

## Feedback's Importance Reporting Incidents at a Pediatric Emergency Department

Mònica Vilà de Muga\*

*Hospital Sant Joan de Déu BCN, University of Barcelona, Spain*

**\*Corresponding Author:** Mònica Vilà de Muga, Hospital Sant Joan de Déu BCN, University of Barcelona, Calle Mercedes 15, Barcelona, Spain.

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### Abstract

**Introduction:** Reporting incidents is an important tool in order to improve patient's safety at the Emergency Departments. The aim of this study is to analyse changes in the incidents report after the implementation of a new model and study its results in patient's safety.

**Methods:** In 2012 an observational study with prospective collection of incidents reported between 2007 and 2011 was conducted. Few reports were detected, not a root cause analysis was performed, the impact on system improvements was small and the feedback consisted on summarizing the reports collected during that period. In May 2012 a model change was made, safety professional referents were assigned to every department, information and diffusion sessions were held, and a new incident reporting system was implemented. With the new model, a new observational study with prospective collection of the reports during a year was initiated and the results compared between models.

**Results:** In 2011, only 19 incidents were reported in the Emergency Department, and between June 1, 2012 to June 1, 2013, 106 incidents (5, 6 times more). The incidents reported were medication incidents (57%), identification (26%) and procedures (7%). The most frequent causes were human (70, 7%), lack of training (22, 6%) and working conditions (15, 1%). Some measures were implemented as a result of these incidents: a surgical checklist, unit doses of salbutamol, tables of weight-standardized doses of drugs for cardiopulmonary resuscitation.

**Conclusions:** The new model of reporting incidents has enhanced the reports and has allowed improvements and implemented preventive measures, increasing the patient's safety condition at the Emergency Department.

**Keywords:** *Emergency Department; Pediatric population; Patient's safety*

### Introduction

Patient safety is increasingly a priority in the sanitary world. Several factors turn Emergency Department (ED) into places of special risk: stress because of emergency situations, high workload, rapid decision making, fatigue accumulated by long shifts and different levels of experience of the physicians [1].

The unique characteristics of children make them more vulnerable: require individualized dose calculations often with special dilutions, have less physiologic reserve to compensate errors, and cannot transmit often their symptoms or argue about procedures and treatments [2].

The first step to improve patient's safety is to create a culture of safety in the department [3]. Traditionally health professionals had

to be infallible, and errors involving negligence were leading doctors to blame themselves for mistakes. It is therefore very important to change the culture of blaming the individual to consider errors as opportunities to improve the system and prevent damage [4]. A safety culture focuses on the following concepts: the errors always occur, systems can be designed to reduce them [5] and errors are the result of several factors or a chain of events and rarely the responsibility of one individual alone [6].

One tool that has been proven to improve the culture of safety is the voluntary reporting of safety incidents, with a posterior analysis and a return of the information to implement new measures [7].

Voluntary incident reporting systems have some advantages over reviews of medical records and detections by computerized systems, such as identification of administration errors or detection of "near misses". The "near misses" are incidents that do not reach the patient, but are the base of the iceberg of all the incidents that occur and are very useful for analysing the causes, identify gaps in the system and search strategies for improvement [8].

The analysis and return of information to all the staff is essential to enhance reporting. It is also very useful to find out measures to improve the system. This also helps to create a climate of safety in the department [9].

Few studies have analysed the incidents that occurred in the paediatric population.

The aim of our study is to analyse reported incidents in the ED during a year and expose several improved measures that have been implemented in our department.

### Methods

We conducted an observational study before and after the application of a new model of incidents reporting.

The study was performed in the ED of a pediatric tertiary level hospital attending about 100,000 visits/year in the ED, ages between 0 and 18 years.

The incidents reported were prospectively collected in both periods: pre-intervention or period 1, between 2007 and 2011, and post-intervention or period 2, June 1, 2012 and June 1, 2013. All reported incidents occurred in the ED were included and analysed.

The pre-intervention model of reporting incidents consisted on 5 different forms online or printed according to the different types of incidents reported: allergic reactions, identification incidents, diets, medication and falls. Each form had different items to fill such as date, place, what happened, why, and other specific depending on the type of incident. The forms were unintuitive, no diffusion of them were made at the different departments of the hospital and when the results of reports obtained were collected, no root-cause analysis was performed, the impact on system improvement was small and the feedback consisted just on summaries of the reports made in the period.

