ORIGINAL ARTICLE

Impact of a quality of care improvement team on the use of sedatives during wound repair in young children

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Objective. To analyze the impact of actions organized by a quality of care improvement team on the use of sedatives when treating wounds in children under the age of 5 years.

Methods. Quasiexperimental pre/post study enrolling children under the age of 5 years brought to a pediatric emergency department with wounds requiring surgical repair with suturing. A team to promote the use of sedation in such minor procedures in these children was established. The team organized the following interventions: training workshops, development and circulation of a sedation protocol, and establishment of a computerized alert. The first analysis of results was done at 2 months and the second at 9 months. The quality of care indicators, the use of sedatives while wounds were treated in children, was analized in 2 age groups: (under the age of 2 years and between 2 and 5 years) and results were compared with the preintervention phase.

Results. A total of 22 958 emergencies were registered in children under 5 years old; 548 (2.4%) involved uncomplicated wounds. Of the 548 patients, 350 (63.8%) required surgical repair, 75 of them (21.4%) in children under the age of 2 years. Ten percent of these children had received a sedative in the period before the team's intervention; 22% had been sedated at the 2-month analysis and 31.4% at 9 months ($P<.01$). For children between 2 and 5 years old, the percentages were 4.4% (pre-intervention), 10% (2 months), and 25% (9 months) ($P<.01$). Eighty-two percent of the families and 69% of the physicians thought that anxiety was adequately controlled.

Conclusion. Actions designed by a multidisciplinary quality of care team are effective for increasing the use of sedatives while wounds are treated in children under the age of 5 years.

Keywords: Minor surgical procedures. Sedation. Care improvement teams.

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Impacto de las acciones emprendidas por un equipo de mejora sobre la utilización de sedación farmacológica en la reparación de heridas en niños

Objetivo. Analizar el impacto de las acciones promovidas por un equipo de mejora (EM) sobre utilización de sedación farmacológica (SDF) en menores de 5 años en los que se repara quirúrgicamente una herida.

Método. Estudio quasiexperimental realizado con la inclusión de los niños menores de 5 años que consultaron en un servicio de urgencias pediátricas (SUP) por una herida por la que precisaron reparación quirúrgica con sutura. Un EM creado en urgencias para promover SDF en procedimientos menores programó las siguientes acciones: talleres de formación, elaboración y difusión de un protocolo sobre SDF e inclusión de una alarma informática. Se realizó un primer análisis a los dos meses y un segundo a los 9 meses, utilizando dos indicadores, porcentaje de pacientes menores 2 años y porcentaje de pacientes de 2 a 5 años, a los que se administró SDF durante la reparación de una herida, que se compararon con la fase preintervención.

Resultados. Durante el periodo de estudio, se registraron 22.958 episodios en menores de 5 años, 548 (2,4%) con heridas no complicadas. De ellos 350 (63,8%) pacientes precisaron reparación quirúrgica, 75 (21,4%) eran menores de 2 años. Previo a la intervención, un 10% de los menores de 2 años recibieron SDF, 22% a los 2 meses y 31,4% a los 9 meses ($p < 0,01$). Entre 2 y 5 años, los porcentajes fueron 4,4%, 10% y 25% respectivamente ($p < 0,01$). El 82% de familias y 69% de médicos presentes consideraron que el control de la ansiedad había sido adecuado.

Conclusiones. Las acciones diseñadas por un EM multidisciplinar son eficaces para incrementar la SDF durante la reparación quirúrgica de heridas en menores de 5 años.

Palabras clave: Procesos menores. Sedación. Equipo de mejora.

Introduction

An important part of the quality of care provided in a paediatric emergency department (PED) is based on the control of pain and the fear and/or anxiety caused by the environment and the techniques and procedures performed there. Despite this, numerous studies point out the scant attention paid to these two aspects in

procedures considered minor[1-4] making it an important aspect of improvement in PED.

