed to evaluate non-physical and minor physical aggressive behaviors that users directed towards healthcare workers.

In this study, participants were asked to answer to the following questions:

- Personal sociodemographic variables: gender, age, professional category, years working in the PED.
- Whether the respondents had experienced any aggressive behavior in the last 12 months.
- The frequency of exposure to at least one of the 10 aggressive behaviors from the patients.
- The frequency of exposure to at least one of the 10 aggressive behaviors from their relatives.
- The type of support received by the healthcare worker after the aggression (from friends, co-workers, supervisors, department heads, the institution, psychiatric support).
- What kind of training was or would be needed to deal with these situations.

The 10 aggressive behaviors that respondents may be exposed to were:

- Psychological violence (7): being angry about waiting, grimaces, questioning decisions, sarcastic jokes, anger due to lack of information, anger that is not proportionate to the situation, unjustified accusations.
- Minor physical conduct (3): aggressive grabbing, pushing or shaking, material damage.

The frequency of exposure to these violent behaviors was evaluated using a Likert-type scale ranging from 0 to 4: 0 never, 1 rarely (less than twice per year), 2 occasionally (less than three times a month), 3 frequently (three or more times per month), and 4 very often (more than twice per week). A behavior rated with a 3 or 4 was considered a "frequent" behavior.

Study protocol

In November 2022, 894 healthcare providers from 20 Catalan PEDs were asked via email to participate in the study. They were asked to anonymously answer an electronic version of the survey that was located in a secure web application (REDCap®). Two reminder emails were sent: one in December 2022 and one in January 2023.

The study was reviewed and approved by the Research Ethics Committee of the hospital that led the study (PIC 146-22).

Data analysis

Data were extracted from the REDCap® platform and analyzed with the software IBM® SPSS® Statistics for Windows® (version 25). Tests were applied for data distribution (Kolmogorov-Smirnov) and for the comparison of quantitative data (Student's T-test, Mann-Whitney U-test) and qualitative data (Chi-squared test, contingency table, Fisher's exact test). P-values under 0.05 were considered significant.

Gender, age, working time in the PED, and professional category were analyzed as risk factors for experiencing workplace violence in the PED.

RESULTS

Of those emailed, 268 surveys were completed by healthcare workers (a response rate of 31.4%).

Demographic characteristics

Of the respondents, 77.6% were female. The participants' median age was 33 years old (IQR 27-43). The median time worked in the PED was 8 years (IQR 4-16). Respondents were physicians (61.6%), nurses (31.7%), nursing assistants (5.6%), and administrative staff (1.1%).

Frequency and types of violence

Among the respondents, 92.1% of healthcare providers claimed to have experienced workplace violence within the last year. Of these aggressive behaviors, 9.7% had occurred while physically restraining a patient and 10.8% while a procedure was performed.

Table 1 and Table 2 show the frequency of the different types of workplace violence perpetrated by children and by their relatives.

Healthcare workers suffer more psychological violence than physical violence: 19.8% of respondents had suffered psychological violence from patients and 75.7% from relatives, while 4% had suffered from physical violence from patients and 9.3% from relatives.

Support

With regard to the support received, 95.2% of the staff said that they were comforted by colleagues, 88.4% by friends, 58.6% by their direct supervisor, and 24% by the institution after having suffered an aggression. In total, 2.9% of the respondents claimed to have needed professional support from a psychiatrist or a psychologist.

In terms of ability to face workplace violence, 43.7% affirmed they felt capable of dealing with aggressive behaviors and 68.3% felt that they needed more training to handle aggression.

Risk factors

No statistically significant differences were found in the prevalence of workplace violence based on gender, age, or length of tenure in the PED.

Being a healthcare professional other than a physician was found to be a risk factor (55.1% of physicians had suffered workplace violence during the past year vs. 80% of the other groups, $p< 0.001$).

DISCUSSION

The results of this study reveal that workplace violence is very frequent among healthcare workers in Catalan PEDs, as almost three-quarters of the respondents experienced some form of it during the last year. Other studies have found similar results, showing that 50-80% of healthcare providers have been victims of workplace violence within the last year[3,5,15]. Nevertheless, most of these studies focused on adult settings, so our findings bring new and important information about violence against staff in PEDs, which may be even more frequent than in general or adult emergency departments.

As previous studies have pointed out, psychological aggression is the most common type of violence against pediatric staff[5,16]. The main cause of violence is being angry about waiting, in both pediatric and adult settings. Thus, preventive strategies should take this into account. In this sense, trying to make waiting times shorter or improving the patient experience while waiting may diminish the frequency of these behaviors[6,12,13,15]. Other common reasons include dissatisfaction with medical decisions, which could be mitigated through a combination of effective communication, empathy, and transparency, as well as increased health education and shared decision-making[6,12].

In sharp contrast with the results obtained in other studies, in PEDs, the main aggressors are caregivers9. This could be explained by the unique characteristics of the pediatric setting, where patients are always accompanied by caregivers. Relatives often behave as advocates for their children and fight for their well-being. This may lead caregivers to express their concerns or fears in an aggressive way when

TABLE 1. Violent behaviors from users (children), n= 268.

	Never	< 2/year	< 3/month	≥ 3/month	> 2/week
Non-physical violence					
Being angry about waiting	34.7%	34.7%	17.2%	8.2%	5.2%
Grimaces	32.5%	43.3%	10.8%	7.8%	5.6%
Questioning decisions	47.4%	35.1%	8.6%	6.0%	3.0%
Sarcastic jokes	52.2%	33.6%	7.1%	4.5%	2.6%
Anger due to lack of information	60.4%	24.6%	7.8%	4.1%	3.0%
Anger not proportionate to the situation	44.8%	26.5%	18.3%	6.3%	4.1%
Unjustified accusations	62.3%	26.1%	6.3%	2.6%	2.6%
Physical violence					
Aggressive grabbing	73.9%	18.7%	3.0%	2.6%	1.9%
Pushing or shaking	79.1%	16.0%	3.4%	0.7%	0.7%
Material damage	79.9%	17.2%	2.6%	0.4%	0.0%

TABLE 2. Violent behaviors from relatives, n= 268.

	Never	< 2/year	< 3/month	≥ 3/month	> 2/week
Non-physical violence					
Being angry about waiting	0.7%	5.6%	21.3%	41.0%	31.3%
Grimaces	1.9%	19.4%	33.2%	26.5%	19.0%
Questioning decisions	1.5%	20.5%	33.6%	34.0%	10.4%
Sarcastic jokes	13.8%	38.8%	29.1%	11.6%	6.7%
Anger due to lack of information	13.8%	35.8%	26.1%	17.5%	6.7%
Anger not proportionate to the situation	8.6%	38.1%	29.9%	15.3%	8.2%
Unjustified accusations	16.8%	39.9%	27.6%	10.4%	5.2%
Physical violence					
Aggressive grabbing	61.2%	23.9%	7.1%	4.1%	3.7%
Pushing or shaking	86.9%	11.2%	1.1%	0.4%	0.4%
Material damage	74.6%	23.5%	1.9%	0.0%	0.0%

they perceive a lack of attention or an excessive waiting time. This particularity of the pediatric setting must be taken into consideration when designing improvement strategies.

Our results suggest that physicians are less commonly assaulted by patients or caregivers in comparison to other groups, as previous studies have found[6,10,12]. These differences between professional categories could be explained by the fact that nurses spend more time with patients and caregivers and, consequently, are more exposed. Another explanation could be that the risk may not be related to the professional category itself, but to being the first staff that patients encounter when they enter the emergency department. In this case, administrative staff and nurses are the first ones to deal with them and are consequently the providers at a higher risk[7,12].

In our study, differences in the risk of suffering from workplace violence were not found to be dependent on age or the number of years worked in the PED[8,10]. However, other studies have shown that the younger the staff, the higher the risk of experiencing aggressive behavior, probably due to their lack of skill in managing violent situations[9,13,15]. Our sample is younger than the samples of these studies, and this fact may explain why we did not find age or years worked in the PED as risk factors. Health institutions should, on the one hand, take measures to protect their workers (such as deterrent measures against violent behaviors), and on the other hand, teach their younger staff how to prevent and manage psychological or physical violence[16].

More than 50% of the respondents in our sample asked for more training programs on handling aggression; this result is similar to previous studies[1,2]. Interventions and training focused on preventing and managing violence are not simple, as there is no single strategy that applies to all settings and all circumstances[17]. Despite that, staff training on managing angry patients and caregivers would definitely diminish the frequency of these behaviors and have a direct impact on the patient experience and the healthcare providers' well-being.

LIMITATIONS

This study presents a few limitations worth mentioning. These surveys were exclusively distributed in major hospitals in Catalonia. While this approach allowed for the examination of workplace violence within well-established healthcare institutions, it inherently restricts the generalizability of our findings to a broader healthcare context such as smaller healthcare facilities, community clinics, or rural hospitals. Furthermore, the retrospective nature of our survey and reliance on self-reported surveys is another limitation, as these types of studies are inherently susceptible to recall bias. Lastly, we must also be cautious when interpreting our results, as there is a possibility of selection bias. This is due to the fact that those individuals experiencing workplace violence may be more willing to answer a survey on this topic.

CONCLUSION

In conclusion, our study highlights a high prevalence of workplace violence within Catalan PEDs. Psychological violence is more frequent than physical violence, so further interventions should be focused on improving communication and de-escalation skills among healthcare providers. These training programs and support systems should be geared towards all healthcare professionals, but with an emphasis on those who are more frequently exposed, such as nurses.

REFERENCES

1. Ashton RA, Morris L, Smith I. A qualitative meta-synthesis of emergency department staff experiences of violence and aggression. Int Emerg Nurs. 2018; 39: 13-9.
2. Zahid MA, al-Sahlawi KS, Shahid AA, al-Ajmi MT, Awadh JA. Violence towards doctors: prevalence and effects. Hosp Med. 1999; 60(6): 414-8.
3. Cánovas Pallarés JM, Ruiz-Hernández JA, Galián-Muñoz I, Beteta Fernández D, Pardo Ríos M, Llor-Esteban B, et al. Workplace violence in hospital emergency departments and consequences for health care professionals and support staff: a cluster analysis. Emergencias. 2023; 35(5): 353-8.
4. World Health Organization. Framework guidelines for addressing workplace violence in the health sector. WHO Team on Health Workforce (HWF). Geneva: World Health Organization; 2002. Retrieved from: https://www.who.int/publications/i/item/9221134466
5. Li Z, Yan CM, Shi L, Mu HT, Li X, Li AQ, et al. Workplace violence against medical staff of Chinese children's hospitals: A cross-sectional study. PLoS One. 2017; 12(6): e0179373.
6. Yıldız İ, Tok Yıldız F. Pediatric emergency nurses' workplace violence experiences: A qualitative study. Int Emerg Nurs. 2022; 62: 101160.
7. Ruiz-Hernández JA, López-García C, Llor-Esteban B, Galián-Muñoz I, Benavente-Reche AP. Evaluation of the users violence in primary health care: Adaptation of an instrument. Int J Clin Health Psychol. 2016; 16(3): 295-305.
8. Huang CJ, Boulos AK, Field S, Wang VJ, Yen K. Workplace Violence in the Pediatric Emergency Department: A National Survey of Physicians in the United States. Pediatr Emerg Care. 2024; 40(4): 249-54.
9. Alshahrani M, Alfaisal R, Alshahrani K, Alotaibi L, Alghoraibi H, Alghamdi E. Incidence and prevalence of violence toward health care workers in emergency departments: a multicenter cross-sectional survey. Int J Emerg Med. 2021; 14(1): 71.
10. Galián Muñoz I, Llor Esteban B, Ruiz Hernández JA. User violence towards nursing staff in public hospitals: Murcia, Spain. Rev Esp Salud Publica. 2012; 86(3): 279-91.
11. Shea T, Sheehan C, Donohue R, Cooper B, De Cieri H. Occupational violence and aggression experienced by nursing and caring professionals. J Nurs Scholarsh. 2017; 49(2): 236-43.
12. Lameiro C, Besteiro A, Cuevas A, Pérez Rodríguez A, Gómez C, Pérez Víctor MC. Violencia laboral en Instituciones sanitarias. Análisis de un perfil cambiante. Enferm Trabajo. 2013; 3(2): 66-74.
13. Yenealem DG, Woldegebriel MK, Olana AT, Mekonnen TH. Violence at work: determinants & prevalence among health care workers, northwest Ethiopia: an institutional based cross-sectional study. Ann Occup Environ Med. 2019; 31: 8.
14. Ruiz-Hernández JA, Sánchez-Muñoz M, Jiménez-Barbero JA, Pina López D, Galían-Muñoz I, Llor-Esteban B, et al. User violence in mental health services: Adaptation of an instrument. Healthcare-workers' Aggressive Behaviour Scale-Users-Mental Health Version (HABS-U-MH). PLoS One. 2019; 14(3): e0212742.
15. Ramacciati N, Gili A, Mezzetti A, Ceccagnoli A, Addey B, Rasero L. Violence towards Emergency Nurses: The 2016 Italian National Survey-A cross-sectional study. J Nurs Manag. 2019; 27(4): 792-805.
16. Judy K. Workplace violence: a survey of paediatric residents. Med Teach. 2009; 31(11): 1038.
17. Ramacciati N, Ceccagnoli A, Addey B, Lumini E, Rasero L. Interventions to reduce the risk of violence toward emergency department staff: current approaches. Open Access Emerg Med. 2016; 8: 17-27.

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ORIGINAL ARTICLE

Annual report of the Toxicological Observatory of the Poisoning Working Group of the Spanish Society of Pediatric Emergencies. 2023

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Observatorio toxicológico
Reporte anual

Abstract

Introduction and objective: Since 2008, the Toxicologic Surveillance System (TSS) of the Intoxications Working Group of the Spanish Society of Pediatric Emergency Medicine has recorded poisoning-related episodes on designated days each month in 58 Pediatric Emergency Departments (ED) across 15 Autonomous Communities. The objective of this study is to describe the poisoning episodes recorded in 2023.

Methodology: We conducted a descriptive study of the episodes recorded in 2023 by the 58 EDs participating in the TSS, including exposures of children under 18 years of age to different toxicants.

Results: A total of 254 episodes were recorded (62.3% female, median age 8 years, IQR 2–14). The primary route of exposure was ingestion (252 cases, 99.2%), predominantly due to unintentional ingestion (110 cases, 43.3%), followed by intentional suicidal poisonings (63 cases, 24.9%). The most frequently involved toxicants were medications (157 cases, 61.8%), household products (35 cases, 13.9%), and ethanol (33 cases, 13.1%). A total of 173 episodes (79.4%) occurred at home; 10 cases (4%) involved consultation with the National Institute of Toxicology. Of the total, 117 patients (46.4%) were symptomatic, diagnostic tests were performed in 166 cases (65.4%), treatment was administered in 114 cases (45.1%), and 163 patients (64.1%) remained under observation. No deaths were reported.

Conclusion: In 2023, an increase in suicidal poisonings was confirmed, along with changes in the most frequently involved toxic agents compared to previous TSS studies.

INFORME ANUAL DEL OBSERVATORIO TOXICOLÓGICO DEL GRUPO DE TRABAJO DE INTOXICACIONES DE LA SOCIEDAD ESPAÑOLA DE URGENCIAS DE PEDIATRÍA. 2023

Resumen

Introducción y objetivo: *El Observatorio Toxicológico (OT) del Grupo de Trabajo de Intoxicaciones de la Sociedad Española de Urgencias de Pediatría registra desde 2008 mensualmente, en unos días designados, los episodios relacionados con intoxicaciones en 58 Servicios de Urgencias Pediátricas (SUP) de 15 Comunidades Autónomas. El objetivo del estudio es describir los episodios de 2023.*

Metodología: *Estudio descriptivo de los episodios registrados en los 58 SUP del OT por exposiciones de niños menores de 18 años a sustancias potencialmente tóxicas en 2023.*

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Resultados: *Se registraron 254 episodios (62,3% mujeres, mediana de edad 8 años, RI 2-14). La vía de intoxicación principal fue la ingesta (252, 99,2%), sobre todo por ingestas no intencionadas (110, 43,3%), seguida de intoxicaciones suicidas (63, 24,9%). Los grupos de tóxicos más frecuentes fueron los fármacos (157, 61,8%), productos del hogar (35, 13,9%) y etanol (33, 13,1%). 173 (79,4%) ocurrieron en domicilio, 10 (4%) contactaron con el Instituto Nacional de Toxicología, 117 (46,4%) fueron sintomáticos, en 166 (65,4%) se practicaron pruebas, 114 (45,1%) recibieron tratamiento y 163 (64,1%) permanecieron al menos unas horas en observación. Ninguno falleció.*

Conclusión: *En 2023 se confirma el aumento de las intoxicaciones con fin suicida apreciándose cambios en los tóxicos más frecuentemente implicados en relación a estudios previos del OT.*

INTRODUCTION

The Toxicological Observatory (TO) was established within the Poisoning Working Group of the Spanish Society of Pediatric Emergencies (SEUP) in October 2008. This observatory collects, on a monthly basis, episodes of exposures to potentially toxic substances recorded in Pediatric Emergency Departments (PED)[1]. Until 2014, all episodes were recorded on a single day each month, and from 2014 onward, episodes have been recorded on three days per month (the 13th, 14th, and 15th). Currently, the Toxicological Observatory comprises 58 hospitals across 15 Autonomous Communities.