Therefore, in May 2012 a change was introduced into the model, professional safety referents in each service were named, information and outreach sessions were held, and a new incident reporting system was implemented.

The new model of reporting and incident management consisted on the following steps:

- a. Voluntary **report** of incidents, using an online form, accessible to all the professionals' through the internal net of the hospital, which allows reporting different kinds of incidents. It is a **voluntary, anonymous** and **no punitive** report.
- b. **Notification** to the head of the Patient Safety Area.
- c. **Management** of the incident by the Safety Area and **risk matrix**.
- d. **Analysis of the incidents** by the safety professional referent of the department, by the **method of analysis of the clinical incidents using the London protocol [10]**:

- i. Incidents that occur, according to the international classification of the World Health Organization (WHO) [11]: clinical management, clinical process/ procedure, documentation, healthcare associated infection, medication/ fluids for intravenous administration, blood/ blood products, nutrition, oxygen/ gases/ vapours, devices/ medical equipment, behaviour, patient accidents, infrastructure/ locals/ facilities and resources/ management of the organization.
- ii. Their latent causes (Classification of "National Patient Safety Agency" (NPSA)) [10]: individuals of the professional, team, communication, tasks, training, equipment/ resources, working conditions, organizational/ strategic, patients.
- iii. Measures to prevent them and comments (Figure 1).

Field:	Date:	Reference:
<b>1. Description of the incident</b> (risk matrix: severity/frequency)		
<b>2. Immediate action measure</b>		
<b>3. Source of information</b>		
Medical record	Protocols, trajectories	Field personnel interviews
		Equipment, material, medication review
		Field visit
		Other: claim of a family, ...
<b>4. Plan of action</b>		
- Professional: work overload, fatigue, lack of experience, ...		
- Organization: availability and use of protocols, procedures, technological and maintenance problems, physical inadequate structure ...		
- Staff: communication, staffing, clarity of roles and functions, (London protocol)		
<b>Causes/ contributing factors</b>	<b>Recommendations/ actions</b>	<b>Information</b>
<b>5. Comments</b>		

Figure 1: Form used for the analysis of incidents reported.

- e. **Implementation of measures** arising from reported incidents.
- f. **Evaluation and monitoring of measures.**
- g. **Feedback:** return of the information to all professionals working at the service to introduce the new approved measures to encourage everyone to continue reporting incidents. This is put in common through monthly meetings with the staff of the service and subsequent diffusion of online summary of each meeting to all professionals working in the service.

In June 2012 began a prospective study collecting the reported incidents with the new model during one year. Incidents were analysed as they were declared using the method of London [10], looking for their causes and for improvement measures. The analysis was spread monthly in the form of service sessions and online format to all staff working in the service.

The severity degree of the incidents was defined according to the criteria of Lesar [12]: mild incident is one that does not involve a risk to the patient (for example: higher or lower doses of medication than 20% of the correct dose, which has no risk to the patient), moderate incident is one that presents a remarkable vital risk without vital commitment (for example: excessively high doses of salbutamol (as twice the recommended dose) which involves monitoring the patient due to a secondary tachycardia) and severe incident is what causes life-threatening (for example: allergies).

### Statistical analysis

Statistical analysis using SPSS (version 19.0) was done. A descriptive study of quantitative variables was performed as median and 25 - 75 percentile or mean and standard deviation and qualitative variables as frequencies and percentages.

Several new improvement measures that have been applied to the analysis of the incidents reported in the service have been periodically reassessed and spread.

### Results

Between June 2012 and June 2013 (period 2) 106 incidents were reported in the pediatric ED, compared to 19 incidents reported in 2011 (reports have been multiplied by 5, 7). During the 2013, 102 incidents of a total of 630 were reported throughout the hospital (16, 1%) (Figure 2).

