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SHORT REPORT

The role of critical incident monitoring in detection and prevention of human breast milk confusions

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Abstract Feeding a mother's expressed breast milk to the wrong infant is a well-known misidentification error in neonatal intermediate care units (NICU) with potential harmful consequences for the neonate. In this study, we aimed to analyze the role of critical incident monitoring on detection and prevention of human breast milk confusions. The critical incident monitoring made us aware of this misidentification error on our NICU. Despite the implementation of system changes to make breast milk application clearer and safer, we failed to reduce the incidence of breast milk confusions.

Keywords Breast milk · Newborn · Critical incident monitoring

Introduction

Breast milk, the optimal source of nutrition for neonates, may contain pathogens and therefore carries the risk to transmit infections [4, 5]. Namely, the human immunodeficiency virus, hepatitis virus, cytomegalovirus, herpes simplex virus, and methicillin-resistant *Staphylococcus aureus* can have harmful consequences for the neonate [9, 11]. In addition to this genuine medical problem, breast milk administration error produces enormous psychic stress to the mother whose baby received the milk of another woman [5]. Recently, a breast milk administration error led to a headline in the yellow press in Switzerland, which also shows the relevance of this misidentification error in the public [6].

We intended to point out the impact of the critical incident monitoring on the incidence of breast milk administration errors over a period of 7 years.

Materials and methods

The study was performed in a 15 bed neonatal intermediate care unit of a university teaching children's hospital. In the year 2000, we implemented the critical incident monitoring (CIM). CIM is a voluntary, anonymous, non-punitive reporting system of harmful and potentially harmful events [7]. Our reporting form consists of a narrative section about the critical incident (CI), including possible contributory factors, proposals of measures to prevent any such CI in the future, and exact time of the CI. Every 3 months, the reports were analyzed by the quality management group and discussed with the whole team.

The frequency of feeding expressed breast milk was constant over the years with approximately 22,000 applications per year. After the first few months of CIM, our attention was drawn to breast milk administration errors. As a countermeasure, the labels on the bottles were changed. While previously the bottles were labeled only with a number corresponding to the neonates, and nurses had to check up the numbers on a list, from then on the whole name of the infant, date of birth, patients ID number and case number as well as bottle content were written on the bottles. As a next step 3 years later when reports on bottle confusions persisted, the labels on the bottles were changed again. Labels of bottles containing breast milk were

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additionally marked with a big black bar. The intention of this modification was to explicitly draw the nurses' attention to those bottles containing breast milk.

The variation of frequency of reported breast milk confusions over 7 years was analyzed by chi-squared test for trend.

Results

We encountered three incidents of breast milk administration errors in the years 2001 and 2002 either. By the end of the year 2002, labels of the milk bottles were changed as described in the "Materials and methods". This change did not decrease the number of reported breast milk administration errors (Fig. 1). In 2005, only one incident was reported. In 2006, already four incidents were reported in the first half of the year. By the end of July 2006, we introduced the next label change as described above. In the second half of the year 2006, no more incidents occurred, whereas in 2007 three incidents were reported. Chi-squared test for trend over the 7 years was not significant ($p>0.05$).

Altogether 23 breast milk application errors were reported from 2001 to 2007 (about 0.14 confusions/1,000 feedings). Regarding diurnal distribution of breast milk confusions, in 17 incidents, the exact time was monitored. More than 75% of breast milk application errors happened during evening and night shifts, and almost 60% after 6 P.M. (Fig. 2).

The leading causes, mentioned by the reporters, were interruption of nurses on their way to feeding an infant and taking the wrong bottle out of the common water bench due to non-attention or distraction. In one case, it was reported that similar sounding first name of the infants was the reason for the error. In all reported cases, viral blood testing of the "donor"-mother was performed, yielding throughout negative results.