Up to 2023, the TO has recorded 3,939 episodes corresponding to exposures to toxic substances, the annual distribution of which is shown in Figure 1. Of these, the clinical-epidemiological characteristics have been documented in 3,429 episodes.

The aim of this annual report is to present the episodes recorded in 2023.

MATERIALS AND METHODS

This descriptive study reviews the episodes recorded in 58 PEDs from 15 Autonomous Communities in Spain (Appendix 1) by the TO, concerning exposures of children under 18 years of age to potentially toxic substances in 2023. Among these centers, 32 serve patients up to 14 years old and 11 serve patients up to 18 years old.

During the study period, consultations for exposures to possible toxic substances were recorded in the PEDs on the 13th, 14th, and 15th of each month using electronic questionnaires.

The participating PEDs reported the total number of visits as well as the details of all consultations related to exposures to potentially toxic substances using electronic forms completed via Google Drive. The data collection questionnaire for each patient includes the date of the episode, age, sex, toxic substance, mechanism of poisoning, location and type of storage of the potential toxin, previous similar episodes in the patient or another family member, prehospital evaluation or treatment, accompanying person at the emergency department, mode of transportation, time elapsed from the contact with the toxic substance to arrival at the PED, symptoms and signs, additional examinations performed, treatment received in the PED, patient disposition, and outcome.

The severity of the episodes was measured using the Poisoning Severity Score (PSS): PSS= 0 (no toxicity), PSS= 1 (mild toxicity with mild, transient, or self-limited symptoms), PSS = 2 (moderate toxicity with marked or persistent symp-

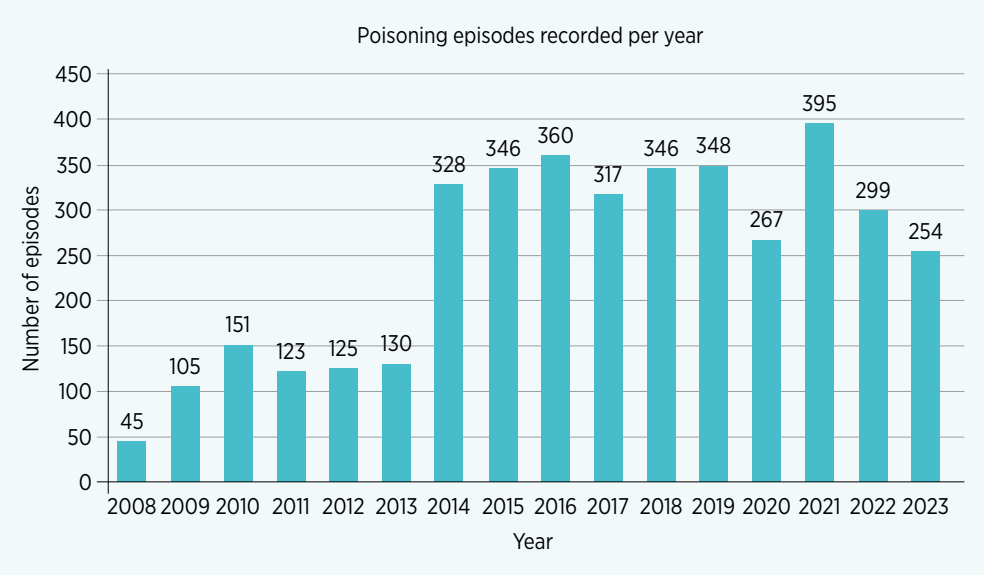

FIGURE 1. Number of poisoning episodes recorded by pediatric emergency departments in the Toxicological Observatory between 2008 and 2014. Until 2014, all episodes were recorded on a single day each month, and from 2014 onward, episodes were recorded on three days per month, on the 13th, 14th, and 15th.

toms), PSS= 3 (severe toxicity with life-threatening risk or risk of permanent sequelae), and PSS= 4 (fatal toxicity).

The quality of the care provided was measured using the quality indicators of SEUP[2].

Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 24.0 (IBM Corp., Armonk, NY, USA). Data are expressed as the mean (standard deviation) for quantitative variables and as percentages for categorical variables. Quantitative variables were compared using the Student's t-test, while categorical variables were analyzed using the Chi-squared test and Fisher's exact test. A p-value of less than 0.05 was considered statistically significant. The study was approved by the Clinical Research Ethics Committee of Euskadi.

RESULTS

In 2023, on the designated recording days, 147,360 episodes were registered in the 58 pediatric emergency departments, of which 254 (0.17%) corresponded to exposures to potentially toxic substances (62.3% female). The median age was 8 years (IQR 2–14 years). Forty-seven PEDs serve patients only up to 14 years of age. The route of intoxication was oral ingestion in 252 cases (99.2%) and inhalation in 2 cases (0.8%). The predominant mechanism of intoxication was unintentional ingestion (110, 43.3%), followed by suicidal poisoning (63, 24.9%), recreational exposures (36, 14.2%), dosing errors (28, 11.1%), CO inhalation (2, 0.8%), and others (14, 5.5%).

The toxic agents most frequently involved were medications (157, 61.8%), followed by household products (35, 13.9%) and ethanol (33, 13%) (Table 1).

The distribution of the episodes according to the patient's age and the mechanism of intoxication is shown in Figure 2.

A total of 79.4% (173) of the episodes occurred at the child's home. In 210 cases (82.6%), the parents were the ones who brought the child to the PED, and in 180 episodes (75.9%), a private vehicle was used for transportation. In only 10 episodes (4%) was the National Toxicology Institute contacted prior to presentation at the PED. Furthermore, 190 patients (75%) sought consultation within the first two hours after contact with the potentially toxic substance.

Overall, 115 patients (46.4%) were symptomatic, with neurological symptoms predominating (55, 22%), followed by gastrointestinal symptoms (28, 11.4%). Physical examination was normal in 196 patients (77.2%).

The severity of the episodes, as measured by the Poisoning Severity Score (PSS), was as follows in the 251 cases for which it was recorded: PSS = 0 in 146 cases (58.2%); PSS= 1 in 87 (34.7%); PSS= 2 in 16 (6.4%); PSS = 3 in 2 (0.8%); and PSS= 4 in 0 cases.

The characteristics of the episodes according to the mechanism of intoxication are shown in Table 2.

TABLE 1. Groups of toxins involved in intoxications recorded in the year 2023.

Toxic Agent Group	n (%)
Medications	157 (61.8%)
Paracetamol	27 (10.6%)
Benzodiazepines	22 (8.6%)
Lorazepam	11 (4.3%)
Clonazepam	6 (2.3%)
Alprazolam	3 (1.1%)
Bromazepam	2 (0.7%)
Selective serotonin reuptake inhibitors	12 (4.7%)
Sertraline	9 (3.5%)
Fluoxetine	3 (1.1%)
Nonsteroidal anti-inflammatory drugs (NSAIDs)	11 (4.3%)
Ibuprofen	9 (3.5%)
Naproxen	1 (0.3%)
Dexketoprofen	1 (0.3%)
Polypharmacy	29 (11.5%)
Household products	35 (13.9%)
Ethanol	33 (13.1%)
Illicit drugs	7 (2.8%)
CO	2 (0.8%)

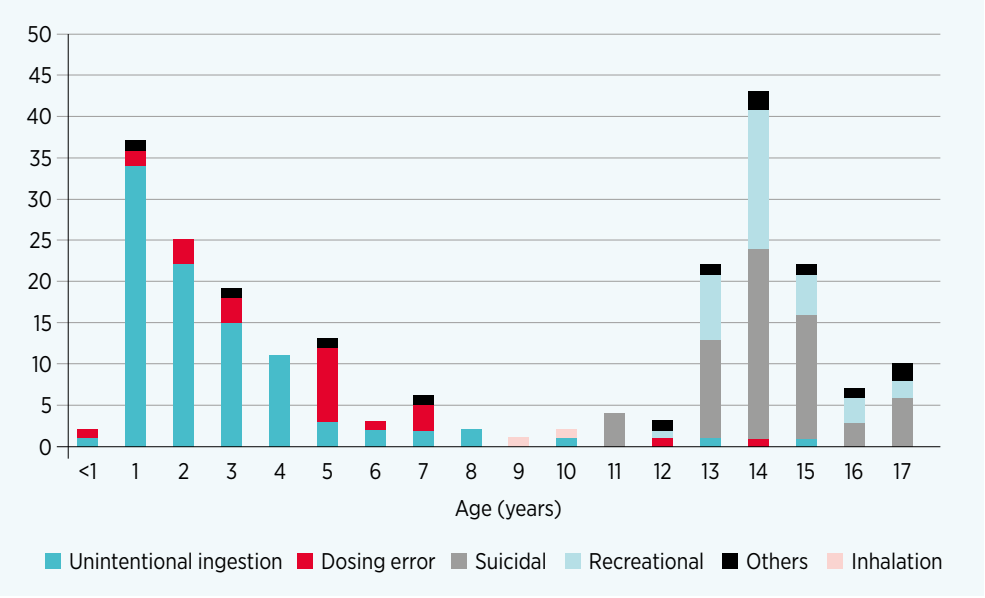

FIGURE 2. Poisoning episodes recorded according to age and poisoning mechanisms. 32 pediatric emergency departments serve patients up to 14 years old, and eleven serve patients up to 18 years old.

Additional tests were performed in 166 patients (65.4%), and 45.1% received treatment. A total of 163 patients (64.1%) remained under hospital observation for at least a few hours. No patient died, and all experienced a favorable outcome.

The interventions performed according to the mechanism of intoxication are shown in Table 3. Gastrointestinal decontamination was performed in 43 patients, including gastric lavage in 2 cases (4.6%, with the quality indicator standard

TABLE 2. Characteristics of the episodes managed according to the main mechanisms of poisoning.

	Mechanism of poisoning				
	Unintentional ingestion				
	Medications	Household products	Dosing error	Recreational	Suicidal
Number of cases	55	30	28	36	63
Female (%)	30 (55.6%)	12 (40%)	15 (53.6%)	21 (58.3%)	57 (90.5%)
Median age (IQR)	3 years (2-4.5)	2 years (1-3)	4 years (2-7)	14 years (13.25-15)	14 years (13-15)
Most frequent toxins	1º Ibuprofen 2º Paracetamol 3º Melatonin	1º Bleach 2º Hydrogen peroxide 3º Hydroalcoholic gel	1º Paracetamol 2º Vitamin D 3º Azitromicina	1º Ehtanol 2º Cannabis	1º Paracetamol 2º Lorazepam 3º Sertraline
% of patients presenting within the first 2 hours	90.9%	90%	71.4%	77.8%	52.3%
% of patients with PSS > 0	16.6%	26.6%	28.5%	83.3%	55.7%
Transport to the Emergency (n, %)*					
Family vehicle	49 (98%)	24 (88.9%)	28 (100%)	12 (35.3%)	35 (58.3%)
Non-medical ambulance	1 (1.8%)	1 (3.7%)		10 (29.4%)	11 (18.3%)
Medical ambulance		2 (7.4%)		8 (23.5)	13 (21.7%)
Police				2 (5.9%)	
Others				2 (5.9%)	1 (1.7%)
Symptomatic (%, 95% CI)	18.3% (7.1-29.6)	38.4% (18.4-58.5)	26.9% (8.6-45.1)	90.3% (79.3-100)	54% (39.6-68.3)

*PSS: Poisoning Severity Score; 95% CI: 95% confidence interval; *In 13 cases, the type of transport to the emergency department was not recorded.*

TABLE 3. Interventions performed in the episodes managed according to the main mechanisms of poisoning.

	Mechanism of poisoning				
	Unintentional ingestion				
	Medications	Household products	Dosing error	Recreational	Suicidal
Number of case	55	30	28	36	63
Additional tests (yes) (%, 95% CI)	55.1% (40.6-69.5)	30.7 (11.7-49.7)	61.9% (39.2-84.5)	90.3% (79.3-100)	88% (78.6-97.3)
Treatment (yes) (%, 95% CI)	44.9% (30.4-59.3)	15.3% (5.2-30.2)	38.1% (15.4-60.7)	61.2% (43.1-79.4)	62% (48-75.9)
Decontamination (yes) (%, 95% CI)	34.6% (20.8- 48.5)	3.8% (0-11.7)	7.1% (3-17.3)	3.2% (0-9.8)	28% (15.1-40.8)
Activated charcoal (single dose) (%, 95% CI)	22.8% (20.4-32.3%)	0%	21.4% (5.2-37.6%)	0%	34.9% (22.8-47)
Multiple-dose activated charcoal (%, 95% CI)	0%	0%	0%	0%	1.6% (0-4.9)
Tube insertion for charcoal administration (%, 95% CI)	0%	0%	0%	0%	1.6% (0-4.9)
Gastric lavage (%, 95% CI)	0%	0%	0%	0%	3.2% (0.9-10.8)
Antidote (yes) ** **(%, 95% CI)**	0%	3.8% (0-11.7)	10.7% (4-23.2)	0%	14% (4-29.3)
Hospital admission (yes)* **(%, 95% CI)**	59.1% (44.9-73.4)	42.3 (21.9-62.6)	53.5% (33.8-73.2)	80.6% (65.9-95.3)	90% (81.3-98.6)

*CI: 95% confidence interval; *Not enough data to calculate the exact 95% CI in the original table. **Antidotes used included N-acetylcysteine (9, 69.2%), biperiden (1, 7.6%), flumazenil (1, 7.6%), glucagon (1, 7.6%), and one unknown antidote (1, 7.6%). ***Includes observation in the pediatric emergency department. No patient underwent renal or extrarenal purification techniques.*

being < 10%). Activated charcoal was administered within the first 2 hours after ingestion in 51 patients (91.1%, quality indicator standard ≥ 90%). In the two patients exposed to carbon monoxide (CO), oxygen therapy at maximum concentration was administered (100%, quality indicator standard > 95%).

DISCUSSION

Despite the efforts undertaken by various institutions in the field of prevention, childhood poisonings continue to be a public health problem in Spain[3]. This Toxicological Observatory of the Poisoning Working Group of SEUP recorded more than 250 episodes related to toxic substance exposures in Spanish pediatric emergency departments (PEDs) in 2023.

Most of the characteristics of the episodes recorded in the Toxicological Observatory during the past year are similar to those documented in previous years[4,5]. However, there are significant changes during this latest period that warrant special emphasis.

In general, the age at presentation exhibited a bimodal distribution, with two peak incidences: a first peak in patients under 5 years of age, among whom unintentional ingestion predominates, and a second peak in adolescents over 12 years of age, where intentional ingestion predominates.

However, the incidence of the different mechanisms of poisoning deserves special mention. The increase in poisonings with suicidal intent recorded during this past year is notable compared to the incidence previously reported by this Working Group[6,7]. This increase was observed during the COVID-19 public health emergency, but it has persisted after the end of that emergency, highlighting the importance of addressing mental health in children and adolescents.

Another point worth noting is the change in some of the toxic substances involved. Antipyretic/anti-inflammatory drugs (primarily ibuprofen and paracetamol) have been the main pharmacological group implicated in unintentional poisonings, despite the implementation of safety caps on liquid paracetamol containers. Notably, in 2023, ibuprofen was the drug most frequently involved in unintentional ingestions resulting from the exploratory behavior of young children, displacing paracetamol and benzodiazepines. Similarly, an increase was observed in the number of poisonings due to dosing errors with vitamin D, a finding that invites further reflection[8,9].