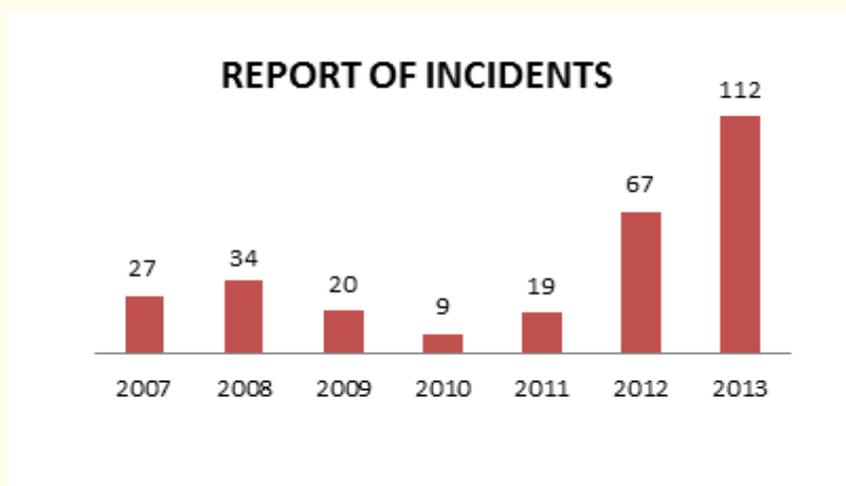


Figure 2: Reported incidents between 2007 and 2013. Application of the new model in June 2012.

With the pre-intervention model, in the period 2007 to 2011 or **period 1**, 112 incidents were reported at emergencies (17, 2% of all reported incidents throughout the hospital, 650), corresponding to an average of 22, 4 incidents reported each year.

During this period 1 the following incidents were reported at emergencies: 76 identification incidents (68%), 32 medications (28%) and 4 falls (3, 5%).

Medication incidents reported in period 1 were: dose (53, 1%), indication (21, 9%) and route of administration (3, 1%). Most were prescription (59, 4%). Drugs with more associated incidents were: bronchodilators (40, 6%), antibiotics (15, 6%), electrolytes (9, 4%) and antipyretics (6, 3%). They were detected before they affected the patient in 72% of cases (6.3% not recorded).

Among the incidents reported in **period 2**, the median age of the patients was 2, 6 years old (p25 -75; 1 - 6 years), with a predominance of boys (52, 8%).

The source of information used to report the incidents was computerized medical record on 85, 8% of cases, 7, 5% patient and family, 5, 7% revision of equipment and/or material and 0, 9% nursing.

The physician involved into the reported incidents was medical staff at 94, 3%, compared to 5, 7% of nurses. While the incidents were reported mostly 66% by nurses, 2.8% by nursing assistants, 30.2% by physicians and 0.9% by other professionals.

Medication incidents were the most common ones (56, 6%) (Figure 3). Among these the most frequent were dose (40, 6%) and administration route (7, 5%), other less frequent were pharmaceutical form (3, 8%), administration frequency (1, 8%), name of the drug (1, 9%) and non-administration (0, 9%). Drugs associated to more incidents were bronchodilators (27, 4%), antibiotics (5, 7%), corticosteroids and intravenous fluids and electrolytes (3, 8%).