Minor procedures that are most frequently performed in PED are wound repair, urethral catheterization, lumbar puncture, and channelling of venous access[5]. Many can be performed using local anaesthesia and with measures of distraction of the child, such as the presence of parents, animation films, etc. However, sometimes, and especially in younger children, the use of anxiolytic/sedative drugs may be necessary.

A wide variety of sedative and dissociative drugs are now known, with an excellent safety profile and a very low rate of adverse effects[6] when administered by trained personnel, with correct doses and under close supervision and monitoring. However, having drugs and devices for the administration of pharmacological sedation (PSD) and a place and staff trained in its use may be insufficient to introduce its use in minor procedures.

In order to increase the probability of success of changes and improvements, the creation of improvement teams (IT) has been proposed[4-6]. IT comprise different professionals, without hierarchies, who after a period of training, brainstorming and recognition of its members, propose improvements, plan them, deploy them, measure their results and introduce new changes.

The objective of this study was to analyse the impact of actions promoted by an IT in the use of PSD in children under 5 years who required surgical repair of a wound in the PED of a tertiary hospital. As secondary objectives, the safety of PSD in this procedure and its acceptance by parents and professionals were analysed.

Method

Pre-post quasi-experimental study performed in children under 5 years of age who consulted our PED (with approximately 54,000 visits annually) during the study period for a wound requiring surgical repair with suture.

Verbal consent was obtained from the legal guardians of all participants and the study was approved by the hospital's Ethics Committee.

The values prior to the implementation of improvement actions were obtained in December 2012. One of the quality indicators used in the study, PSD in children under 2 years, has been part of the quality management system of our PED since the year 2010.

The following indicators were defined for the study:

- Percentage of patients under 2 years of age who received PSD during wound repair before and after the implementation of the improvement measures proposed by IT.

- Percentage of patients 2-5 years old who were given PSD during the repair of a wound during implantation of the improvement measures proposed by the IT.

The IT for sedation in minor procedures was established in May 2011 and comprised two paediatricians, one nurse, one nursing assistant and one internal paediatric resident physician. In September 2012, the initial improvement action was proposed: to promote the use of PSD in children under 5 years old who consulted in our PED for a wound needing surgical repair with suture. Periodic meetings were held to design the implementation process (Figure 1) of the improvement action and to elaborate a checklist using the systematic improvement cycles. After the diffusion and the collection of the comments of the different groups, an analysis of the suggestions was made, and the month of February 2013 was scheduled as a trial period to begin the implementation of the actions, during the morning shifts of working days. Having verified the feasibility of the implementation of the proposed actions, in March 2013, implementation began. A first analysis of the scope of measures implemented was carried out at two months; and a second evaluation, at 9 months. In addition to the above indicators, we also analysed the percentage of patients in whom PSD was satisfactory for professionals and family members in this phase.

Data collection was performed in two phases. 1) Pre-implementation phase: indicators of the department's guidelines, half-yearly registration. Data collection involved reviewing the episodes treated in the PED. 2) Post-implantation phase: all information on each procedure was recorded on a record sheet, noting the child's demographics, the type and duration of the procedure, the sedative used and the side effects and incidences observed during the intervention. After performing the procedure under pharmacological sedation, a survey on satisfaction was offered to both the medical team and to the child's parents/guardians, to collect and analyse their personal assessment. This information was subsequently included in the guidelines.

Regarding the operative process in the post-implantation phase, once a child under 5 years of age was identified at triage as having an uncomplicated wound requiring surgical repair and following the usual protocol, the nursing team applied the aesthetic gel LAT (4% lidocaine, 0.1% epinephrine and 0.5% tetracaine) on the wound. The decision to offer PSD to the families fell to the physician responsible for wound repair (Figure 2). In all cases, whether PSD was used or not, wound repair was performed in the presence of the parents and non-pharmacological sedation measures were used, such as the projection of suitable videos films. In the case of PSD, the child's heart rate and oxygen saturation were monitored using a pulse oximeter. As a minor PSD/anxiolysis procedure, the administration of oxygen during the procedure was not considered and the patients' fasting status was not taken into account or recorded.