On the other hand, in recent years there has been an increase in cases of unintentional ingestion of illicit drugs[10] (2.8% of the episodes recorded in 2023, all due to unintentional cannabis ingestion), a phenomenon that was also reported at the SEUP congress in 2024.

Although no patient died and all had favorable outcomes, multiple interventions were performed. Recreational poisonings were the most symptomatic upon arrival at the PED (90.3%) and were associated with the highest number of additional tests performed (90.3%); poisonings with suicidal intent received the most treatments (62%), including antidotes (14%); gastrointestinal decontamination was mainly used in poisonings due to unintentional ingestion of medications (34.6%); and intentional ingestions with suicidal intent were the cases most frequently requiring hospital admission (90%). Gastric lavage was performed in only 2 children. The results demonstrate adequate compliance with SEUP quality indicators, although data regarding the time elapsed until the administration of activated charcoal are not available.

CONCLUSIONS

In 2023, the increase in poisonings with suicidal intent is confirmed, with changes observed in the toxic agents most frequently involved compared to previous OT studies. Pediatric poisonings continue to be a dynamic and evolving field. This annual report from the Toxicological Observatory underscores the need for the existence of this multicenter surveillance system established in pediatric emergency departments (PEDs). This system enables clinicians to understand the nature of the episodes they manage and allows the relevant authorities to identify the weaknesses in our system to design new prevention strategies.

CONFLICTS OF INTEREST

The authors of this manuscript declare that they have no conflicts of interest.

REFERENCES

1. Azkunaga B, Mintegi S, Bizkarra I, Fernández J; Intoxications Working Group of the Spanish Society of Pediatric Emergencies. Toxicology surveillance system of the Spanish Society of Paediatric Emergencies: first-year analysis. Eur J Emerg Med. 2011; 18(5): 285-7.
2. González Hermosa A, Benito Fernández FJ, Fernández Elías M, González Peris S, Luaces Cubells C, Velasco Zúñiga R; Grupo de Trabajo de Seguridad y Calidad. Indicadores de calidad SEUP. Revisión 2018. Madrid: Ergon; 2018. [Último acceso 17 Mar 2025]. Disponible en: https://seup.org/pdf_public/gt/mejora_indicadores.pdf.
3. Mintegi S, Fernández A, Alustiza J, Canduela V, Mongil I, Caubet I, et al. Emergency visits for childhood poisoning: a 2-year prospective multicenter survey in Spain. Pediatr Emerg Care. 2006; 22(5): 334-8.
4. Salazar J, Zubiaur O, Azkunaga B, Molina JC, Mintegi S; Grupo de Trabajo de Intoxicaciones de la Sociedad Española de Urgencias de Pediatría. Diferencias territoriales en las intoxicaciones agudas en menores de 14 años en España. An Pediatr (Barc). 2015; 82(1): e39-43.
5. Mintegi S, Azkunaga B, Prego J, Qureshi N, Dalziel SR, Arana-Arri E, et al. International Epidemiological Differences in Acute Poisonings in Pediatric Emergency Departments. Pediatr Emerg Care. 2019; 35(1): 50-7.
6. Azkunaga B, Echarte P, Zumalde A, Mintegi S; Grupo de Trabajo de Intoxicaciones de la Sociedad Española de Urgencias de Pediatría. Incremento de las intoxicaciones con fin suicida en los servicios de urgencias en España durante la pandemia COVID-19. An Pediatr (Barc). 2023; 98(1): 67-9.
7. Algarrada Vico L, Martínez-Sánchez L, Baena Olomí I, Benito Caldés C, Rodríguez Varela A, López-Corominas V, et al. Multicenter study of adolescent suicide attempts by poisoning: social, epidemiological, and clinical characteristics. Emergencias. 2024; 36(6): 438-46.

8. Zubiaur O, Salazar J, Azkunaga B, Mintegi S; Grupo de Trabajo de Intoxicaciones de la SEUP. Therapeutic psychotropic drugs: Most common cause of unintentional poisoning in children. An Pediatr (Barc). 2015; 83(4): 244-7.
9. Levita J, Wilar G, Wahyuni I, Bawono LC, Ramadaini T, Rohani R, et al. Clinical toxicology of vitamin D in pediatrics: A review and case reports. Toxics. 2023; 11(7): 642.
10. Galior K, Grebe S, Singh R. Development of vitamin D toxicity from overcorrection of vitamin D deficiency: A review of case reports. Nutrients. 2018; 10(8): 953.
11. Azkunaga B, Crespo E, Oliva S, Humayor J, Mangione L. Poisoning by illegal drugs in young children in spanish paediatric emergency departments. An Pediatr (Barc). 2017; 86(1): 47-9.

APPENDIX 1. Members of Working Group of the Spanish Society of Pediatric Emergencies belonging to the Toxicology Observatory.

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- C.S. Parc Taulí: Baena I, Bajja S
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SPECIAL ARTICLE

Adherence to double verification in the prescription, preparation, and administration of high-risk medications

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Metodología de mejora de la calidad
Errores médicos
Medicación de alto riesgo
Pediatría

Abstract

Introduction: Adverse events in healthcare are a common cause of death and disability, and 80% are preventable. Implementing harm reduction strategies is therefore a priority. High-risk medications (HRMs) are those that, if used incorrectly, are more likely to result in serious or fatal harm. Double-checking by physicians and nurses during prescription, preparation, and administration is an effective safety strategy.

Objective: To increase adherence to double-checking during the prescription, preparation, and administration of HRMs to 20%.

Methods: An improvement methodology study was performed. A prospective, descriptive study with interventions was conducted in the resuscitation area of Garrahan Hospital in Buenos Aires, Argentina, between December 11, 2023, and January 31, 2024. Interventions were implemented through Plan-Do-Study-Act cycles and included educational sessions, dissemination of the HRM list, and reminders via different channels. Double verification (prescription, preparation, and administration) was assessed through double signature checks before and after the interventions.

Results: Adherence to double-checking increased from 0% to 65% by the end of the study.

Conclusion: The interventions led to a significant increase in adherence to double-checking high-risk medications (HRMs), exceeding the initial target. Increasing and maintaining this practice is essential for improving patient safety and quality of care.

ADHERENCIA A LA DOBLE VERIFICACIÓN EN PRESCRIPCIÓN, PREPARACIÓN Y ADMINISTRACIÓN DE MEDICAMENTOS DE ALTO RIESGO

Resumen

Introducción: *Los eventos adversos en la atención sanitaria son una causa frecuente de muerte y discapacidad, y el 80% son prevenibles. La implementación de estrategias de reducción de daños es prioritaria. Las medicaciones de alto riesgo (MAR) son aquellas que, usadas incorrectamente, tienen mayor probabilidad de causar daños graves o mortales. La doble verificación por médicos y enfermeros en su prescripción, preparación y administración es una estrategia efectiva de seguridad.*

Objetivo: *Aumentar la adherencia a la doble verificación en la prescripción, preparación y administración de MAR a un 20%.*

Métodos: *Estudio de metodología de mejora. Se desarrolló un trabajo prospectivo, descriptivo, con intervenciones, en el sector de reanimación del Hospital Garrahan de Buenos Aires, Argentina, entre 11 de diciembre de 2023 y 31 de enero de 2024. Se aplicaron intervenciones en ciclos Plan-Do-Study-Act, incluyendo sesiones educativas, difusión del listado de MAR y recordatorios mediante distintos canales. Se evaluó doble*

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verificación (prescripción, preparación y administración) mediante el control de doble firma antes y después de las intervenciones.

Resultados: *La adherencia a doble verificación pasó de 0% a 65% al finalizar el estudio.*

Conclusión: *Las intervenciones lograron un aumento significativo en la adherencia a doble verificación de MAR, superando el objetivo inicial. Incrementar y sostener esta práctica es importante para mejorar la seguridad y calidad de atención.*

INTRODUCTION

Healthcare-associated adverse events are among the 10 leading causes of death and disability worldwide[1]. These events are preventable in 80% of cases[2], making the implementation of harm reduction strategies a priority across all healthcare settings.

In 2004, the World Health Organization (WHO) established the Global Alliance for Patient Safety to support the development of policies and practices that promote patient safety, based on the principle of "First, do no harm"[3].

Following a collaborative effort between the WHO and The Joint Commission, the "Patient Safety Solutions Preamble" was published in 2007, outlining nine key improvement measures.

Finally, in the same year, the WHO launched the "Medication Without Harm" campaign as a global challenge, aiming to introduce improvements at every stage of the medication process to achieve a 50% reduction in medication errors within five years[4].

Based on WHO recommendations, Argentina promotes the implementation of several lines of action to improve patient safety, including promotion of a culture of safety, safe medication use, prevention and control of healthcare-associated infections, safe surgeries, safe care practices, accurate patient identification, effective communication among healthcare professionals, management of adverse events, and patient involvement in safety efforts[5].

Regarding the safe use of medications, strategies are proposed to ensure the safe management of HRMs, drugs that, when used incorrectly, are more likely to cause serious or even fatal harm. These strategies include: dissemination of accessible HRM lists for all healthcare personnel, alert identifiers on labels, clearly differentiated storage areas, pre-printed prescription forms, electronic prescribing systems, double-checking during administration, active participation of pharmacists in medical rounds, centralized management in the pharmacy, standardized dilutions, medication reconciliation at care transition points, and actions to educate patients about their active role in the safe use of medications and reconciliation processes[5].

Prior to the administration of HRMs, a final check by two professionals (physician and/or nurse) is recommended to verify the correct patient identification, as well as the pharmaceutical formulation, dose, rate, and route of administration of the medication.

HRMs represent a key area of concern in medication safety and should be prioritized within patient safety programs across healthcare institutions.

The proposed strategies include the double-checking process during the prescription, preparation, and administration of HRMs.

The aim of this study was to evaluate and improve adherence to this process in the Pediatric Emergency Department (PED) of a tertiary-level hospital in Latin America.

METHODS

Context

Pediatric Hospital Prof. Dr. J. P. Garrahan (HPG) is located in Buenos Aires, Argentina. It is a highly complex institution that provides care to children and adolescents from various regions of the country, as well as from neighboring countries.

Approximately 6,100,000 patient visits are received and 12,000 surgeries are performed each year, and more than 28,000 patients are discharged. The hospital has 587 beds, including 132 intensive care beds, 20 operating rooms, 200 outpatient offices, and specialized departments for Transplantation, Neonatology, and Burns, as well as a Comprehensive Care Center for Hematology–Oncology Patients. It also has a Blood, Cells, and Tissue Bank, a Public Umbilical Cord Blood Bank, a Tumor Bank, and 14 laboratories[6].

The HPG receives approximately 120,000 visits per year for acute illnesses and injuries. The PED has 47 observation and short-stay beds, with additional beds added during seasonal peaks, and a resuscitation area (RA) with five beds.

The complexity of the Pediatric Emergency Department (PED), the medications administered, and the high demand for care can contribute to the occurrence of healthcare-related adverse events. Despite advances in the digitalization of healthcare processes, medical orders in our PED are still handwritten.

At HPG, the double-checking process is promoted during both the prescription of HRMs (by physicians) and their preparation and administration (by nursing staff). This verification is documented through double signatures on the medication orders, signed by both medical and nursing personnel.

As part of the "Improvement Methodology Course" offered by Cincinnati Children's Hospital and the Latin American Society of Pediatric Emergency Medicine (SLEPE)[7,8], a prospective, descriptive improvement methodology study was conducted with interventions between December 11, 2023, and January 31, 2024. A team was formed for this

purpose, consisting of three physicians and two nurses from the PED.

Adherence to the double-check and double-signature protocol for selected HRMs among PED staff was assessed. Initial mapping revealed no compliance with the established protocol. A series of interventions were subsequently implemented using the Plan-Do-Study-Act (PDSA)[a] cycle, aiming to improve adherence rates and enhance the quality and safety of patient care in the PED (Figure 1).

Intervention

Adherence of PED staff to the double-checking process was recorded and analyzed through mapping[b].

The study was conducted between February 26, 2023, and January 31, 2024.

For convenience, data collection was limited to the RA, on weekdays, between 08:00 a.m. and 04:00 p.m.

The SMART *Aim*[c] was: To increase the percentage of double-checking, defined as documentation with a double signature, during the prescription (by physicians), preparation, and administration (by nurses) of HRMs on the prescription sheet, from 0% to 20% in patients admitted to the RA on weekdays between 08:00 a.m. and 04:00 p.m., by January 31, 2024.

Key Drivers[d] were identified to guide the development of effective interventions, and Knowledge Discovery in Databases (*KDD*)[e] was applied to analyze the planned interventions (Figure 2).

A baseline measurement was taken, followed by the implementation of interventions and subsequent reassessments.

- Baseline measurement: a pilot study was conducted between February 26 and April 27, 2023, through a retrospective review of written prescriptions for an HRM (intravenous (IV) 25% magnesium sulfate – $MgSO_4$). Following this initial evaluation, it was decided to include the most commonly used HRMs in the area, based on the epidemiological profile of patients treated in our RA(9), including insulin, IV electrolyte corrections, inotropes, and IV $MgSO_4$. Medical prescriptions were then evaluated prospectively from September 12 to October 27, 2023.
- First intervention: in December 2023, informational sessions were conducted on safety culture, the HRM list, and the double-check and double-signature procedure. Baseline measurement results were shared with the team. Simultaneously, informational posters were placed in medication preparation areas, the nursing station, physicians' office, and the RA. Reminders were delivered regularly, both in person and through multiple communication channels.

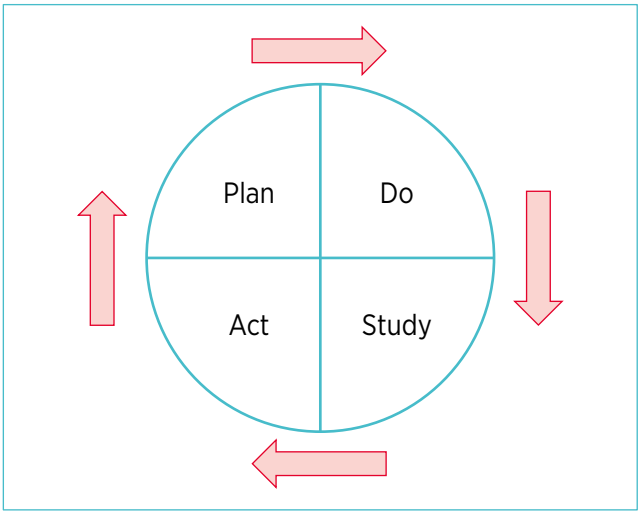


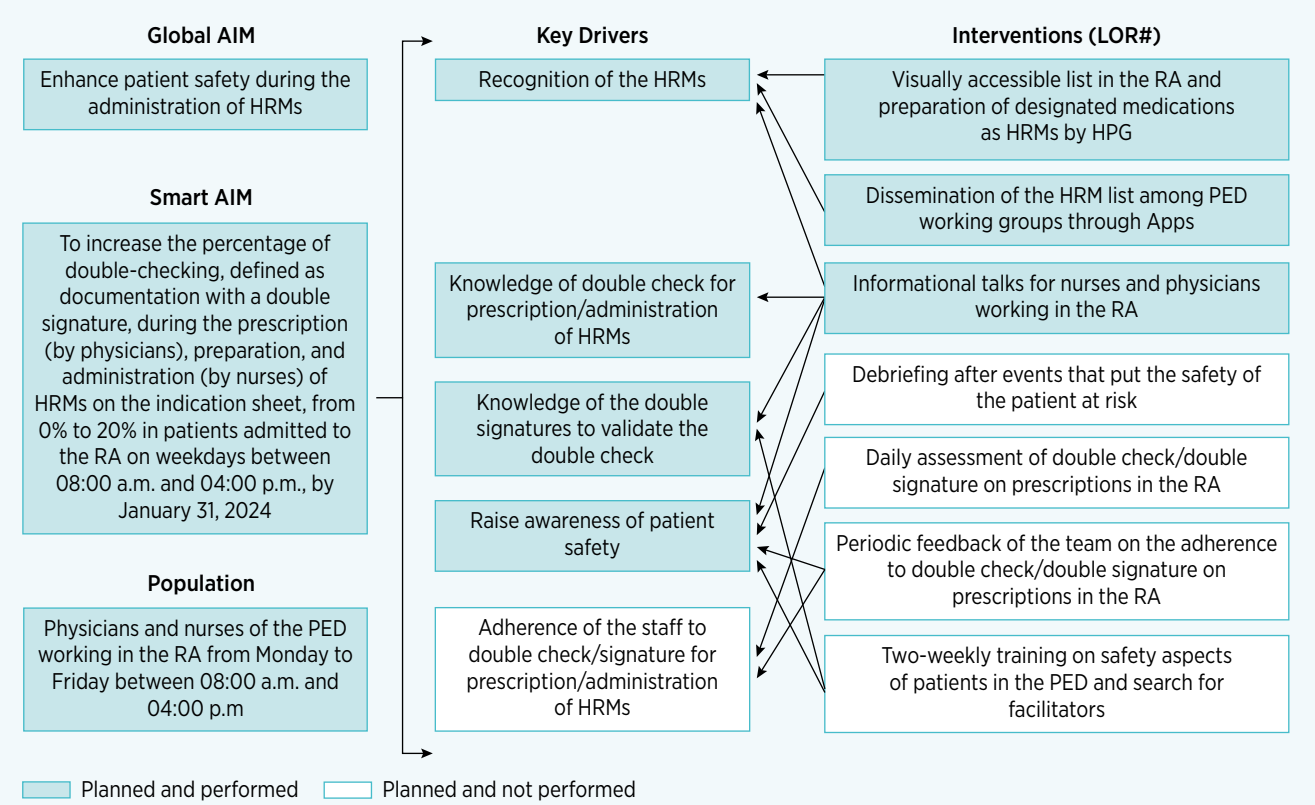
FIGURE 1. Plan-Do-Study-Act (PDSA) cycle.