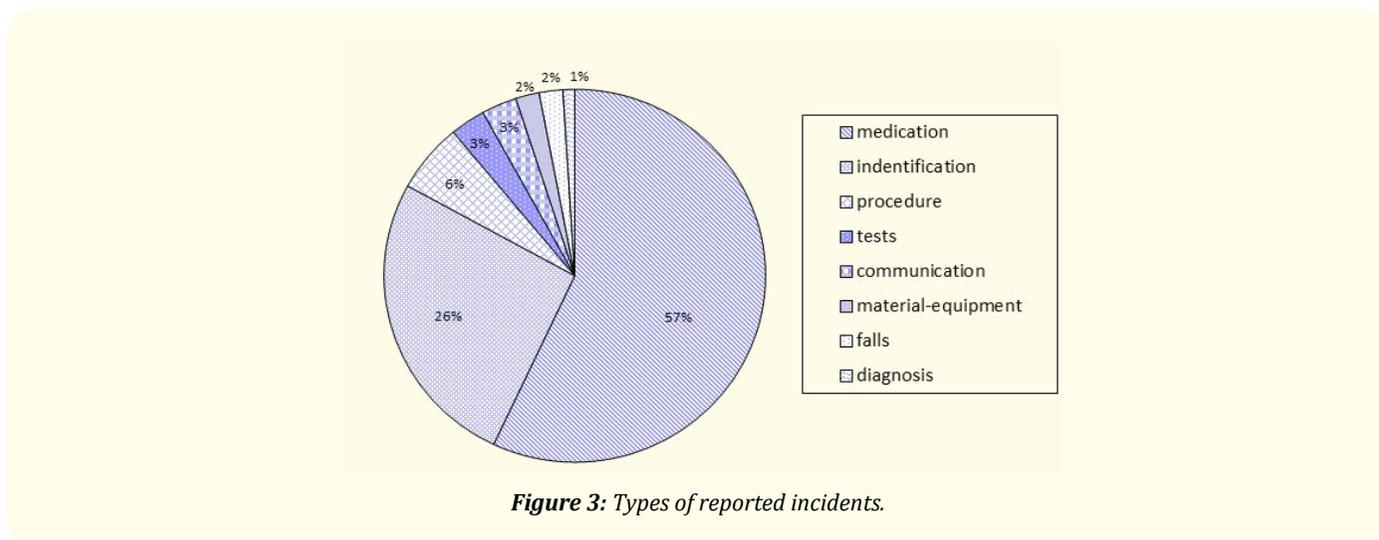


Figure 3: Types of reported incidents.

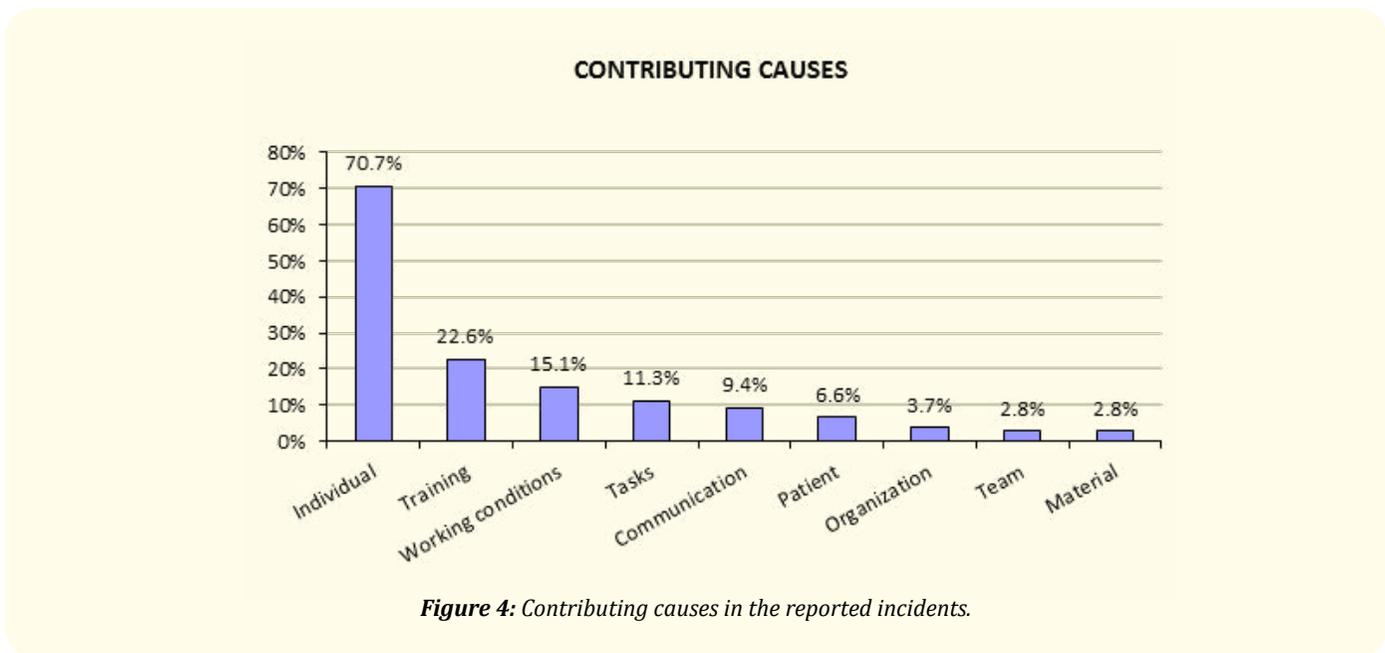
Incidents were, in terms of severity, 75 mostly mild (70, 8%), 26 moderates (24, 5%) and 5 severe (4, 7%). The 5 severe incidents were the following ones:

- Metasedin, instead of metamizol (similar name), was prescribed 350 mg intravenous to a patient of 17 Kg for a headache. It did not reach the patient because he did not require analgesia and error was detected on time.
- 8 mg of nebulized salbutamol was prescribed to an 8, 6 Kg infant, it was detected before the administration and it did not reach the patient.
- Error in the diagnosis of myocarditis.
- drenaline 0, 5 mg/Kg intramuscular, instead of nebulized dose, was prescribed to a 4 Kg infant with bronchiolitis. It was detected before the administration and it did not reach the patient.
- Metamizol 200g, instead of 200 mg, intravenous was prescribed to a 10 Kg patient to relief moderate pain. It was detected before the administration and it did not reach the patient.

A risk matrix was established for each incident (product of their frequency and severity), assuming a low risk to the patient in 81, 1% of cases, moderate in 12, 3% and severe in 6, 6 %.

In 38, 7% of cases the incident affected the patient, compared to 61, 3% of cases, in which the error was detected on time.

Contributing causes (following the classification of the NPSA (10)) more frequently detected were: human (70, 7%), training (22, 6%) and working conditions (15, 1%) (Figure 4).



Starting from the identified causes improvement measures were proposed to cut down with incidents, including the highlighted ones: measures of training and supervision (54.5%), measures aiming to reduce medication errors (50%) like unit doses and high dose alarms and reinforcing patient identification (25, 5%) (Figure 5).

The main improvement measures applied at our hospital due to reported incidents are the following ones:

- a. Tables for cardiopulmonary resuscitations (CPR) drugs have been developed, disseminated and applied in the resuscitation room.
- b. The unit doses of salbutamol have been established to patients over 10 kg weight: to patients between 10 and 20 kg a unit dose of 2.5 mg is administered, and to patients over 20 kg a unit dose of 5 mg is administered.
- c. A surgical checklist, which is applied to all surgical interventions, has been created.
- d. A summary of the most used protocols in emergencies for the family physicians has been made, it consists on simple protocols of the most frequently diseases treated at the ED.
- e. Alarms have been set to patients concerning us (because they require supervision every hour) using red stickers on nursing sheets.

**Discussion**

Creating a new standardized model for reporting and analysing incidents, stablishing improvement measures and returning information to the service professionals, has allowed quintuple the incident reports compared to the prior year of their implementation. At the literature we have reviewed other similar studies that have also shown benefits [13,14].

The diffusion of the new model in the service, emphasizing the importance of reporting incidents and the return of information of the reports and the improvement measures implemented, are the main causes of the increase of reports. The regular incidents and measures return of information has been the most important part to reinforce the reports because it transmits utility consciousness [9].

