Evaluation of Adherence to a Convulsion Management Protocol for Children in Rwanda

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Summary

Inappropriate seizure management may result in high morbidity and mortality. We assessed the adherence of health professionals in southern Rwanda to a national protocol for pharmacological management of seizures in children. A questionnaire featuring a 5-year-old child with generalized prolonged seizures was administered. The questions focused on the choice of initial treatment and the sequence of management following failure of the initial treatment choice. Benzodiazepine was chosen as initial therapy by 93.7% of physicians and 90.9% of nurses. Only 49.2% of physicians and 41% of nurses would repeat the initial treatment in case of failure of the first dose and 47% of doctors would wait 30 min to intervene. In case of refractory status epilepticus, 34% of physicians would give three doses of benzodiazepine, whereas 19% did not know what to do. These results suggest poor adherence to national protocol.

Key words: epileptic seizures, emergency therapy, guideline adherence, Rwanda.

Background

The prevalence of epilepsy is two to three times higher in Sub-Saharan Africa than in industrialized countries. It strikes especially the young: 60% of the seizures start before the age of 20 years [1, 2]. In Rwanda, 32% of cases begin before the age of 5 years [3]. Current management of convulsions in Sub-Saharan Africa falls well short of perfection. Critical shortages of qualified staff, limited capacity for paraclinical investigations and poverty are some factors responsible for the inadequate management of children with seizures in less-equipped countries [4, 5].

The objective of our study was therefore to assess the adherence of health professionals involved in the management of pediatric cases to the protocol for management of convulsions in children proposed by the Ministry of Health of Rwanda [6].

Methodology

This study design was cross-sectional. Data were collected by interviewing health professionals, using a questionnaire based on clinical situations and written in the three main languages spoken in Rwanda (Kinyarwanda, English and French). Interviews were conducted between 1 February and 1 June 2012.

The questionnaire featured a 5-year-old child who had generalized tonic–clonic seizures lasting longer than 5 min. The recognition of seizures lasting >5 min and commencing non-pharmacological management was considered to be the first step of the therapeutic sequence. The initial pharmacologic treatment was considered to be the next step. The questions focused on the choice of initial treatment (Step 2) and the sequence of management following failure of the initial treatment choice. This sequence

doi:10.1093/tropej/fmt094 Advance Access published on 13 December 2013

involved the third, the fourth and the fifth therapeutic choice and the waiting period between one step and the next. Additionally, interviewees were asked if they wanted training to be organized for them on the management of prolonged seizures in children. The length of interview was ~30–60 min. Interviewees answered individually and were not allowed to confer.

Answers to the questions were encoded in database by using Epi Data software. Data were analyzed using SPSS 17.0 software. They were synthesized as a proportion (or percentage). The association between the therapeutic attitudes and profession as well as the comparison of attitudes between physicians and nurses were tested using the Pearson chi-square test. A p value <0.05 was considered statistically significant.

Results

Interviewee sample

Of the 213 doctors and nurses working in 11 hospitals in the Southern Province of Rwanda at the time of administration of the questionnaire, 129 (60.5%) agreed to answer the questionnaire, including 63 doctors and 66 nurses. The per-hospital rates of response ranged between 35 and 100% for doctors and between 40 and 100% for nurses (Table 1).

Among physicians, 56 were general practitioners, and five were in training in the Department of Pediatrics at the National University of Rwanda. Only two were specialists and professors at the National University of Rwanda. Of all the nursing respondents, 30 (45.5%) had the qualification 'A1', meaning 3 years of tertiary nursing education. The remaining 36 (54.5%) were 'A2', with no tertiary training but vocational training during high school.

First-line treatment (Steps 1–2)

Regarding the first-choice anticonvulsant for initial seizure cessation, there was no statistically significant difference between physicians and nurses, 93.7% of physicians and 90.9% of nurses chose a benzodiazepine as their first-choice emergency medicine. Diazepam was chosen by 88.9% of physicians and 80.3% of nurses ($p=0.36$). Among the 129 healthcare professionals surveyed, 10 chose phenobarbital alone as first choice, with four of these being physicians. Regarding the route of administration of the first selected anticonvulsant, the majority of doctors and nurses chose the per-rectal route (63.5% vs. 69.7%), followed by the intravenous route (25. 4% vs. 19.2%). It is notable that 6.3% of physicians and 3% of nurses wanted to administer intramuscular diazepam to stop the seizure. Lorazepam administered by the buccal/sublingual route was proposed by 9.1% of nurses and 4.8% of physicians (Table 2).