- Second intervention: in January 2024, the PED staff received feedback on the progress made following the initial intervention. Previously shared information was reinforced, accompanied by reminders delivered in multiple formats.

RESULTS

- Baseline measurement: thirty-six patients with a diagnosis of asthma exacerbation and an indication for IV MgSO4 were included. In none of the cases, whether during prescription, preparation, or administration, was a double signature by medical and/or nursing staff recorded. After expanding the evaluation to include other HRMs, eight additional patients were enrolled, and adherence to the double-checking process remained at 0%.
  Interventions were subsequently implemented to improve adherence to double-checking during the prescription, preparation, and administration of HRMs.
- Results following the first intervention: as shown in Figure 3, during the four weeks following the intervention, prescriptions of 14 patients were evaluated.
  Adherence to the double-checking process increased, with the median increasing from 0% to 35%, exceeding the 20% target established in the SMART Aim.
  However, by week 9, a decline in adherence below the target was observed, leading to the implementation of a second intervention.

[a]*PSDA*: developing a plan to test the change (Plan), carrying out the test (Do), observing, analyzing, and learning from the results (Study), and determining what modifications to make for the next cycle, if applicable (Act). This is an iterative strategy for evaluating and analyzing changes within a system and should be applied to every planned change strategy.
[b]Process mapping: planning tool that allows for the visual representation of the people and actions involved in a process from start to finish.
[c]SMART Aim: a goal that is Specific, Measurable, Achievable, Realistic, and Time-bound.
[d]Key Drivers: the key conditions or factors necessary to achieve the desired goal.
[e]KDD: a process for identifying valid, novel, useful, and understandable patterns in data, aimed at discovering new knowledge.



HRM: High/risk medications; RA: Resuscitation Area; PED: Pediatric Emergency Department; HPG: Hospital de Pediatría "Prof. Dr. J.P. Garrahan".

FIGURE 2. *Knowledge Discovery in Databases* (KDD).

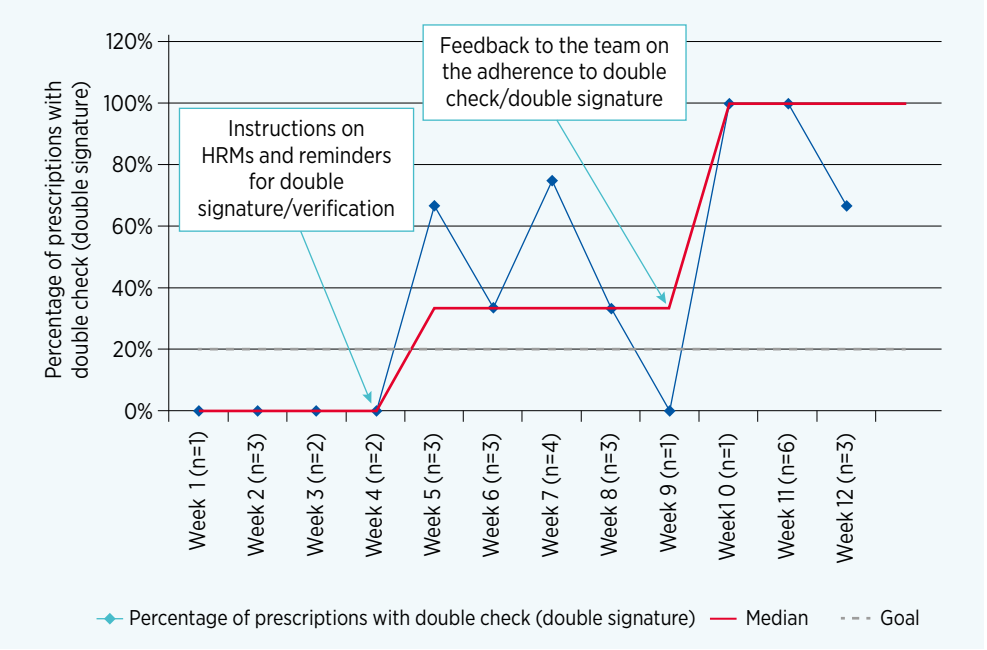


FIGURE 3. Run Chart[f].

- Results following the second intervention: Figure 3 shows that, during the three weeks following the intervention, prescriptions for 10 patients were analyzed. Toward the end of the study, an increase in adherence was observed, reaching levels between 60% and 100%.

[f]*Run Chart*: a visual tool that shows how data changes over time. A way to monitor the evolution of a process or variable to detect trends and/or patterns. It can help identify whether improvements are occurring or if there are special causes of variation that need to be investigated.

DISCUSSION

Despite recommendations that PEDs should implement continuous quality improvement plans through regular reviews and improvement cycles[10], a 2019 survey of 105 PEDs in Latin America found that only 41% reported having an improvement program in place[11].

Continuous improvement plans should include measures that improve patient safety.

At our hospital, as part of the safe medication use framework, double-checking during the prescription, preparation, and administration of HRMs is promoted as a key safety strategy.

Although double-checking medication administration has been a common practice in pediatric hospitals worldwide for decades, evidence of its effectiveness in reducing errors or harm remains limited and conflicting[12-15].

In our study, educational talks, promotion of a safety culture, dissemination of the HRM list, placement of informational posters in medication preparation areas, the nursing office, physicians' office, and the RA, together with periodic reminders shared through multiple communication channels and the dissemination of intervention results, were all associated with a clear improvement in adherence to the double-check strategy.

The implementation and monitoring of multidisciplinary programs—including safety measures such as prescribing system alerts and double-checks by two healthcare professionals—are key actions to optimize the safe use of HRMs[16].

The use of technological systems, pharmacist involvement, effective communication, nursing interventions, and adherence to medication safety guidelines are essential components of safe medication practices, especially in pediatric and neonatal populations[17].

CONCLUSION

Interventions focused on staff education regarding patient safety culture, dissemination of the HRM list, reinforcement of the double-check and double-signature procedure, and periodic reminders contributed to improved compliance with double-checking and signing during the prescription, preparation, and administration of HRMs.

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REFERENCES

1. Slawomirski L, Auraaen A, Klazinga N. The economics of patient safety: Strengthening a value-based approach to reducing patient harm at national level, OECD Health Working Papers, No. 96. Paris: OECD Publishing; 2017. https://doi.org/10.1787/5a9858cd-en. [Consultation: Apr 26, 2025]. Available in: https://www.oecd.org/content/dam/oecd/en/publications/reports/2017/06/the-economics-of-patient-safety_258f9682/5a9858cd-en.pdf
2. Auraaen A, Slawomirski L, Klazinga N. The economics of patient safety in primary and ambulatory care: Flying blind. OECD Health Working Papers, No. 106. Paris: OECD Publishing; 2018. https://doi.org/10.1787/baf425ad-en. [Consultation: Apr 26, 2025]. Available in: https://www.oecd.org/content/dam/oecd/en/publications/reports/2018/11/the-economics-of-patient-safety-in-primary-and-ambulatory-care_3ad229f9/baf425ad-en.pdf
3. World Alliance for Patient Safety. The Launch of the World Alliance for Patient Safety. 27 October 2004. Departmental Update. Washington DC, USA. [Consultation: April 28, 2025]. Available in: https://www.who.int/teams/integrated-health-services/patient-safety/about/world-alliance-for-patient-safety
4. Segunda Cumbre Ministerial Mundial sobre Seguridad del Paciente, celebrada en Bonn (Alemania), 29 March, 2017. [Consultation: Apr 26, 2025]. Available in: https://www.who.int/es/initiatives/medication-without-harm.
5. Monteverde E, Klappenbach R, Baliña J. Ministerio de Salud de la Nación Argentina. Manual de Seguridad del Paciente EX-2022-34231465-APN-DNCSSYRS#MS. [Consultation: 2025 Apr 11]. Available in: https://www.argentina.gob.ar/sites/default/files/2022/11/manual_de_seguridad_del_paciente.pdf
6. Hospital de Pediatría Prof. Dr. Juan P. Garrahan. El Hospital / Bienvenida [Consultation: Apr 1, 2025]. Available in: https://www.garrahan.gov.ar/hospital/bienvenida
7. Valderrama G, González del Rey J. Abriendo camino a la mejora: Curso interactivo de Metodología de Mejora para médicos de Latinoamérica. Emerg Pediatr. 2024; 3(2): 75-7.
8. Valderrama G, González del Rey J. Implementación de un curso de metodología de mejora en Servicios de Urgencias: lecciones y experiencias de Cincinnati a Latinoamérica. Emerg Pediatr. 2025; 4(1): 13-4.
9. Echeveste J, Álvarez Ricciardi MB, Fiorotto M, Monticelli MF, Rino P, Kohn Loncarica G, et al. Características epidemiológicas de los pacientes atendidos en el sector de reanimación de un servicio de emergencia en un hospital de tercer nivel de Argentina. Med Infantil. 2020; 17(2): 125-32.
10. Pediatric Special Interest Group, International Federation for Emergency Medicine 2019. Capítulo 11, Calidad y Seguridad, 75-79. Estándares de Cuidado para Niños en el Departamento de Emergencias Versión 3.0. Published: July 2012 Updated April 2019. [Consultation: Apr 11, 2025]. Available in: https://https://assets.nationbuilder.com/ifem/pages/280/attachments/original/1650605720/IFEM-PEMSIG-Standards-of-Care-for-Children-in-Emergency-Departments-V3-Spanish-June-2020.pdf?1650605720
11. Cáceres L, Boto A, Cagnasia S, Galvis L, Rino P, Yock-Corrales A et al. Estado actual de recursos generales y funcionamiento de Servicios Hospitalarios de Emergencias Pediátricas con gestión pública en Latinoamérica (Estudio RFSEPLA). Rev Fac Med Hum. 2022; 22(2): 232-43.
12. Westbrook JI, Li L, Raban MZ, Woods A, Koyama AK, Baysari MT, et al. Associations between double-checking and medication administration errors: a direct observational study of paediatric inpatients. BMJ Qual Saf. 2021; 30(4): 320-30.
13. Kuitunen S, Niittynen I, Airaksinen M, Holmström AR. Systemic Causes of In-Hospital Intravenous Medication Errors: A Systematic Review. J Patient Saf. 2021; 17(8): e1660-8.
14. Koyama AK, Maddox CS, Li L, Bucknall T, Westbrook JI. Effectiveness of double checking to reduce medication administration errors: a systematic review. BMJ Qual Saf. 2020; 29(7): 595-603.

15. Konwinski L, Steenland C, Miller K, Boville B, Fitzgerald R, Connors R, et al. Evaluating Independent Double Checks in the Pediatric Intensive Care Unit: A Human Factors Engineering Approach. J Patient Saf. 2024; 20(3): 209-15.
16. Canales-Siguero MD, Caro-Teller JM, Pablos-Bravo S, Rodríguez-Quesada PP, Quintana-Estelles D, Gomis-Muñoz P, et al. High-risk medicines: Multidisciplinary program to improve hospital safety. Farm Hosp. 2025 [In press]. doi: 10.1016/j.farma.2025.03.009.
17. Ghezaywi Z, Alali H, Kazzaz Y, Ling CM, Esabia J, Murabi I, Mncube O et al. Targeting zero medication administration errors in the pediatric intensive care unit: A Quality Improvement project. Intensive Crit Care Nurs. 2024; 81: 103595.

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CASE REPORT

Neurological complications associated with acute sinusitis: the importance of clinical suspicion. Report of two cases

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Palabras clave:

Absceso cerebral
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Rinosinusitis
Infecciones del Sistema Nervioso Central

Abstract

Acute sinusitis in childhood typically resolves without complications. However, in some cases, it can progress to severe conditions such as a brain abscess, venous thrombosis, or inflammatory Pott's tumor, which are associated with high morbidity and mortality if not accurately treated. We present two pediatric cases of complicated sinusitis.

The first case had left orbital cellulitis and a frontal epidural abscess, managed successfully with antibiotics, surgical drainage, and anticoagulation. The second case developed a cerebral empyema with midline shift and transtentorial herniation, requiring decompressive craniectomy, prolonged antibiotic therapy, and anticoagulation. This patient developed residual left hemiparesis and focal epilepsy.

These cases highlight the importance of early clinical suspicion and timely neuroimaging in patients with sinusitis who develop neurological symptoms, thereby allowing effective treatment and reducing the risk of severe sequelae.

COMPLICACIONES NEUROLÓGICAS EN LA SINUSITIS: LA IMPORTANCIA DE LA SOSPECHA CLÍNICA. REPORTE DE DOS CASOS

Resumen

La sinusitis aguda en la infancia suele resolverse sin complicaciones. Sin embargo, puede dar lugar a cuadros graves, como absceso cerebral, trombosis venosa o tumor inflamatorio de Pott, con alta morbimortalidad si no se diagnostican a tiempo. Presentamos dos casos pediátricos con sinusitis complicada.

El primero mostró celulitis orbitaria izquierda y absceso epidural frontal, tratados con antibioterapia, drenaje quirúrgico y anticoagulación, con evolución favorable. El segundo desarrolló empiema cerebral, desviación de la línea media y herniación transtentorial, requiriendo craniectomía descompresiva, tratamiento antibiótico prolongado y anticoagulación. Persistió con hemiparesia izquierda y epilepsia focal residual.

Ambos casos resaltan la importancia de la sospecha clínica precoz y el uso oportuno de neuroimagen ante síntomas neurológicos en pacientes con sinusitis, lo que permite instaurar un tratamiento eficaz y prevenir secuelas graves.

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INTRODUCTION

Sinusitis, whether viral or bacterial, usually resolves spontaneously without antibiotic treatment or long-term sequelae. However, 4-11% of bacterial sinusitis cases may progress to severe complications, with a significant risk of morbidity and mortality[1].

Given its high prevalence and typically benign course, maintaining a high index of clinical suspicion is essential for the early diagnosis and appropriate management of complications, which may require antibiotics, anticoagulation, or surgery[1,2]. The cases presented here demonstrate the potential for rapid clinical deterioration, underscoring the need for timely medical intervention.

CASE REPORTS

Case 1

An 8-year-old girl with a history of Pierre Robin sequence and cleft palate repair presented with fever (up to 39°C), upper respiratory symptoms, and a 48-hour history of headache. Clinical examination revealed left periorbital swelling, ptosis, ocular pain, and limited lateral gaze, with pain on eye movement. Contrast-enhanced orbitomaxillary computed tomography (CT) revealed pansinusitis, left preseptal cellulitis, a right frontal epidural abscess, and thrombosis of the left superior ophthalmic vein and cavernous sinus.

Empirical intravenous antibiotic therapy was initiated with cefotaxime, metronidazole, and vancomycin, and surgical drainage of the abscess and paranasal sinuses was performed. *Streptococcus constellatus* (multisensitive) was isolated from both peripheral blood and surgical specimen cultures, and antibiotic therapy was adjusted to linezolid and cefotaxime.