The two drugs used for PSD, depending on age, patient collaboration and / or wound location, were as follows: 1) intranasal midazolam at 0.3 mg / kg (maximal dose 7.5 mg) administered with nasal dispersant (AML MAD Nasal TM), 10-15 minutes prior to initiation of the procedure in children younger than 2 years or older non-collaborators; and 2) inhaled nitrous oxide, in older

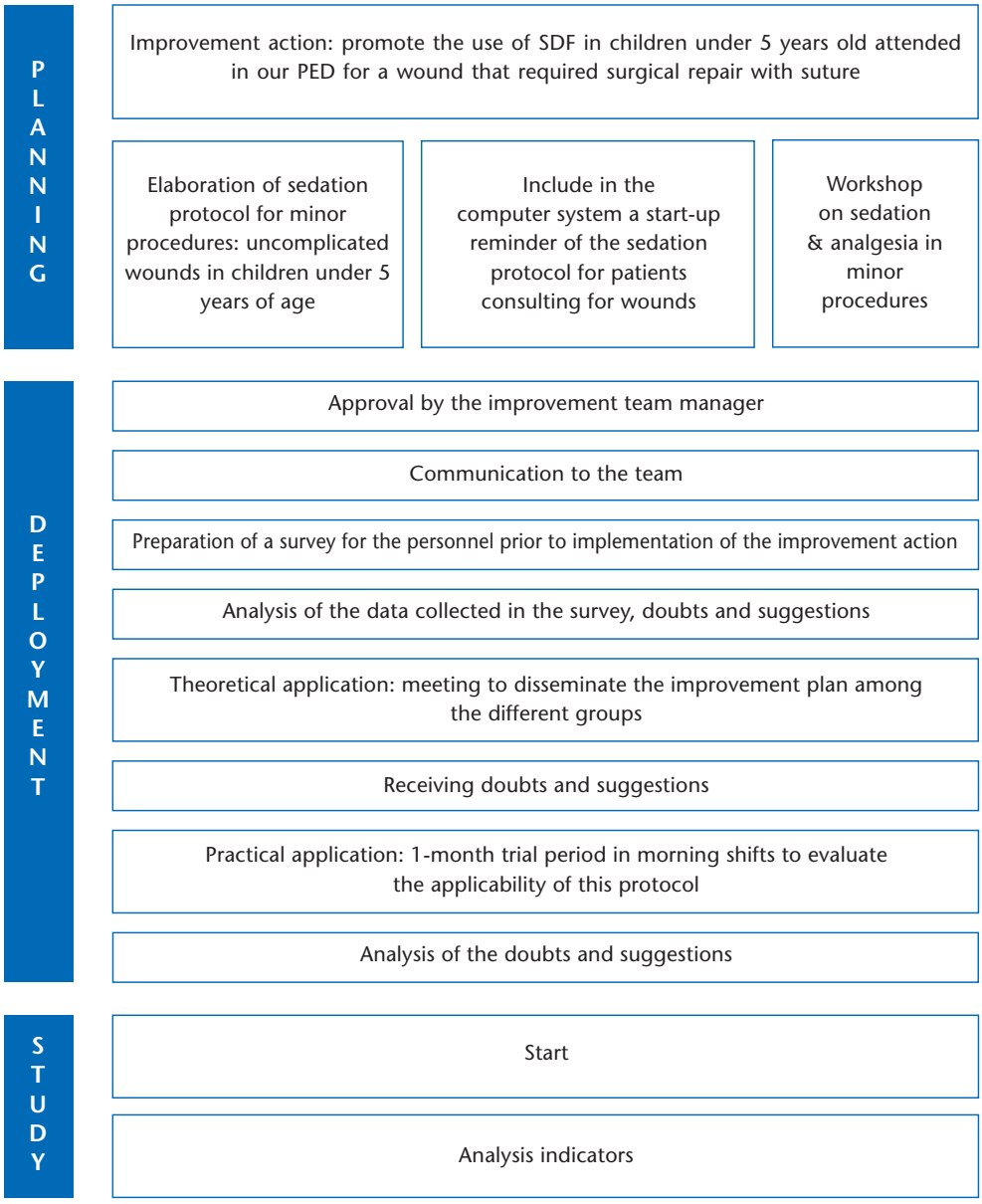

Figure 1. Process of implementation of the improvement team action.

collaborating children, with an equimolar concentration of oxygen and nitrous oxide, administered by face mask at a flow rate of 4 l/min for 3-5 minutes prior to the procedure and continued administration during the procedure.