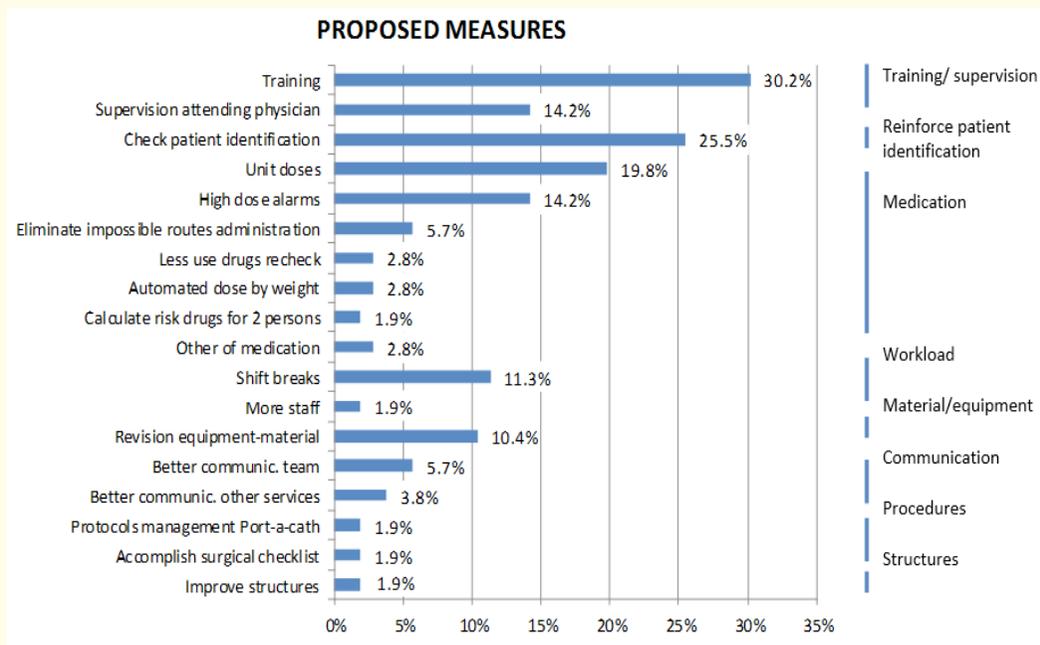


Figure 5: Proposed improvement measures based on reported incidents.

Also the new form of anonymous and confidential reporting may have helped to increase incidents reporting.

Most of the incidents reported were produced by physician, and nursing is who declared highest number of incidents. This is probably because of reporting fear of physicians. On the other hand, most of the incidents are related to medical aspects, probably there is little tradition to assess what is not right in our practice in the nurse side, which is a point to improve.

In our department, medication incidents were the most frequent ones, the same observed in other studies [15]. Bronchodilators were the most involved drugs, and dosage error was the most common.

Therefore, unit dose of salbutamol was proposed and implemented, which seems to reduce dosing errors in the administration of salbutamol, we are in the process of assessing the impact of this measure in reducing errors in salbutamol doses.

Have also been implemented tables by weight for RCP drugs to reduce errors in situations of high stress such as resuscitations. Similarly, in a study of patients who are transferred by ambulance in CPR situation, improvement in the errors was observed with adrenaline using Broselow tables [16].

Other measures described in the literature, that have permitted cutting down with medication incidents were: the use of barcodes in the opioid administration [17], automated calculations according to the weight of the patient for most used drugs [18], and placing information papers in the boxes with the drugs associated to more errors writing down their doses and with measures to prevent prescription errors [19].

Supervision has also been improved in our service, especially among less experienced physicians, first year residents and family physicians, performing specific protocols for them at the start of their rotation in ED.

Other strategies that have been reported as very useful to improve patient safety are: the reduction of weekly working hours of physicians [20] and to improve communication between professionals and with the families [21].

Identification incidents are the most commonly reported, after medication, similar to other studies reviewed [7], consequently we have also tried to implement measures to reduce them, like the placement of the number box in front of the computer or broadcast periodically the importance of repeatedly checking patient's identity before any procedure or medication.

Most of the incidents reported are mild, but this reporting and analysis is important because it allows us to find out many improvement measures, which help us to make a better system [8].

The most common causes of incidents were individual of the professional (physical, psychological, social, personal), due to inexperience, fatigue, ..., which are also the most frequently described in other studies [22].

From the analysis of these causes several correcting measures have emerged, such as training programs and reinforcing patient identification, to solve the most common incidents.

One study shows non clinical skills to reduce incidents caused by individual human factors that, as we have mentioned are the most frequent ones [23].

Our study has allowed us to apply multiple improvement strategies that have helped us to improve safety in the service. There are others that are still in the development process like posters, messages on screens in waiting rooms to encourage patients to report their allergies and their medications, and ask any questions about their diagnosis, procedures and medications; systematize and improve the transfer of patients; improve the system of introduction of computerized medication (alarms, dose per weight, ...) and creating a checklist for intoxication, metabolic, ... patients.

This study has the limitations of depending on a voluntary reporting, and cannot be used to assess the frequency of happened incidents; reporting systems do not have this purpose, but are used as a system to detect problems. Another limitation is that the voluntary reporting is linked to the importance of the event in the memory of the person who reports, who can have prejudices to report certain incidents.

Other useful system for detecting incidents is the use of "triggers", warning signs for the suspicion that an adverse event has occurred, they have been proved as useful on the identification of incidents and to facilitate their detection [24].

Voluntary reporting systems are helpful to detect most incidents and their causes, but it is better to combine different incident detection systems: voluntary reporting, analysis of critical incidents, reviews of medical records, modal analysis of failures and events, to have a more complete overview of the incidents and their causes [15,25].

## Conclusion

The diffusion of the new model in the department, highlighting the importance of reporting incidents has helped to increase the reports. The return of the information thanks to monthly meetings concerning reports and improvement implemented measures has convinced of the usefulness of reporting and has achieved a more safety patient care.

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