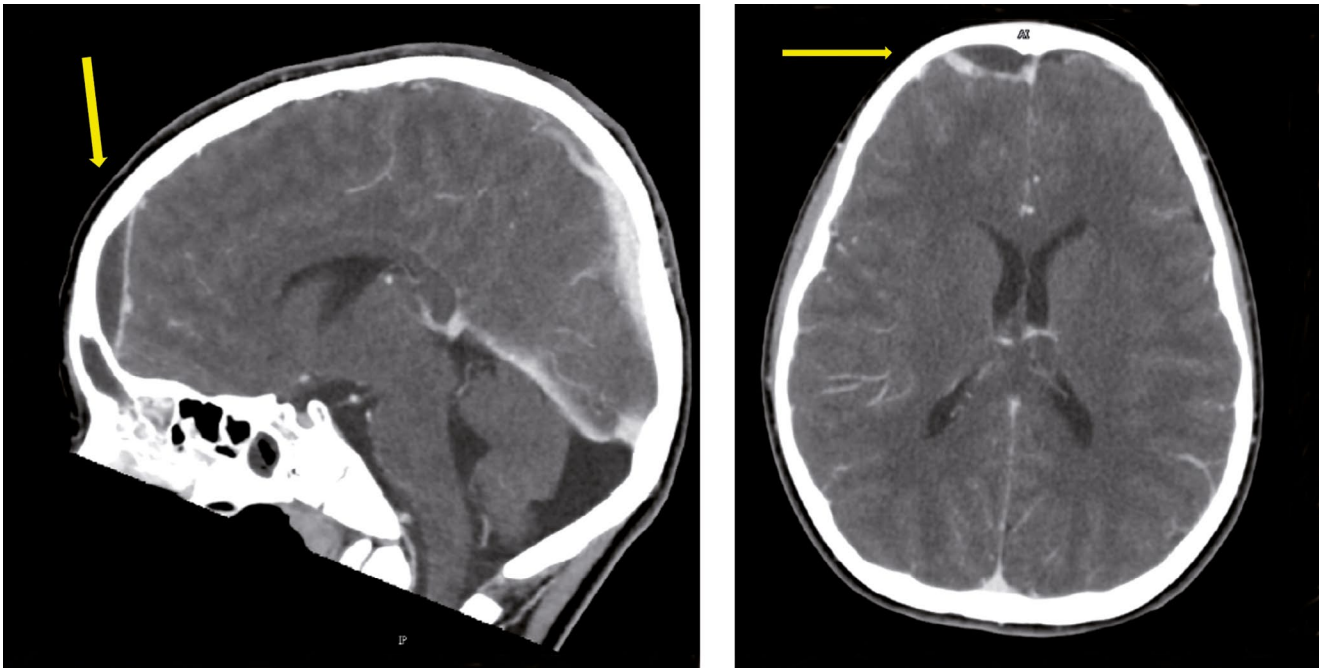
Intravenous antibiotics were administered for five weeks, followed by oral cefixime for an additional two weeks. Venous thrombosis was treated with low molecular weight heparin (LMWH), which was replaced by oral anticoagulation at discharge. Outcome of the patient was favorable, with no neurological sequelae (Figures 1 and 2).

Case 2

An 11-year-old boy with no significant medical history presented with high fever, upper respiratory symptoms, and a six-day history of headache. He also reported pain and a sensation of a mass in the right frontal region, without any preceding trauma. On initial examination, the only notable finding was dental caries. A chest X-ray revealed a possible infiltrate in the right upper lobe, and blood tests showed elevated acute phase reactants. He was admitted for empirical intravenous antibiotic therapy with ampicillin.

Over the following 12 hours, the patient experienced sudden clinical deterioration, developing bilateral eyelid edema, severe headache, and impaired consciousness, requiring urgent orotracheal intubation. A non-contrast brain CT scan revealed a right frontal extra-axial collection, frontal subdural collections, partial ventricular collapse, edema, midline shift, and transtentorial herniation. Treatment was initiated with dexamethasone, cefotaxime, vancomycin, and metronidazole. An urgent decompressive craniectomy was performed, revealing a cerebral empyema.

In the postoperative period, the patient developed convulsive status epilepticus that was managed with antiseizure medication. *Streptococcus thermophilus* was isolated in peripheral blood cultures, while *Parvimonas micra* and *Fusobacterium nucleatum* were identified in the culture of the surgical specimen. Antibiotic therapy was adjusted accordingly. Post-surgical brain magnetic resonance angiog-



FIGURES 1 AND 2. Orbito-maxillary CT scan with contrast, sagittal and axial views, shows a hypodense collection in the right frontal epidural region with peripheral enhancement following contrast administration, compatible with an epidural abscess (*yellow arrow*).

FIGURES 3 AND 4. Non-contrast brain CT scan shows a midline shift and a frontal lesion with bone involvement, suggestive of inflammatory Pott's tumor (*yellow arrow*).

raphy revealed venous sinus thrombosis, which was treated with LMWH.

Intravenous antibiotic therapy was administered for 12 weeks due to poor radiological response. At discharge, the patient presented with left hemiparesis and central facial paralysis, which progressively improved. Antiseizure medication was continued following an isolated focal seizure associated with persistent focal epileptiform activity on electroencephalogram one week after cranioplasty. Anticoagulation was maintained until the venous thrombosis resolved, eight months after diagnosis (Figures 3 and 4).

DISCUSSION

The most common complications secondary to sinusitis are extracranial, such as subperiosteal abscesses, resulting from direct inoculation from the paranasal sinuses. These complications occur more frequently in the pediatric population, especially adolescents, due to the immaturity of the frontal sinus and increased blood flow that facilitates the spread of infection[3]. The clinical presentation of subperiosteal abscesses secondary to frontal sinusitis is variable and may include impaired ocular motility and intracranial complications due to contiguous spread. Management involves intravenous antibiotic therapy and/or surgical drainage with bone debridement[4,5].

Intracranial complications, such as brain abscesses, are usually caused by septic emboli from nearby infectious foci or by direct inoculation, as may occur during neurosurgery or following head trauma[1]. Although their incidence is low, these complications are associated with high mortality rates (5-15%) and result in sequelae in up to 40% of cases, even with early and appropriate treatment[2].

Diagnostic delay is common in cases of intracranial complications due to the nonspecific nature of early clinical symptoms, such as headache, fever, and vomiting. Diagnosis is typically prompted by later-developing signs of intracranial hypertension, including morning headache, explosive vomiting, and impaired consciousness[6,7]. Neuroimaging is essential and should be performed prior to lumbar puncture. CT angiography and/or MR angiography are recommended, given the frequent occurrence of venous thrombosis; however, non-contrast imaging may be preferred initially, as it is faster and safer in acute settings[8,9].

Upon diagnosis of a brain abscess, empirical intravenous antibiotic therapy should be initiated. The regimen varies depending on the suspected primary focus, typically including a third-generation cephalosporin combined with cloxacillin, or vancomycin and metronidazole, with subsequent adjustment based on the antibiogram results[2,7,9,10]. A surgical approach is usually required, although it may be avoided in cases of intracerebral abscesses smaller than 1.5-3 cm, if the pathogen is known and the patient shows a good response to antibiotics, or if the location of the abscess is deep or near critical structures. Antibiotic therapy is generally maintained for 6 to 8 weeks, depending on surgical success and radiological response. In cases with favorable progression, oral antibiotic therapy may be considered after 2-3 weeks[2,7,9,10].

In summary, a neurological examination should be included in the assessment of patients with sinusitis to allow early detection of potentially serious complications. While clinical evaluation can be helpful, neuroimaging is essential to differentiate between extracranial and intracranial complications.

COMMENTS

A high index of clinical suspicion is important to identify complications of sinusitis. Early focal neurological signs (such as restricted eye movements, as seen in the first case) or nonspecific but characteristic neurological symptoms (such as frontal pain due to Pott's tumor, as in the second case) should lead to urgent neuroimaging and hospital admission for intravenous antibiotic therapy.

Verbal consent was obtained from the patients' parents for the publication of this report.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest. No funding was received for this study.

REFERENCES

1. Barquero Artigao F, Berghezan Suárez A, Bravo Queipo de Llano B. Sinusitis y sus complicaciones: celulitis preseptal y orbitaria. Protoc Diagn Ter Pediatr. 2023; 2: 81-96.
2. Carazo Gallego B, Cardelo Autero N, Moreno Pérez D. Meningitis, absceso cerebral, encefalitis aguda. Protoc Diagn Ter Pediatr. 2023; 2(1): 309-28.
3. Pacheco ZR, Cox LV, Sepúlveda AL, Ortega FG. Tumor de Pott y absceso cerebral secundario a sinusitis aguda de foco dentario en paciente pediátrico. Rev Otorrinolaringol Cir Cabeza Cuello. 2023; 83(1): 60-5.
4. Wong SJ, Levi J. Management of pediatric orbital cellulitis: a systematic review. Int J Pediatr Otorhinolaryngol. 2018; 110: 123-9.
5. Anosike BI, Ganapathy V, Nakamura MM. Epidemiology and management of orbital cellulitis in children. J Pediatric Infect Dis Soc. 2022; 11(5): 214-20.
6. Borrego Domínguez RR, Navarro Gómez M, Gómez-Campderá JA, Carreras Fernández J. Absceso cerebral infantil. An Pediatr (Barc). 2005; 63(3): 253-8.
7. Antkowiak T, Putz M, Mandera M. Clinical features, microbiology, and management of pediatric brainstem abscess. Childs Nerv Syst. 2020; 36(12): 2919-26.
8. Guenther G, Arauz A. Trombosis venosa cerebral: aspectos actuales del diagnóstico y tratamiento. Neurología. 2011; 26(8): 488-98.
9. Bodilsen J, D'Alessandris QG, Humphreys H, Iro MA, Klein M, Last K, et al. European Society of Clinical Microbiology and Infectious Diseases guidelines on diagnosis and treatment of brain abscess in children and adults. Clin Microbiol Infect. 2024; 30(1): 66-89.
10. Domínguez Riscart J, Aracil Santos F. Infectología pediátrica: absceso cerebral. En: Guerrero J, Cartón A, Barreda A, Menéndez J, Ruiz J, editores. Manual de diagnóstico y terapéutica en pediatría. 6ª ed. Madrid: Editorial Médica Panamericana; 2018. p. 1447-54.
11. Brizuela M, Pérez G, Martiren S, Baino ANV, Cedillo C, Ruvinsky S, et al. Brain abscess in children: ten years of experience in a third level pediatric hospital. Arch Argent Pediatr. 2017; 115(4): e230-2.

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Evaluation of the effectiveness of the Neodisc in neonatal emergency situations. Assessing the efficacy of a support system during emergency scenarios in Neonatology: a clinical simulation study

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Abstract

Introduction: Emergency situations are frequent and unpredictable in neonatal units, with moments of high stress for the staff in charge. Dosage calculations are usually done mentally, adjusted based on the patient's weight, producing significant variability. These medications require multiple dilutions and a variety of material sizes for the airway management. In order to reduce errors in these cases, we developed the Neodisc tool.

Methods: A research project for the design of the tool and subsequently, carrying out a quasi-experimental study with post-intervention measures, for the evaluation of the effectiveness of the Neodisc.

Results: In 76,7% of cases, errors in the procedure were observed when Neodisc was not used. In contrast, employing the designed tool reduced errors to 10%, a statistically significant discovery with a great clinical relevance. Additionally, preparation time for materials was reduced 142 seconds using Neodisc. Without the tool, the participants admitted not to feel secure, the 93.3% when preparing airway equipment and the 63.3% when preparing medication. The Neodisc provided them with a sense of safety and reduced the possibility of making errors.

Conclusions: The implementation of the Neodisc would bring standardization and significantly reduce the risk of making mistakes in emergency situations. It would reduce the time spent and improve the perception of safety and trust of staff, reducing stress and increasing patient safety.

EVALUACIÓN DE LA EFICACIA DEL NEODISC EN SITUACIONES DE URGENCIA DEL NEONATO. EFICACIA DEL EMPLEO DE UN SISTEMA DE SOPORTE EN LAS SITUACIONES DE EMERGENCIA EN NEONATOLOGÍA: EVALUACIÓN EN SIMULACIÓN CLÍNICA

Resumen

Introducción: *Las situaciones de emergencia son comunes e inesperadas en las unidades neonatales, siendo momentos de gran estrés para el personal a cargo. Los cálculos de dosificación de fármacos suelen hacerse mentalmente, ajustándose al peso del paciente, el cual puede variar considerablemente. Son de uso medicaciones que requieren varias diluciones por su presentación comercial y diversidad de tamaños de materiales para la vía aérea. Con el fin de disminuir los errores en estas situaciones, diseñamos la herramienta Neodisc.*

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Métodos: *Proyecto de investigación para el diseño de la herramienta y posteriormente, realización de un estudio cuasiexperimental con medidas post-intervención, para la evaluación de la eficacia de la Neodisc.*

Resultados: *En un 76,7% de los casos, se observaron errores en el procedimiento sin el uso del Neodisc. En contraste, la utilización de la herramienta diseñada redujo los errores al 10%, un hallazgo que es significativo a nivel estadístico y de gran relevancia clínica. Además, el tiempo de preparación del material se vio reducido con el uso del Neodisc 142 segundos. Sin ella, los participantes admitieron no sentirse seguros, el 93,3% en la preparación del material para la vía aérea y el 63,3% en la preparación de la medicación. La Neodisc les proporcionaba seguridad y reducía la posibilidad de cometer un error.*

Conclusiones: *La implementación de la Neodisc aportaría estandarización y reduciría significativamente el riesgo de cometer errores en situaciones de emergencia. Reduciría el tiempo empleado y mejoraría la percepción de seguridad y confianza del personal, reduciendo el estrés y aumentando la seguridad del paciente.*

INTRODUCTION

Emergencies are frequent and unpredictable in neonatal intensive care units (NICU), often resulting in high levels of stress for the attending staff. In these contexts, medical prescriptions are commonly given verbally, and dose calculations are typically performed mentally, adjusted according to the patient's weight, which can range significantly, from approximately 500 grams to 4000 grams[1].

Currently, there are no commercially available drug formulations with concentrations and volumes tailored to the weight of neonatal patients. As a result, nurses in neonatal intensive care units have to dilute medications and recalculate doses to prepare formulations suitable for administration. Medication dosing in neonates is always adjusted based on their weight and body surface area, often requiring the administration of extremely small doses that differ significantly from standard commercial preparations[2,3].

This combination of factors, particularly in emergency situations, can result in errors at any stage of the medication administration process, putting the safety and the life of the patient at risk[4].

The incidence of medication administration errors in hospitalized patients varies significantly depending on reporting rates and hospital departments, with higher rates observed in intensive care and emergency care units. A systematic review[5] has found that the incidence of such errors in pediatric settings ranges from 5% to 20%.

The idiosyncrasies of newborns—such as their physiological and metabolic immaturity, unique pharmacokinetic and pharmacodynamic profiles, the high number of procedures they undergo, the need for extremely small doses, and the impossibility to perform active checks or report adverse effects[6]—make them the group most at risk for this type of error. One study[7] demonstrates that potentially harmful medication errors may occur up to three times more frequently in the pediatric population than in adults.

Given the above, implementing strategies that can reduce and detect errors before medication administration and simplifying the calculation of doses and dilutions is crucial.

Patient safety remains a constant concern among healthcare professional[8]. However, existing strategies are often inadequate or poorly adapted to the specific needs and characteristics of neonatal patients and NICUs[9,20]. Although in the literature different solutions are proposed to enhance medication safety for neonates in emergency situations, many fail to address the actual needs perceived by healthcare providers[10,11,18].

Consequently, a decision was made to design a safety tool for medication preparation and airway equipment handling that would be user-friendly and easily accessible, aiming to support its effective use in emergency situations within the neonatal intensive care unit. The tool was named Neodisc.

The **primary objective** of this study was to assess the effectiveness of the Neodisc system in improving safety and efficiency during the preparation of medications and airway management equipment, in comparison to standard practice, within a simulated environment.

The specific objectives were to:

1. Examine the errors made in the preparation of medications and airway equipment when using the Neodisc versus standard practice.
2. Evaluate the time required to prepare medications and airway equipment using the Neodisc in comparison to traditional methods.
3. Analyze healthcare professionals' perceptions of safety when using the Neodisc compared to conventional practices.

METHODOLOGY

This research project involved the development and validation of a clinical tool, designed and tested experimentally in both simulated and real clinical environments to assess its efficacy. The study was conducted in two main phases.