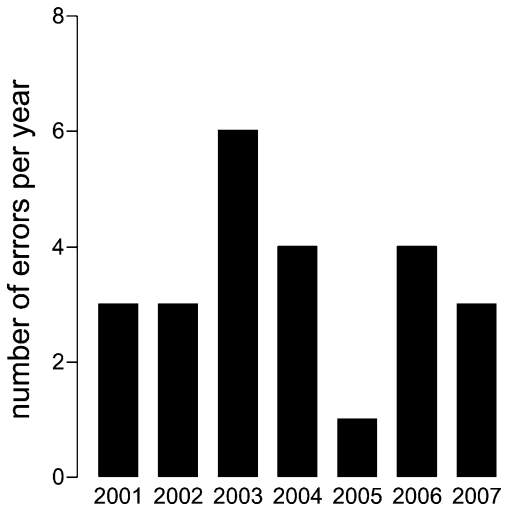

Fig. 1 Number of breast milk confusions (errors) per year from 2001 to 2007

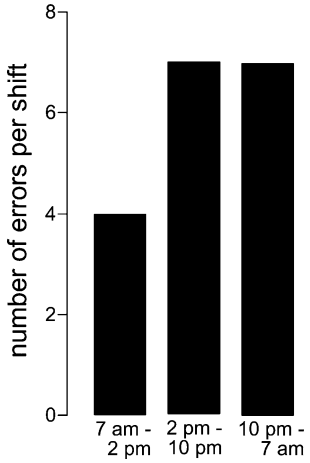

Fig. 2 Occurrence of breast milk confusions (errors) during early, late, and night shifts. The total number of errors (24 in Fig. 1 and 18 in Fig. 2) differs as in six cases the exact time was not mentioned in the critical incident monitoring

Discussion

Shortly after implementation of CIM, breast milk administration errors were discovered as an important problem within the neonatal unit. At the root of most critical incidents, there are system failures [10]. According to this concept, we introduced system changes (different labeling of milk bottles). However, we noticed an increase in reports of breast milk administration errors after this intervention, probably because of a more assiduous monitoring, as nurses were more aware of the specific problem and were consistently encouraged to report administration errors. Moreover, correct labeling of the bottles with patient name and bottle content made it really possible or at least easier to detect and report milk bottle confusions. The second system change too was not followed by an unequivocal decrease in the number of reports. It has been shown that voluntary CIM does not allow tracking the quality of care and evaluating the impact of interventions [3, 7], that is, the number of reported incidents does not correlate with the true number of incidents. The strength of voluntary CIM is a qualitative one, namely spotting of patient safety problems.

Drenckpohl et al. [5] described a remarkable and Dougherty and Giles [4] a transient reduction of breast milk administration errors after focused interventions. While Drenckpohl et al. used the six sigma methodology to monitor and reduce the incidence of breast milk application errors, Dougherty and Giles developed a quality assurance (QA) program. In this QA program, a breast milk incident protocol is initiated, if feeding error has occurred.

Gray et al. found that similar sounding last names, same last names, or similar medical recording number were main risk factors for patient misidentification. In their study, one quarter of the reported misidentification errors involved expressed breast milk [8]. Bar code technology has been introduced for medication administration [2]. So far, there are no reports on this technology for dispensing bottle feeds.

The clustering of breast milk application errors during the night emphasizes the human factor in critical incidents, as there is a physiological decrease in concentration and effectiveness during night. Ideally, system changes prevent human failures from reaching the patient.

In conclusion, the introduction of CIM helped us to recognize breast milk application errors as a problem in our neonatal unit. Through contextual information on individual breast milk confusions, the CIM allowed to find the root causes and to implement respective system changes. However, our study shows that voluntary CIM does not allow tracking the true number of incidents. Conversely, more awareness of specific problems and implementation of system changes which facilitate identification of critical incidents may both increase specific reporting rates. Therefore, the strength of CIM is its ability to give clues of system failures. Other measures, such as engagement of independent observers may be more appropriate to monitor the true number of incidents [1].

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