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Seizure management by preschool teachers: A training concept focussing on practical skills

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ABSTRACT

Purpose: Prolonged seizures can cause severe harm and even death. For seizures lasting longer than 5 min, an administration of rescue medication is therefore recommended. Caregivers such as preschool teachers should be able to administer correctly anticonvulsive rescue medication to children.
Methods: A training concept for preschool teachers on seizure management focussing on practical skills was developed. To assess the success of the training, a structured interview on attitudes relating to rescue medication administration was conducted. The number of committed errors during administration of a rectal/buccal rescue medication to dummy dolls was compared before and after training.
Results: 210 teachers from 115 preschools participated while all teachers from 303 preschools had been invited. The self-reported level of confidence in their own skills to administer anticonvulsive rescue medication increased from 5 to 8 on a scale from 1 to 10 ($p < 0.001$). The number of participants who agreed to administer rescue medication rose from 195/210 (92.8%) before training to 209/210 (99.5%, $p < 0.001$) after training for the rectal route, and from 173/210 (82.4%) to 209/210 (99.5%, $p < 0.001$) for the buccal route. For teachers who administered rescue medication before and after training, the number of administrations without any administration errors rose from 1/195 (0.5%) to 117/195 (60.0%, $p < 0.001$) for the rectal route, and from 13/173 (7.5%) to 95/173 (54.9%, $p < 0.001$) for the buccal route.
Conclusion: A training for preschool teachers boosted the level of self-confidence relating to administration of anticonvulsive rescue medication. Teachers also committed fewer errors when administering rescue medication to dummy dolls.

1. Introduction

Prolonged seizures in children can produce fatal outcomes [1–5]. The administration of rescue medication in seizures that last longer than 5 min can prevent prolonged seizures. If a rescue medication is administered within the first 15 min of a seizure, the chance of successful termination of the seizure stands at 97%, which falls to 57% if rescue medication is administered any later [6,7]. In patients with acute repetitive seizures, an early administration of anticonvulsive rescue medication can reduce seizure frequency [8]. Furthermore, the early administration of rescue medication results in the reduction of the number of hospital admissions [9]. Many seizures occur away from home. One out of six emergency calls in schools relates to a seizure [10]. In those cases, caregivers other than parents, such as (pre)school teachers, are first responders [11,12]. This is why persons caring for children with epilepsy should have regular access to an appropriate rescue medication. In order to improve levels of safety for children with epilepsy, however, the entire medication process has to be considered. This process does not end with an appropriate prescription and the availability of the medication but has to be continued up to an appropriate drug administration. To this end, all relevant caregivers should be trained on the appropriate administration of rescue medication [13]. In a previous study, (pre)school teachers expressed uncertainty relating to emergency situations, especially those resulting in the administration of rescue medication [14]. We thus developed a training concept for preschool teachers focussing on practical administration of anticonvulsive rescue medication.

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2. Material and methods

2.1. Setting

All 303 preschools in Leipzig, a city with 570,000 inhabitants in Saxony/Germany, were invited to take part in the study. In Germany, preschools supervise children ≤ 6 years and are also responsible for supervision of pupils usually up to 10 years of age in the afternoon. The full study was approved ahead of time by the Youth Welfare Office of Leipzig. No ethic approval was requested due to the non-involvement of either patients or healthy children.

2.2. Study design

We provided preschool teachers with training that addressed practical skills in the administration of rescue medication in children with epilepsy. Training took place in each of the participating preschools. In each training, 1–2 participants were selected by chance out of the attending preschool teachers and invited to take part in the assessment of their practical skills. For this purpose, the selected participants were asked to administer rectal diazepam and buccal midazolam to dummy dolls prior to and following the training. We also interviewed the selected participants with regards to their attitudes concerning the administration of anticonvulsive rescue medication.