The first phase focused on the creation and design of a tool to improve patient safety. To this end, a literature review was conducted on available market solutions, as well as the studies that support and validate them, identifying limitations in the existing options. These solutions, although useful, did not fully meet our specific needs. This led us to design our own tool that would be convenient, portable, and easy to consult in critical situations. Digital formats for mobile

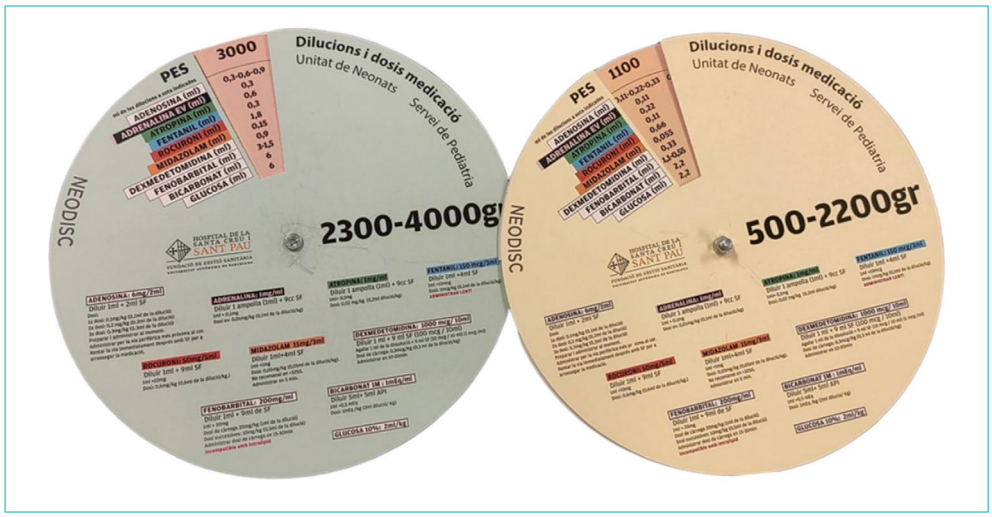

FIGURE 1. General view of the disc, side A (medication).

FIGURE 2. Detailed view of the disc.

devices were ruled out due to the risk of nosocomial infections linked to cross-contamination from surface contact. Instead, a physical format was chosen to minimize these risks and ensure safe and efficient access. A team consisting of two nurses (M.A. and A.R.) and two pediatricians (M.J. and E.M.) from the NICU was formed, in collaboration with the Innovation Unit of the Hospital de la Santa Creu i Sant Pau. The most commonly used emergency medications in our unit were selected, dosage per kilogram was reviewed, and airway equipment was defined according to weight. Based on this information, the Neodisc tool was developed. The calculations generated by the computer system were reviewed by all the authors, and any potential errors were corrected.

Neodisc is a support tool for the preparation of medications and dilutions, as well as for calculating medication volumes and airway equipment appropriate to the patient's weight in emergency situations within the neonatal unit.

Based on the information obtained, a polypropylene disk was designed in two versions, according to the patient's weight, in 100-gram increments (500 g-2200 g and 2300 g-4000 g). It was also produced in two formats: a large version, 29.5 cm in diameter, to be placed on the trolley for quick and easy reference, and a smaller version, 14 cm in diameter, to be carried in a uniform pocket for use during transfers, in the delivery room, etc. One side of the disk contains information on airway equipment and medications; the other side details the standard preparation and dilution of emergency drugs. The disk is rotated around the central slit to select the patient's weight in grams, displaying the most appropriate dosage or equipment for each case (Figures 1 and 2).

The initial prototype was presented to the unit's professionals, and training on its features and use was offered to the entire healthcare team.

Following its implementation, the second phase of the study was started: a quasi-experimental study with post-intervention measurements to evaluate the effectiveness of the Neodisc in simulated neonatal emergency situations, using the participating professionals themselves as the control group.

The study was conducted between January and September 2023 in the Neonatology Department of Hospital de la Santa Creu i Sant Pau, Barcelona, after obtaining approval from the institution's Ethics Committee (reference number IIBSP-NEO-2022-113).

In 2023, Hospital de la Santa Creu i Sant Pau attended 1,803 births. The unit is accredited as a level 3A NICU, equipped with 10 critical care stations and 7 semi-critical care incubators. In 2023, 389 newborns requiring urgent care were admitted, including 142 preterm infants under 36 weeks of gestation from our catchment area, as well as from other towns in Catalonia and Andorra, transferred by the Medical Emergency Service (SEM) via pediatric medicalized transport.

A targeted sample was selected, consisting of the nursing team that regularly works in the unit. A total of 86% of the staff participated (30 out of 35 professionals), all of whom were nurses with varying levels of experience. The researchers were excluded from the study. Participation was voluntary.

Each participant completed two simulation exercises, with a total duration of approximately 20 minutes.

TABLE 1. Preparation time for equipment and medication in the two study groups.

	Without Neodisc	With Neodisc	t	p
Preparation time for equipment Mean (SD) in sec	93.9 (40.4)	79 (34)	2.45	0.02
Preparation time for medication Mean (SD) in sec	421 (162)	279 (88.8)	6.23	< 0.01

t: Student's t value; p: significance value.

The simulations were conducted using standard unit equipment, in front of the medication trolley, and for a simulated patient with a randomly generated weight obtained via a mobile app. Participants were required to prepare the appropriate airway equipment based on that weight (including the laryngoscope blade, endotracheal tube, and self-inflating bag-mask). After being verbally given three medication doses in milligrams (adrenaline, midazolam, and rocuronium), calculated according to the simulated weight, participants had to prepare the corresponding dilutions and accurately measure the prescribed doses.

In the second simulation, the same procedure was followed, with the difference that this time the Neodisc was used as a support tool. Each participant was provided with a sheet of paper, a pen, and a calculator, along with two bowls: one for airway equipment and the other for medications.

During the verbal medication orders, the dose of midazolam was deliberately given with a guideline error (x10) in all cases, in order to assess the rate at which participants detected the error when receiving verbal instructions.

During the simulated scenarios, the researchers collected data on predefined variables using a recording sheet. Participants recorded their impressions by completing a Likert-type survey, which had been developed by consensus among the research team.

The primary study variable was the incidence of errors, which were classified as follows:

- Absence of airway equipment (laryngoscope blade, endotracheal tube, or self-inflating bag-mask).
- Size of equipment inappropriate for the patient's weight.
- Incorrect transcription of the prescribed dose.
- Miscalculation of the dose or dilution.
- Incorrect preparation of the dose.

The following secondary variables were also defined:

- Type of incident during the preparation of medication or airway equipment (dose calculation errors, dilution or dose preparation errors, incorrect transcription of verbally indicated doses, use of inappropriate equipment for the patient's weight, and absence of required airway material).
- Time (in seconds) required to prepare the airway equipment and the medications.
- Nurses' perception of safety and satisfaction with the use of the Neodisc.

Data were collected using an ad-hoc survey and entered into a database created in Clinapsis for descriptive analysis using SPSS version 26 with a significance level of $p< 0.05$. Descriptive analysis was conducted for all variables, and bivariate analysis was performed for the primary outcome variable. The bivariate analysis of the primary variable was performed using the Chi-square test, while secondary variables were analyzed using the paired Student's t-test.

RESULTS

A total of 60 simulations were conducted with 30 participants, including nurses who work in the NICU. Ninety-seven percent of the sample was female. Of these, 50% had less than 5 years of experience (16.7% with less than 1 year and 33.3% between 1 and 5 years), while the remaining 50% had more than 5 years of experience.

In 76.7% of cases, errors were observed during the procedure without the use of the Neodisc. In contrast, the use of the tool reduced the error rate to 10%, a difference that was statistically significant (Pearson's Chi-square = 27.149; $p< 0.001$).

Among the professionals who performed the first simulation, errors in equipment selection were observed in up to three-quarters of the cases (73.4%). Years of experience reduced the number of errors related to equipment size selection by half. The mean number of errors per simulation among nurses with less than 5 years of experience was 1.67 (SD= 1.2), compared to 0.80 (SD= 0.676) among those with more than 5 years of experience (t= 2.47; p= 0.02).

Errors in the preparation of dilutions or doses were not highly prevalent; however, 26.7% of professionals made medication administration errors without the use of Neodisc, compared to 3.3% when using the tool.

In addition, material preparation time was reduced with the use of the Neodisc and with greater professional experience. When comparing the mean preparation times, a significant difference of 14.8 seconds was observed (SD= 33.1) (Table 1).

When grouping the data by years of experience, it was observed that professionals with more than 5 years of experience had significantly shorter material preparation times, both with and without the use of the tool, as shown in Table 2.

On the other hand, use of the tool significantly reduced medication preparation time by 142 seconds (SD 125), as shown in Table 1. However, the differences observed between the two groups based on professional experience were not statistically significant. The group with less than 5 years of experience took one minute longer to prepare medication without the use of the Neodisc, but this difference was reduced by half when the tool was used in the group with more than 5 years of experience (Table 2).

During the simulations, an intentional verbal prescription error was introduced during medication preparation. In the first simulation, conducted without the Neodisc, 93.3%

TABLE 2. Preparation times for equipment and medication according to professional experience.

		< 5 years Mean (SD) sec	> 5 years Mean (SD) sec	dif	t	p
Preparation time for equipment	WITHOUT Neodisc	111 (46.4)	76.7 (24.6)	34.3 (13.6)	2.56	0.017
	WITH Neodisc	93 (38.5)	65 (22.3)	28 (11.5)	2.44	0.021
Preparation time for medication	WITHOUT Neodisc	453.5 (172.4)	388.8 (149.9)	64.7 (59)	1.10	0.283
	WITH Neodisc	292 (85.8)	265.8 (94.6)	26.3 (33)	0.80	0.433

t: Student's t value; p: significance value.

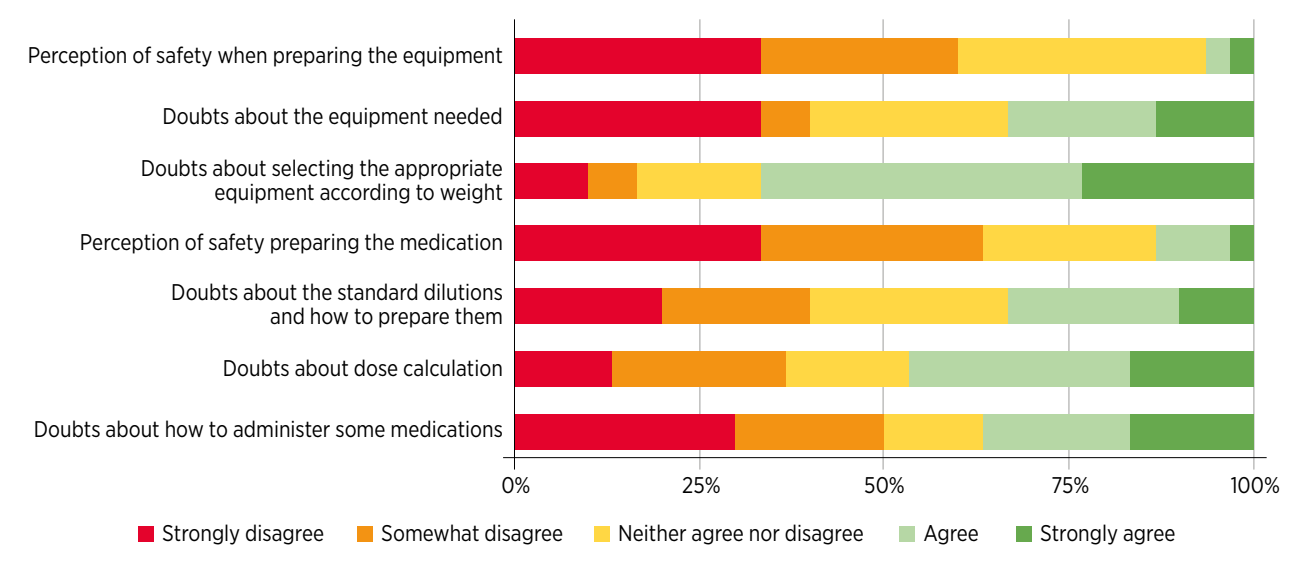

FIGURE 3. Results of the post-simulation survey in participants without the Neodisc.

(n= 28) of participants failed to detect the error. In the second simulation, the same verbal prescription error was present; however, this time, the medication was prepared using the Neodisc, bypassing the verbal instruction. Error detection increased to 23.3% (n= 7) with the use of the tool. Although the increase in error detection was not statistically significant, medication was prepared according to the dosage indicated on the Neodisc, preventing the error from reaching the simulated patient.

Professional experience was not found to significantly influence error identification (χ= 2.143; p= 0.143).

In the final brief survey, 93.3% of participants reported not feeling fully confident in preparing airway equipment without the use of the Neodisc, and up to 83.3% expressed doubts about selecting the appropriate equipment based on the patient's weight without the support tool. Regarding medication preparation, 63.3% admitted feeling not very confident; 33.3% reported doubts about dilution preparation, 46.7% expressed uncertainty in dose calculation, and 36.7% in administration. These results are illustrated in Figure 3.

Professionals' satisfaction with the use of the tool was very positive, as shown in the results presented in Figure 4. The use of the Neodisc increased their confidence in preparing both equipment and medication, and they felt it helped reduce preparation time.

DISCUSSION

Systematic reviews[5,13,15] indicate that in pediatrics, medication administration errors are detected in 5% to 20% of cases, with serious clinical impact reported in 0.6%. The most frequent errors involve administration (68.1%) and prescription (39.5%), with nurses reporting the majority of incidents (65.4%). Although 89.4% of these errors do not cause harm, a small percentage result in permanent injury or death.

The main causal factor identified is distraction (59%), along with the complexity of dose calculation. Although 17% of errors are intercepted, there remains significant room for improvement in prevention[13,15].

In our study, we identified an incidence of 26.7% for this type of error, a figure that rises to 93.4% when verbal prescription errors are included. These figures are influenced by the rate of error reporting and detection; thus, we observed a higher incidence, as errors in critical situations, where prescriptions are given verbally and calculations are done mentally, are rarely identified.

Strategies to reduce errors in neonatal units—such as standardization and dose calculation charts, electronic medical prescribing, educational simulation and training programs, and smart infusion pumps—as well as the underlying causes of these errors, have been extensively analyzed in the

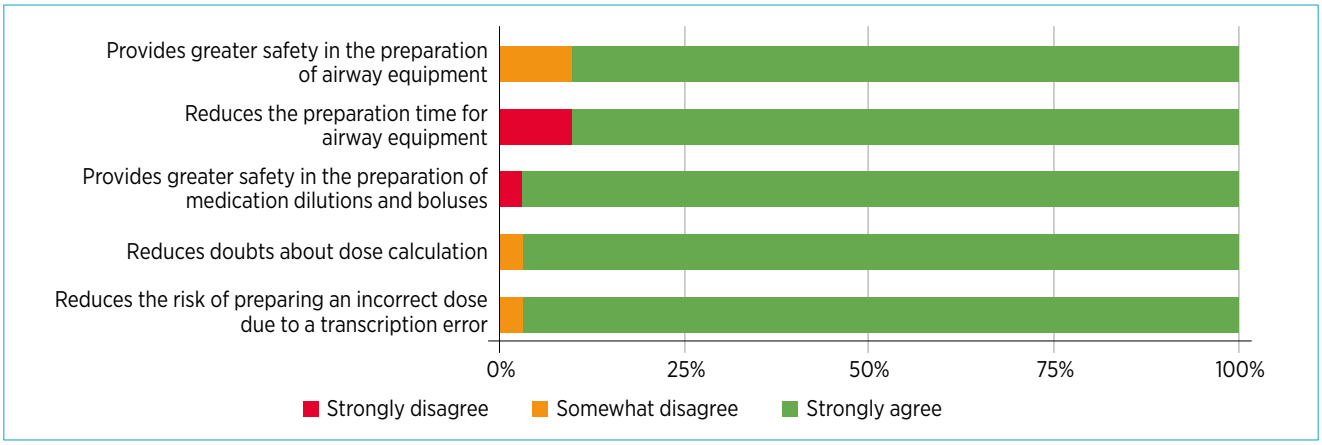

FIGURE 4. Results of the post-simulation survey in participants with the Neodisc.

literature[1,2,5,9-12,14,16]. However, there remains a lack of tools and strategies specifically adapted to the unique needs of NICUs. Process standardization has been shown to enhance safety and significantly reduce errors[16]. The Neodisc proves to be an effective standardization solution, with a highly favorable cost-benefit ratio.