In addition, "uncomplicated wound" was defined as a wound that only affects the skin and subcutaneous cellular tissue, in a territory not affecting any organ function. And "surgical repair" was defined as that performed with surgical suture or staples.

For statistical analysis, qualitative variables were described as frequencies and percentages. The variables were compared using chi-squared or Fisher's exact test. Statistical significance was considered $p < 0.05$. SPSS version 23.0 was used.

Results

During the period of implementation of the actions, between March 2013 and November 2013, 34,378 episodes were recorded for children under the age of 14, of which 22,958 (66%) were under 5. Of these, 548 (2.4%) were treated for an uncomplicated wound, and 350 required surgical repair (316 suture and 34 staples), 75 of which were younger than 2 years.

Of the 350 patients who required surgical repair, PSD was offered to 137 (39.1%), usually to those younger than 2 years (53.3% vs 35.2% of children aged 2-5 years, $p < 0.05$). The acceptance rate did not change between the age groups and increased non-significantly after a communication workshop

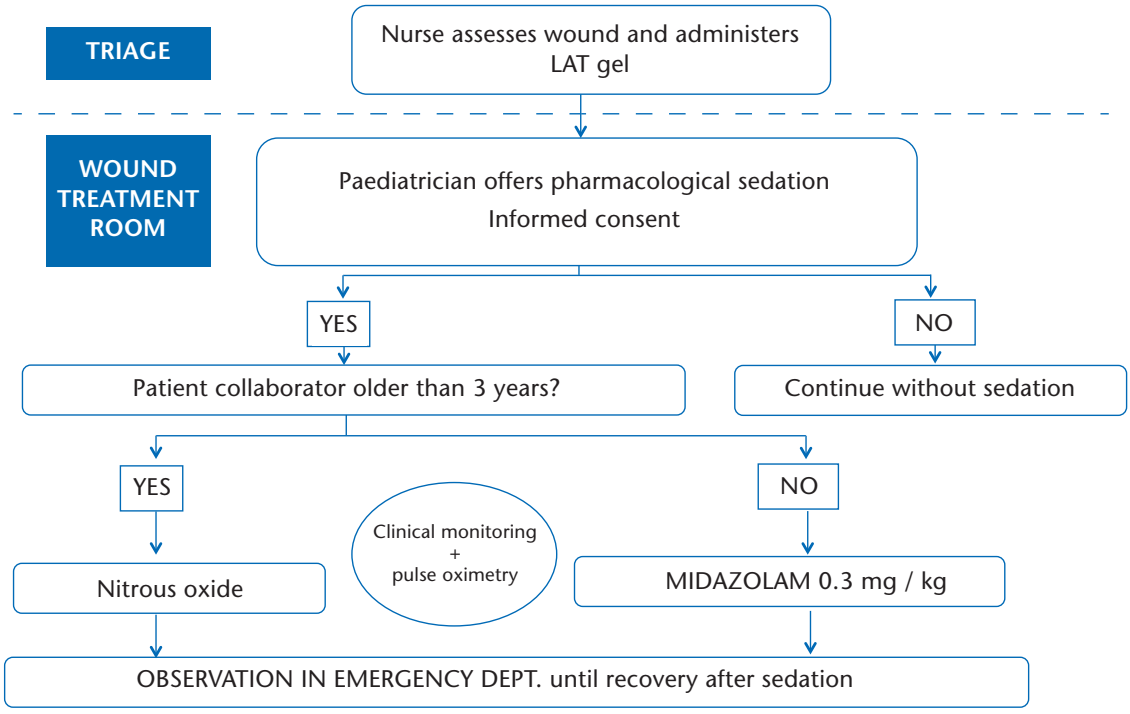

Figure 2. Protocol of pharmacological sedation in minor procedures: uncomplicated wounds in children under 5 years. 4% Getilidocaine, 0.1% adrenaline and 0.5% tetracaine; In: intranasal.