2.3. Study instruments

2.3.1. Intervention instrument

2.3.1.1. Training concept

An expert panel of neuropaediatricians and clinical pharmacists developed a training concept consisting of a standardised presentation assisted by digital slides focussing on seizure management and a correct presentation of practical administration of rectal and buccal rescue medication. In addition to introducing issues relating to the disease (i.e. pathomechanism and symptoms), we explained how to handle an acute seizure and how to administer rescue medication correctly. For the latter, the following issues were addressed:

- the importance of prompt rescue medication administration,
- the appropriate route of drug administration,
- the mode of drug action,
- the construction of the drug devices (rectal tube and buccal syringe), and
- the correct handling of the drug devices.

The training was performed as a group session and lasted for forty minutes. After completing the training course, participants received a handout that provides guidelines for the emergency management of a seizure.

2.3.2. Assessment instruments

2.3.2.1. Structured interview of attitudes and fears

We conducted short, structured interviews which also featured questions about attitudes towards and fears relating to the administration of rescue medication. The interviews were performed individually with each participant. For questions relating to the level of self-confidence in one's own skills, we used a scale ranging from 1 (no confidence) to 10 (highest amount of confidence).

2.3.2.2. Practical performance by administration to dummy dolls

We used dummy dolls as assessment instruments along the lines previously described by Kaune, Schumacher et al. [15]. This allowed us to assess the practical performance of individual participants in the administration of rescue medication before and after the training independently from other participants. The administration was observed by an experienced pharmacist (who always was one and the same person). A prepared doll was used for administration of a rectal tube, as was an artificial mouth reproduction for administration of a buccal syringe. To facilitate data assessment during the limited time frame before and after the training, we adjusted the dummy doll protocol as described by Kaune, Schumacher et al. [15] by focussing on basic application steps of the administration of rescue medication. As a result, in our setting, 5 potential handling errors were investigated for rectal administration and 3 for buccal administration. The severity of the handling error had been rated from 1 (lowest) to 6 (highest) risk by an expert panel [15].

2.4. Statistics

Statistical analysis was conducted using IBM SPSS Statistics® 23.0 (IBM Corporation, Armonk, NY, USA). Frequencies are reported as numbers and percentages. Continuous data are presented as median with first (25%) and third (75%) quartiles (Q25 and Q75). Values were compared by McNemar test, Wilcoxon test, or by Mann-Whitney U test, as appropriate. A p-value < 0.05 is considered to indicate significance.

3. Results

3.1. Characteristics of participants and of the setting

In 115 preschools, 210 teachers agreed to take part in the study. From those, 181 (86.2%) were female preschool teachers, 29 (13.8%) male. They had a median work experience of 9 (Q25/75 3/26) years. 49/210 (23.3%) of preschool teachers took care of children with epilepsy at the time of study, 70/210 (33.3%) at any time of their work life. Regardless of this fact, 70/210 (33.3%) participants had familiarised themselves with the administration process of rescue medication previously. 33 (47.1%) of those 70 teachers who previously had taken care of children with epilepsy had familiarised themselves with this issue.

3.2. Attitudes towards the administration of rescue medication

The self-reported level of confidence of preschool teachers in their own skills to administer anticonvulsive rescue medication rose from 5 (Q25/75 3/7) prior to the training to 8 (Q25/75 7/9) after the completion of the training (see Fig. 1). Prior to the training, preschool teachers who had previously familiarised themselves with the administration of rescue medication felt more confident [6 (Q25/75 5/8)] than participants who had not [5 (Q25/75 3/6), $p < 0.001$]. After the training, there were no significant differences between the two groups of participants.

The number of participants who expressed no fears relating to the administration of rescue medication increased from 36/210 (17.1%) prior to the training to 85/210 (40.5%, $p < 0.001$) after the completion of the training (for details, see Fig. 2). As with regards to the existence of fears, we did not find significant differences between preschool teachers who had previously familiarised themselves with the administration of rescue medication and those who had not.

The number of participants who agreed to administer a rescue medication to dummy dolls rose from 195/210 (92.9%) before training to 209/210 (99.5%, $p < 0.001$) after training for the rectal