Observation facilitates the identification of errors in emergency situations—even in simulated contexts—yielding more representative data on their incidence. Our study observed a reduction in both equipment and medication preparation times, as well as a decrease in preparation errors through the use of the Neodisc. The standardization of these procedures, as suggested by multiple authors[1,2,5,9-12,14,16], decreases the incidence of errors and, consequently, increases the safety of our patients and healthcare personnel.

Our study underscores the importance of the learning curve[17] among healthcare professionals in neonatal emergency situations, which helps reduce response time and improve the accuracy of care. The use of the Neodisc contributes significantly to these positive outcomes, and its implementation could make a meaningful difference in the quality of care, particularly in critical situations.

During the simulations, a scenario was recreated involving an error in the verbal communication of the medication regimen. Although the use of the tool did not guarantee detection of the error, it effectively prevented the error from reaching the simulated patient. In this scenario, participants prepared the correct dose as indicated by the tool, rather than the incorrect verbally communicated dose, thereby avoiding potential negative consequences for the simulated patient.

Some of the errors considered during the simulations, such as mask size, are theoretical and subjective. Although mask size is determined based on the patient's weight, in practice, material selection may also depend on other factors, such as the size of the face.

During the course of the study, the developed tool was well received, as evidenced by favorable results in the evaluation of its usability and perceived usefulness. Professionals who participated in the simulations expressed a positive perception of the safety and efficiency the tool provided. This contributed to increased confidence in their ability to manage critical situations and enhanced their work efficiency, factors that could ultimately improve the quality of care and patient safety.

In this study several limitations and potential sources of bias were identified that should be considered when interpreting the results. First, the small sample size, consisting of permanent staff (25 individuals) and rotating staff (10–12 individuals) from the NICU, may limit the generalizability of the findings. However, we consider this sample to be representative of the unit's regular clinical team. Additionally, as the study was based on simulated scenarios rather than real emergency situations, the recorded times and observed errors may not fully reflect actual clinical conditions. On the other hand, the quasi-experimental design with post-intervention measurements may be subject to bias related to healthcare professionals' perceptions of the Neodisc tool. Despite these limitations, the study aims to contribute to improving patient safety in critical situations by reducing errors in the preparation of medication and airway equipment. These findings highlight the need for further research using more robust study designs and larger sample sizes to validate the results and enhance their applicability in neonatal care settings.

CONCLUSIONS

The use of the Neodisc can significantly reduce the risk of errors in equipment selection and medication preparation during emergency situations in neonatal care. Additionally, it can markedly decrease the time required for these tasks, helping to streamline the overall process.

The implementation of the Neodisc in clinical practice would provide standardization in both equipment selection and the preparation of dilutions and medication dosages in ml/kg. This standardization could help reduce errors in medication preparation, prescription, and administration. Furthermore, the use of a tool like the Neodisc would enhance healthcare professionals' perception of safety and confidence when managing neonatal emergencies, thereby reducing the stress associated with such high-pressure situations and contributing to the delivery of high-quality patient care.

Our two-year experience using this tool in the delivery room, NICU, and during neonatal air transport has been highly positive, with strong acceptance from all professionals involved, including both nurses and physicians.

REFERENCES

1. Balaguer Santamaría JA, Fernández Ballart JD, Escribano Subias J. Utilidad de una aplicación informática para disminuir errores de tratamiento en neonatología. An Pediatr. 2001; 55(6): 541-5. https://doi.org/10.1016/s1695-4033(01)77734-x
2. Santesteban E, Arenas S, Campino A. Medication errors in neonatal care: A systematic review of types of errors and effectiveness of preventive strategies. J Neonatal Nusr. 2015; 21(5): 200-8. https://doi.org/10.1016/j.jnn.2015.04.002
3. López Martínez R, Cabañas Poy MJ, Oliveras Arenas M, Clemente Bautista S. Utilización de medicamentos en una UCI neonatal: Estudio prospectivo. Farm Hosp. 2005; 29(1): 26-9. https://doi.org/10.1016/s1130-6343(05)73632-1
4. Melgarejo González C, Bossacoma Busquets F. Bulletí de prevenció d'errors de medicació. Generalitat de Cataluña; 2019; 12(2). https://scientiasalut.gencat.cat/bitstream/handle/11351/4291/butll_prev_errors_medicacio_catalunya_2019_17_02_cas.pdf?sequence=2&isAllowed=y
5. Miller MR, Robinson KA, Lubomski LH, Rinke ML, Pronovost, PJ. Medication errors in paediatric care: A systematic review of epidemiology and an evaluation of evidence supporting reduction strategy recommendations. Qual Saf Health Care. 2007; 16(2): 116-26. https://doi.org/10.1136/qshc.2006.019950
6. Barra CL, Marín PA, Coo S. Cuidados del desarrollo en recién nacidos prematuros: Fundamentos y características principales. Andes Pediatr. 2001; 92(1): 131. https://doi.org/10.32641/andespediatr.v92i1.2695
7. Campino A, Santesteban E, García M, Rueda M, Valls-i-Soler A. Errores en la preparación de fármacos intravenosos en una unidad de cuidados intensivos neonatal: Una potencial fuente de eventos adversos. An Pediatr. 2013; 79(1): 21-5. https://doi.org/10.1016/j.anpedi.2012.09.005
8. Gutiérrez S, Mogni A, Berón A, Iramain R. Errores de medicación en niños hospitalizados. Arch Pediatr Urug. 2011; 82(3): 133-40. https://www.scielo.edu.uy/scielo.php?script=sci_arttext&pid=S1688-12492011000300002
9. Nguyen MNR, Mosel C, Grzeskowiak LE. Interventions to reduce medication errors in neonatal care: A systematic review. Therap Adv in Drug Saf. 2018; 9(2): 123-55. https://doi.org/10.1177/2042098617748868
10. Chedoe I, Molendijk HA, Dittrich STAM, Jansman FGA, Harting JW, Brouwers JRB, et al. Incidence and nature of medication errors in neonatal intensive care with strategies to improve safety: A review of the current literature. Drug Saf. 2007; 30(6): 503-13. https://doi.org/10.2165/00002018-200730060-00004
11. Martín Delgado MC, Trenado Álvarez J, Sanz López E, Riaza Gómez M, Sánchez Galindo A, Nieto Moro M, et al. Prevención de errores de medicación en las Unidades de Cuidados Intensivos de adultos, pediátricas y neonatales en España. Sociedad Española de Neonatología; 2022. Diponible en: https://seneo.es/images/site/publicaciones/20220503_INFORME-PREVEMED.pdf
12. Marufu TC, Bower R, Hendron E, Manning JC. Nursing interventions to reduce medication errors in paediatrics and neonates: Systematic review and meta-analysis. J Pediatr Nur. 2022; 62: e139-47. https://doi.org/10.1016/j.pedn.2021.08.024
13. Esqué Ruiz MT, Moretones Suñol MG, Rodríguez Miguélez JM, Sánchez Ortiz E. Izco Urroz M, de Lamo Camino M, et al. Los errores de tratamiento en una unidad neonatal, uno de los principales acontecimientos adversos. An Pediatr. 2016; 84(4): 211-7. https://doi.org/10.1016/j.anpedi.2015.09.020
14. Puma-Quito RS, Mesa-Cano IC, Ramírez-Coronel AA, Pacurucu-Avila NJ. Efectividad de intervenciones de enfermería basada en protocolos de administración segura de medicamentos por vía venosa: revisión sistemática. Arch Venez Farmacol Terap. 2021; 40(3): 274-82. https://www.redalyc.org/articulo.oa?id=55969712009
15. Escandell-Rico FM, Pérez-Fernández L. Análisis de los errores de medicación en Cuidados Intensivos Neonatales: una revisión sistemática. Med Intens. 2024; 48(11): 654-62. https://doi.org/10.1016/j.medin.2024.06.008
16. Medina S, Olmedo E. Ríos P, Bruno V. Propuesta de estandarización de etiquetado de medicamentos de alto riesgo: un instrumento para la mejora de calidad. Rev Fundasamin. 2023;43: 36-49. https://doi.org/10.61481/Rev.enferm.neonatal.n43.05
17. Webb C, Dabkowski E, Missen K, Missen A. Contributing factors to medication administration errors among novice registered nurses: An integrative review. J Clin Nurs. 2025 [En prensa]. https://doi.org/10.1111/jocn.17721.
18. Yamanaka TI, Pereira DG, Pedreira MLG, Peterlini MAS. Redesenho das atividades de enfermagem para redução de erros de medicação em pediatria. Rev Brasil Enfermagem. 2007; 60(2): 190-6. https://doi.org/10.1590/S0034-71672007000200012
19. Henry Basil J, Premakumar CM, Mhd Ali A, Mohd Tahir NA, Seman Z, Voo JYH, et al. Prevalence and factors associated with medication administration errors in the neonatal intensive care unit: A multicentre, nationwide direct observational study. J Adv Nurs. 2025; 81(2): 820-33. https://doi.org/10.1111/jan.16247
20. Sutherland AB, Phipps DL, Grant S, Hughes J, Tomlin S, Ashcroft D. Understanding the informal aspects of medication processes to maintain patient safety in hospitals: A sociotechnical ethnographic study in paediatric units. Ergonomics. 2025; 68(3): 444-58. https://doi.org/10.1080/00140139.2024.2333396

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WORKING GROUP

Activities of the Working Group on Hydration and Electrolyte Disorders of the Spanish Society of Pediatric Emergencies over the past ten years

M. Ángeles García[1], Belén Guibert[2], Rosario López[3], María de Ceano-Vivas[3] and the Working Group on Hydration and Electrolyte Disorders of the Spanish Society of Pediatric Emergencies

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The physiological mechanisms regulating water and electrolyte homeostasis in children have specific characteristics that differ from those in adults. Pediatric emergency physicians manage patients presenting with a wide range of clinical conditions, some of which involve disturbances in water balance, electrolyte balance, or acid-base status. In other cases, patients may simply require oral or intravenous fluid therapy for a limited period due to various reasons.

In response to these needs, 10 years ago, a group of pediatricians from the Spanish Society of Pediatric Emergencies (SEUP) established a Working Group (WG) dedicated to this field, with the aim of standardizing the management of related clinical conditions. The group's initial objectives included developing protocols, guidelines, and recommendations based on scientific evidence. Thus, the SEUP Working Group on Hydration and Electrolyte Disorders (SEUP-HED-WG) was formed.

INFORMATION SOURCES: MANUALS, PROTOCOLS, AND ALGORITHMS

Our first activity was aimed at preparing the "Manual for the diagnosis and treatment of dehydration and electrolyte disorders in Pediatric Emergency Departments"[(1)], a pocket-sized manual designed to support the rapid management of electrolyte disturbances and the initiation of oral or intravenous fluid therapy, both in cases of dehydration and for maintenance purposes.

In line with the work of the SEUP, the WG has developed and periodically updated the protocol for the management of "Dehydration in the Context of Acute Gastroenteritis", as part of the SEUP Diagnostic and Therapeutic Protocols in Pediatric Emergency Medicine[(2)], together with the corresponding clinical algorithm[(3)]. The most recent update, published in 2024, includes not only revised dosing and fluid volume recommendations based on the degree and type of dehydration, but also the option of using balanced intravenous solutions in treatment. These protocols are routinely implemented in pediatric emergency departments and primary care settings, both nationally and internationally.

In 2021, the group published the "Document of Recommendations on Rapid Intravenous Rehydration in Acute Gastroenteritis" in *Anales Españoles de Pediatría*[(4)]. This document was selected for inclusion in the English edition of the journal[(5)]. It provides consensus-based recommendations, supported by scientific evidence, to standardize the use of rapid intravenous rehydration (RIR) in emergency departments. The project was developed using the GRADE methodology, involving the formation of an expert panel; the creation of a catalogue of research questions and identification of key issues; prioritization of each item; a comprehensive literature review; evaluation and synthesis of the scientific evidence (GRADE); and the subsequent review, discussion, and formulation of recommendations. Ten clinical questions were defined, resulting in 16 recommendations addressing the safety of RIR, its indications and contraindications, duration, optimal fluid composition, infusion rate, and the clinical and laboratory monitoring required during treatment.

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QUALITY IMPROVEMENT: QUALITY INDICATORS AND "DO-NOT-DO" RECOMMENDATIONS

The SEUP-HED-WG has collaborated with the Quality Improvement Group on the "SEUP Quality Indicators" manual. The indicator "Use of intravenous rehydration in dehydrated patients with acute gastroenteritis"[6] was developed, establishing that oral rehydration is the therapy of choice for dehydration associated with acute gastroenteritis and that intravenous rehydration should be used in less than 5% of cases of acute gastroenteritis.

With the aim of improving clinical practice in emergency departments, a list of "Do-Not-Do" Recommendations when rehydrating a patient with acute gastroenteritis was developed[7]. These include initiating rehydration without first estimating fluid deficit, using non-approved oral rehydration solutions (ORS), selecting intravenous rehydration as the first option when oral rehydration is not contraindicated, administering hypotonic saline solutions, and failing to monitor for signs of volume overload during rehydration, particularly when using intravenous fluids.

FAMILY INFORMATION RESOURCES

Information sheets on the home management of vomiting and acute gastroenteritis have been developed[8]. These materials provide clear guidance on appropriate care and monitoring at home, helping to standardize the information provided at discharge. Parent information sheets are widely used not only in pediatric emergency departments but also in primary care settings.

In the summer of 2023, coinciding with a heatwave, the group produced informational posters aimed at families and caregivers[9]. Under the slogans "In summer and in the sun, children can suffer heat stroke" and "In summer and in the sun, avoid intense exercise to prevent heat stroke", the posters provided basic guidance to help prevent the adverse effects of prolonged sun exposure.

Similarly, in the context of treating acute gastroenteritis, the WG promoted the slogan "Don't do your children wrong, give oral rehydration solution" to reinforce the message that fluid and electrolyte losses should be replaced with oral rehydration solutions, not commercial beverages.

TRAINING

In 2021, the Working Group was asked by the SEUP to lead the online seminar "Fluid therapy in different clinical situations". The seminar addressed topics including rapid intravenous rehydration, hypernatremia, and severe dehydration[10]. It remains available on the SEUP Campus under the Online Seminars section.

Finally, we would like to emphasize that intravenous fluid therapy is likely the most frequently prescribed treatment in hospitals[11]. The introduction of new balanced solutions, already incorporated into guidelines for the management of hypovolemic states, presents a new challenge in the context of dehydration and maintenance fluid therapy. However, the implementation of these guidelines remains limited by the unavailability of a balanced isotonic fluid that also contains glucose.

The work carried out over the years by the SEUP-HED-WG has focused on developing evidence-based resources to support patient care and to assist families and caregivers in the home management of these highly prevalent conditions. Specialist physicians from 16 hospitals, both within Spain and internationally, have contributed to the development and implementation of these activities.

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REFERENCES

1. García Herrero MA, López López MR, Molina Cabañero JC. Manual para el diagnóstico y tratamiento de la deshidratación y de los trastornos electrolíticos en Urgencias de Pediatría. Madrid: Ergon; 2018.
2. García Herrero MA, López López R, Guibert Zafra B. Deshidratación en contexto de gastroenteritis aguda En: Protocolos diagnósticos y terapéuticos en urgencias de pediatría. 4ª ed. Sociedad Española de Urgencias de Pediatría (SEUP); 2024. Disponible en: https://seup.org/wp-content/uploads/2024/04/17_Deshidratacion_4ed.pdf
3. García Herrero MA, López López R, Guibert Zafra B. Paciente con deshidratación en el contexto de gastroenteritis aguda (no incluye periodo neonatal). Disponible en: https://seup.org/wp-content/uploads/2024/04/9_Deshidratacion_may2024.pdf
4. Mora-Capín A, López-López R, Guibert-Zafra B, de Ceano-Vivas La Calle M, Porto-Abad R, Molina-Cabañero JC, et al; Grupo de Trabajo de Hidratación y Trastornos Electrolíticos de la

Sociedad Española de Urgencias Pediátricas. Documento de recomendaciones sobre la rehidratación intravenosa rápida en gastroenteritis aguda. An Pediatr. 2022; 96(6): 523-35.