(pre-workshop 50% versus 63% post-workshop, p> 0.05).

Prior to the intervention, 10% of children younger than 2 years of age received PSD during wound repair, compared to 22% at 2 months and 31.4% at 9 months after the intervention (p <0.01). In children aged 2 to 5 years, the percentages were 4.4%, 10% and 25% respectively (p <0.01) (Figure 3).

Most (82%) of the families and 69% of the physicians present thought that anxiety control had been adequate. The vast majority (95%) of family members of children receiving PSD said they would choose this option in a similar procedure.

During the study period, there were no incidences or side effects resulting from the use of PSD.

Discussion

The implementation of improvement actions promoted by a multidisciplinary IT facilitates the use of PSD in children under 5 years of age undergoing surgical repair of an emergency wound. This improvement strategy could be applicable in other smaller procedures practiced in the same area.

Numerous studies emphasize the importance of assessing and treating pain and anxiety during painful procedures in the ED, such as fracture reduction, wound repair and burn debridement[7-14]. However, despite advances in the use of non-pharmacological sedation, such as the presence of family members during procedures and entertainment strategies, PSD, an effective and safe alternative to increase child comfort, is not routinely used in PEDs[15-17]. The low utilization of PSD is especially striking in procedures considered minor, such as wound repair, which on the other hand are the most commonly performed in the ED. In fact, in our PED, the use of PSD in these procedures was anecdotal before the implementation of improvement actions. The existing barriers to the use of sedative drugs and major analgesics such as opioids in children are well known, such as the belief that they do not feel pain or anxiety in the same way as adults, the lack of knowledge about how to evaluate pain and/or anxiety in young children, the possibility of physical restraint in this subgroup of patients, lack of time and fear of side effects secondary to drugs[2,3].

However, there is concern about the control of anxiety and fear during procedures performed in the PED[1,2,6,8,13,14]. In fact, in our PED, in December 2010 we began to monitor a quality indicator that reflected the use of PSD during wound repair in children under 2 years. Despite the different strategies designed by the department's management team (protocol design, training sessions, introduction of nasal dispersers), the percentage of these children receiving PSD at that time was less than 10%.

Other strategies, such as the establishment of IT, have proved useful for improving deficient areas in any type of organization[22-25], although they are rarely used in the health world. Our study shows how the actions planned and implemented by a multidisciplinary IT improved a clearly deficient area, significantly increasing the use of PSD in these patients. Another relevant as-