5. Mora-Capín A, López-López R, Guibert-Zafra B, de Ceano-Vivas La Calle M, Porto-Abad R, Molina-Cabañero JC, et al; Grupo de Trabajo de Hidratación y Trastornos electrolíticos de la Sociedad Española de Urgencias Pediátricas. Recommendation document on rapid intravenous rehydration in acute gastroenteritis. An Pediatr (Engl Ed). 2022; 96(6): 523-35. doi: 10.1016/j.anpede.2021.04.011. PMID: 35624005.
6. García Herrero MA. Uso de la rehidratación endovenosa en paciente deshidratados con gastroenteritis. En: González Hermosa A, Benito Fernández FJ, Fernández Elías M, González Peris S, Luaces Cubells C, Velasco Zúñiga R, eds. Indicadores de calidad SEUP. Madrid: Ergon; 2018.p.86.
7. https://seup.org/pdf_public/gt/Acciones/GT_Hidratacion.pdf
8. https://seup.org/hojas-informativas/
9. https://seup.org/wp-content/uploads/2023/07/golpe_calor_GT_hidratacion.pdf
10. https://seup.org/seminarios-online/
11. Brossier DW, Goyer I, Morice C, Alsohime F, Mayberry HF, Porcheret F, et al; European Society of Pediatric and Neonatal Intensive Care (ESPNIC) IVMFT group. How to follow the guidelines, when the appropriate fluid is missing? Eur J Pediatr. 2024; 183(6): 2797-803.

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SCIENTIFIC LETTER

Assessment of a specific care pathway for patients referred from Primary Care to a Hospital Pediatric Emergency Department

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A considerable proportion of patients seen in a hospital Pediatric Emergency Department (PED) are initially referred from a Primary Care Center (PCC) or private medical consultations (PMCs), where a physician performs the initial assessment and determines that referral to a hospital is necessary[1,2]. These patients differ from those who present on their own initiative, as they have been initially assessed by a physician and are referred with a report requesting specific actions. The reasons for hospital referral vary and may include the need for diagnostic tests not available in primary care, urgent evaluation by a specialist, or the initiation of treatments that cannot be provided at the primary care level[2,3]]. At our center, the care pathway for referred patients is identical to that for those who attend on their own initiative: initial data registration at admission, triage classification, and post-triage waiting based on the assigned level. During periods of high demand, waiting times in the emergency department increase for this group of patients, as well as for others. In this context, there is a rise in emergency department abandonment, higher rates of return visits, and increased discomfort among patients and their families.

As previously mentioned, since these patients have already been evaluated by another physician, an initiative was proposed to optimize their care through a pilot study conducted in October 2023. A specific care pathway was developed to establish a system for prioritizing referred patients. At the time of registration, referral status was recorded, and after triage classification (which remained unchanged regardless of referral), a pediatrician specialized in emergency medicine evaluated these patients in consultation rooms specifically reserved for this purpose, separate from those used for patients who came on their own initiative. The remaining pediatricians attended to these patients through the standard care pathways in the emergency and urgent care areas.

The aim of this study was to determine whether a specific care pathway for referred patients improved their management in the PED.

A descriptive observational study was conducted in the PED of a tertiary maternal and child hospital in Barcelona. We reviewed the electronic medical records of patients under 18 years of age who were seen between 8:00 a.m. and 8:00 p.m. on weekdays and were referred from a PCC, a primary care emergency center (PCEC), or a PMC. Data were collected for two periods: October 2022 (prior to the pilot test) and October 2023 (during the implementation of the specific care pathway). Patients seen exclusively by the Traumatology, Surgery, and/or Psychiatry departments, as well as those referred from other hospitals, were excluded from the analysis.

Improvements in hospital care were defined as a reduction in the number of triaged patients who left without being seen (dropout rate), a decrease in waiting time for medical evaluation (measured in minutes from arrival at the PED to the start of care), and a reduction in the need for scheduled follow-up appointments with other specialists or additional diagnostic tests to complete the consultation.

For the statistical analysis, the extracted data were analyzed using IBM SPSS Statistics for Windows, Version 29.0.0.0 (IBM Corp., Armonk, NY, USA, 2023). Descriptive statistics were used, with means or medians for quantitative variables and percentages for categorical variables. The hospital's ethics committee approved the study.

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In October 2022, there were 343 referrals out of a total of 4,755 visits (7.2%), compared to 359 referrals out of 4,303 visits (8.3%) in October 2023 (p= 0.045). The median age of referred patients in 2022 was 4.1 years (interquartile range [IQR]: 1.2–8.9 years), compared to 4.0 years in 2023 (IQR: 1.0–9.9 years) (p= 0.91). Regarding the hourly distribution of referrals, 43% arrived at the PED during the morning shift (08:00–14:00), while 57% arrived in the afternoon (14:00–20:00). In October 2022, the dropout rate among referred patients was 3.8% (13 patients), whereas in 2023, no referred patients left the PED without being seen (p< 0.001). Table 1 presents the comparison according to triage level, waiting times, and discharge destination.

Analysis of the results showed that the percentage of pediatric referrals was similar to that reported in other studies, such as Yebra Delgado et al., who found a rate of 7.2% in the Gijón area[4], and San José-González et al, who reported a rate of 9% in Lugo[5]. The time distribution of referrals, with a predominance in the afternoon, was consistent with findings from other studies[6]. The most frequent reasons for referral were the need for complementary tests and evaluation by another specialists[7]. It would be valuable to assess the resources available in various primary care centers and consider providing them with additional diagnostic tools to reduce the number of referrals, thereby minimizing patient travel and alleviating the demand on hospital care[2].

We found that implementing a specific care pathway for referred patients led to a notable improvement in their management, according to the defined criteria. There was a reduction in the median waiting time, particularly among patients classified in the lower triage priority levels. This may help explain the absence of patients who left the PED without being seen. However, there was no significant decrease in the rate of follow-up appointments scheduled at discharge during the pilot phase of the new pathway. This may be attributed to the fact that most pediatric subspecialties provide care only during morning hours, whereas a higher proportion of referrals occurred in the afternoon.

The results demonstrate an improvement in certain aspects of patient care during the pilot test, suggesting that long-term implementation of this pathway should be considered. However, such a strategy would require additional personnel and appropriate space, which is currently unfeasible due to limited available resources. Nevertheless, the implementation of a single, isolated care pathway might be insufficient[8]. As previously mentioned, a considerable number of referrals require assessment by pediatric subspecialties outside the PED, which often cannot be provided immediately. Improving communication between primary care and these subspecialty services through the creation of a direct referral pathway could reduce visits to the PED that primarily serve a liaison function.

The results of our pilot study demonstrate the usefulness of a specific care pathway in improving the management of referred patients. Nevertheless, we believe that optimal communication and coordination between hospital centers and primary care would represent the ideal approach to enhancing their care. At a broader level, effective organization across the different levels of the healthcare system is essential to optimize pediatric care, not only to reduce the burden on healthcare services, but also to lower costs and improve care quality and patient experience.

TABLE 1. Patients referred to the PED (pediatrics only) seen according to triage level, median waiting time according to triage level and destination.

	2022 (n= 330)	2023 (n= 359)	p
Triage level			*0.366*
2	33 (10%)	30 (8.4%)	
3	133 (40.3%)	128 (35.7%)	
4	141 (42.7%)	168 (46.8%)	
5	23 (7%)	33 (9.2%)	
Median waiting Triage 2 (min)	21	15	***0.018***
Median waiting Triage 3 (min)	43.5	24	***<0.001***
Median waiting Triage 4 (min)	168.5	56.5	***<0.001***
Median waiting Triage 5 (min)	196	44	***<0.001***
Destination at discharger from PED			*0.811*
Home	231 (70%)	248 (69.1%)	
Appointment with specialist	45 (13.6%)	55 (15.3%)	
Admission	54 (16.4%)	56 (15.6%)	

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

REFERENCES

1. Mollar JB, Vara M, Meneu R, Roselló M, Ripoll P. Derivaciones desde Atención Primaria a las urgencias hospitalarias en el departamento 7 de Valencia. FML. 2010; 14(3): 6.
2. Pérez Martín A, López Lanza JR, Dierssen Sotos T, Villa Puente M, Raba Oruña S, del Río Madrazo JA. Análisis de las derivaciones hospitalarias desde un servicio de urgencias de Atención Primaria durante un año. Semergen. 2007; 33(7): 341-8.
3. Escobedo F, González Gil L, Salarichs M, Manzano A, López I, Martín JA, et al. Evaluación de las urgencias hospitalarias desde un área básica de salud (ABS). Aten Primaria. 1997; 19(4): 169-75.
4. Yebra Delgado S, Bravo Merino L, Suárez Gil P. Análisis de la atención a la población pediátrica por médicos de familia en un punto de atención continuada. Semergen. 2019; 45(8): 523-7.

5. San José-González MA, Méndez-Fernández P, Basanta-González D, Núñez-García C. Atención urgente de una población pediátrica rural en un punto de atención continuada. Aten Primaria. 2008; 36(9): 524–5.
6. Bouzas Senande E, López Olmeda C, Cerrada Cerrada E, Olalla Linares J, Menéndez JL. Adecuación de las derivaciones desde atención primaria al servicio de urgencias hospitalario en el Área 9 de Madrid. Emergencias. 2005; 17: 215-9.
7. Trenchs V, Hernández-Bou S, Fernández-Santervás Y, Quintillá JM, Luaces C, García-García JJ, et al. Anàlisi dels motius de derivació a un servei d'urgències pediàtriques. Bol Soc Catalana Pediatr. 2003; 63: 69-72.
8. Hodgson HS, Webb N, Diskin L. Consultant-led triage of paediatric hospital referrals: a service evaluation. BMJ Paediatr Open [Internet]. 2021; 5(1): e000892.

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LETTER TO THE EDITOR

"Fellow SEEUUP" and "SLEPE PEM Fellows Conference" bursaries

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To the Editor:

We would like to take this opportunity provided by Emergencias Pediátricas to address our pediatric emergency medicine residents and fellows and share our experience with the bursaries for SEUP and SLEPE fellows for the Pediatric Emergency Medicine (PEM) Fellows Conference.

Dear Pediatric Emergency Medicine Fellow or Resident,

We are Andrea Moreno Domínguez (second-year Pediatric Emergency Medicine fellow at the Centro Hospitalario Pereira Rossell in Montevideo, Uruguay) and Marta Lloret Carnicero (fourth-year resident in Pediatrics and its Specific Areas at the Hospital Infantil Universitario Niño Jesús in Madrid, Spain). We would like to share with you the enriching experience we had this year thanks to the PEM Fellows Conference bursaries, offered by the Spanish Society of Pediatric Emergency Medicine (SEUP) and the Latin American Society of Pediatric Emergency Medicine (SLEPE).

Thanks to these bursaries, we were both able to attend the PEM Fellows Conference, held from 9 to 11 March in Seattle, Washington (USA). This is a truly unique experience, as the format of the conference differs from that of traditional scientific meetings we are used to. Its aim is to introduce PEM fellows to a number of topics that, in our view, currently represent a gap in formal training. The various workshops and presentations addressed topics such as time management, how to effectively present our work to others, the use of new technologies and artificial intelligence, and how to identify a personal niche where we can align our passions, skills, and the needs of society and our healthcare institutions. We had never before attended a medical conference where issues like the impostor syndrome or the work-life balance were openly discussed. We had the opportunity to hear from important professionals with years of experience, who shared their insights on these often-overlooked aspects of personal and professional development, areas where no formal training exists and that we usually learn gradually through our mentors and role models as we encounter real-life challenges.

The organizing committee of the conference also gave each of us the opportunity to present a research project and receive feedback from fellow trainees working on similar topics, as well as from senior faculty members and leading researchers. Thanks to their valuable advice, we returned home with our suitcases full of literature and fresh ideas that helped us improve our projects. The small-group format, which encouraged the sharing of personal experiences, was particularly enriching for us as participants from different healthcare systems and it allowed us to contribute ideas to our colleagues' projects from a different perspective.

In short, it has been a unique experience for us, in which we have come to realize the power of listening and curiosity as the driving forces behind what we do. There will always be someone who has seen something we haven't, someone who doesn't share our mental model but can enrich it by contributing their vision, and it is vital that we recognize this.

We would like to thank SEUP and SLEPE for this incredible opportunity and encourage anyone beginning their professional career in the field of PEM to apply for this bursary. The requirements set by both societies, which are described in detail on their respective websites, are similar: applicants must have a C1 level of English or equivalent, a research project, be enrolled in a PEM training program, and be available to travel and attend the conference on the scheduled dates.

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We are confident that for those who have the chance to participate, it will be as valuable an experience as it has been for us.

Useful links:

- https://pemfellowsconference.com/
- https://seup.org/beca-fellow-seeuup/

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LETTER TO THE EDITOR

Award from the Spanish Association of Pediatrics: collaborative work between Emergency Departments and Psychiatry in the prevention of pediatric self-injury and suicide

Azucena Díez Suárez

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Dear Editor,

Recently, the article published in Anales de Pediatría, entitled "Self-injury and suicidal behavior in children and youth population: Learning from the pandemic"[1], received the award for the scientific publication that most contributed to the journal's impact index. This article was the result of a collaborative effort between pediatric emergency physicians, primary care providers, and child and adolescent psychiatrists.

This study was prompted by growing concern over the sharp rise in consultations for self-injury and suicidal behavior in pediatric emergency departments following the pandemic. The findings highlight the urgent need for all professionals working with adolescents to receive training in mental health and suicide prevention. The data are alarming: non-suicidal self-injury is estimated to affect 15–20% of adolescents[2], and suicide is among the leading causes of death in this age group[3]. Both behaviors are increasing, underscoring the importance of early identification and timely intervention. Although suicide remains a taboo subject, silence will not solve the problem, on the contrary, open and informed conversations about suicide can save lives.

The rise in mental health-related emergencies calls for serious reflection and can be attributed to several factors. First, numerous studies involving diverse populations and social backgrounds have documented a deterioration in the mental health of children and adolescents[4]. Second, changes in social and family dynamics have led many young people to adopt less healthy lifestyles—such as increased sedentary behavior, excessive screen time, and poor dietary habits—which further compromise their mental well-being. Third, there is growing awareness among young people and their families of the importance of mental health and the need to care for it actively. In this context, some emergencies involving self-harm or suicidal ideation may not reflect a mental illness per se, but rather acute emotional distress in the absence of adequate support[5]. Referring these cases to child and adolescent psychiatry teams is not always straightforward, nor is it necessary in every instance. Nonetheless, training in mental health is essential for accurately assessing these situations. Pediatricians, who are often the professionals most familiar with children and their families from the earliest stages of life, are particularly well-positioned to engage in risk assessment and, most importantly, prevention.

This award is yet another testament to the value of mutual understanding, coordination, and collaboration among the many professionals dedicated to the care of children and adolescents. It is a privilege for our entire team that, among all the possible topics featured in Spain's leading pediatrics journal, the mental health of young people has drawn the greatest attention. We hope this recognition encourages all pediatricians to reflect on the importance of training in child and adolescent psychiatry. We warmly invite you to take part in the training activities offered by the Spanish Association of Pediatrics, which remains deeply committed to promoting mental health among children and adolescents. Every child deserves the highest standard of care, always delivered with respect and compassion.

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REFERENCES

1. Vázquez López P, Armero Pedreira P, Martínez-Sánchez L, García Cruz JM, Bonet de Luna C, Notario Herrero F, et al. Self-injury

and suicidal behavior in children and youth population: Learning from the pandemic. An Pediatr (Engl Ed). 2023; 98(3): 204-12.

2. Xiao Q, Song X, Huang L, Hou D, Huang X. Global prevalence and characteristics of non-suicidal self-injury between 2010 and 2021 among a non-clinical sample of adolescents: A meta-analysis. Front Psychiatry. 2022; 13: 912441.
3. Van Meter AR, Knowles EA, Mintz EH. Systematic Review and Meta-analysis: International Prevalence of Suicidal Ideation and Attempt in Youth. J Am Acad Child Adolesc Psychiatry. 2023; 62(9): 973-86.
4. Unicef. The State of Children in the European Union. [Internet]. Ginebra; 2024 [citado May 2025]. Disponible en: https://www.unicef.org/eu/media/2521/file/The%20State%20of%20Children%20in%20the%20European%20Union%20.pdf
5. Algarrada Vico L, Vázquez Gómez. La salud mental en los Servicios de Urgencias Pediátrico. Emerg Pediatr. 2025; 4(2): 71-2.