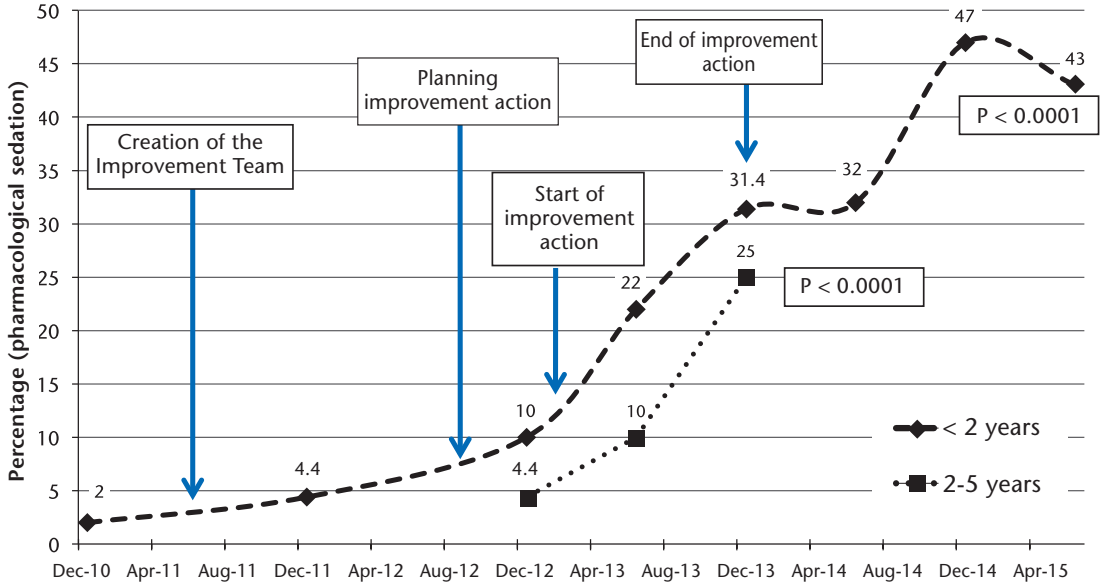

Figure 3. Percentage of patients under 5 years of age receiving pharmacological sedation during wound repair before and after implantation of improvement measures.

pect is that the improvement obtained after the actions undertaken by the IT has been maintained over time, as shown by the indicator in the group of less than 2 years that continues to be monitored today. This fact shows that the actions undertaken have led to a real change in clinical practice, demonstrating the strength of the improvement strategy through IT.

The increase in PSD depends on whether families are offered and accept it. Prior to the intervention, PSD was not offered in the repair of wounds in our department, and was only applied in specific cases, after checking the patient's difficult management. Also, during the study period, PSD was not offered to all family members of children who could potentially benefit from this treatment. This decision was at the discretion of the professional who repaired the wound and the most probable causes for not using PSD were that it was not necessary in that procedure and lack of adherence to the new protocol. Although there is no quality standard on the percentage of PSD children under 5 years of age, we believe that offering family members this option, following the actions undertaken by IT, is clinically significant. In addition, it results in a change in attitude of resident physicians and emergency paediatricians regarding the management of minor procedures, involving family members in decision-making[15,16].

The applicability of the improvement cycle methodology is specifically reflected in one aspect of our study. In the early stages of implantation, the family member rejection rate regarding PSD was striking. After analyzing the possible causes, the IT identified the way of informing parents as a possible cause of rejection, so a communication workshop together with family members was held. This initiative was associated with a slight improvement in acceptance of PSD, confirming that feedback, included in the work methodology of the IT, is an effective tool to achieve behavioural changes in health professionals[21,22].

In addition, the satisfaction of parents and professionals with PSD in this type of procedure is high. This is an aspect that should always be considered when implementing an improvement in a health service. This satisfaction is related to the perception of control of the child's anxiety by the parents and to facilitate a minor procedure[4].

Our study has several limitations. This is a unicentric study with the inherent limitations to this type of studies and the characteristics of other centres should be considered before applying these measures. However, we believe that the IT-based methodology can be applied to other PSDs with similar characteristics. Another possible limitation is that follow-up of the indicator in patients younger than two years was interrupted after implementing the improvement actions. However, we believe that the follow-up of the indicator in patients younger than 2 years, with parallel results to those found in older children, is a reliable reflection of the maintenance of the improvement also in this age group. Finally, the absence of internationally accepted quality standards on the use of PSD for minor procedures in the emergency department means that we cannot ensure that the rate of PSD use in our patients is the most appropriate. The development of these standards would provide emergency paediatricians with tools to improve the quality and uniformity of the treatment of pain and anxiety among children attending different PSDs[20].

In conclusion, actions designed by a multidisciplinary IT are effective to increase PSD during surgical repair of wounds in children under 5 years of age in the emergency room. PSD is a safe and well-valued option for parents and professionals to control anxiety and fear during the performance of this procedure.

Conflicting interests

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Ethical responsibilities

The Ethics and Clinical Research Committee of the Hospital Universitario
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All authors have confirmed the maintenance of confidentiality and respect for patients' rights in the document of author responsibilities, publication agreement and assignment of rights to EMERGENCIAS.

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