Second choice (Step 3)

Step 3 concerns the choice of a second-line drug in non-responders to the first administration of anticonvulsant. In all, 49.2% (31/63) of doctors and 41% (27/66) of nurses chose to repeat the same anticonvulsant administered initially. Twenty-six of 63 doctors (41.3%) and 34 of 66 nurses (51.5%) chose a different anticonvulsant. Of the 26 doctors, 19 (73.1%) gave phenobarbitone, 1 (3.8%) used phenytoin and 6 others gave a different benzodiazepine. We noted that five doctors (7.9%) chose to combine diazepam with phenobarbitone. One doctor thought the patient should be sent to intensive care for induction of pharmacologic coma. Among the 34 nurses, 21 (61.8%) gave phenobarbitone and the other nurses gave an alternative benzodiazepine.

TABLE 1
Respondents classified according to hospital

Hospital	Physicians		Nurses	
	Target number	Actual respondents *n* (%)	Target number	Actual respondents *n* (%)
BUTH	8	8 (100)	16	13 (81.2)
DH/GAKOMA	7	5 (71.0)	6	3 (50.0)
DH/GITWE	7	4 (57.0)	6	5 (83.3)
DH/KABGAYI	20	7 (35.0)	20	11 (55.0)
DH/KABUTARE	11	7 (63.6)	6	5 (83.3)
DH/KADUHA	6	4 (66.6)	10	4 (40.0)
DH/KIBILIZI	10	6 (60.0)	12	8 (66.7)
DH/KIGEME	8	4 (50.0)	5	3 (60.0)
DH/MUNINI	6	6 (100)	5	5 (100)
DH/NYANZA	7	6 (85.7)	10	5 (50.0)
DH/REMERA-RUKOMA	12	6 (50.0)	5	4 (80.0)
Total	102	63 (61.8)	111	66 (59.5)

BUTH, Butare University Teaching Hospital; DH, district hospital.

TABLE 2
Suggested management of seizures classified according to profession

Management steps	Profession		*p*
	Physicians $n=63$	Nurses $n=66$	
Diagnosis of generalized tonic–clonic seizure lasting >5 min (Step 1)	63 (100)	66 (100)	
First-choice AED (Step 2)			
Diazepam	56 (88.9)	53 (80.3)	0.39
Lorazepam	3 (4.8)	7 (10.6)	
Phenobarbitone	4 (6.3)	6 (9.1)	
Administration route of the first-choice AED			
Intrarectal	40 (63.5)	46 (69.7)	0.46
Intravenous	16 (25.4)	12 (18.2)	
Intramuscular	4 (6.3)	2 (3.0)	
Buccal/sublingual	3 (4.8)	6 (9.1)	
Second-choice therapy (Step 3)			
Further dose of the same AED	31 (49.2)	27 (41)	NA
Different AED	26 (41.3)	34 (51.5)	
Combination of two AEDs	5 (7.9)	1 (1.5)	
Transfer to PICU	1 (1.6)	4 (6.0)	
Waiting time after the second-choice therapy			
≤10 min	26 (41.3)	28 (42.4)	0.18
11–30 min	30 (47.6)	22 (33.3)	
>30 min	1 (1.6)	2 (3.1)	
No answer	6 (9.5)	14 (21.2)	
Third-choice therapy (Step 4)			
Further dose of any AED	35 (55.6)	36 (54.5)	0.91
Transfer to PICU	28 (44.4)	30 (45.5)	
Waiting time after the third-choice therapy			
≤10 min	8 (12.7)	12 (18.2)	0.10
11–30 min	17 (27)	7 (10.6)	
>30 min	2 (3.2)	4 (6.1)	
No answer	36 (57.1)	43 (65.1)	
Plan if seizure is refractory to three doses of AED (Step 5)			
Transfer to PICU	50 (79.4)	41 (62.1)	NA
Any further AED	1 (1.6)	2 (3)	
Seek senior advice	0 (0.00)	5 (7.6)	
No answer	12 (19)	18 (27.3)	

P, *p*-value; NA, not applicable; AED, antiepileptic drug.

When asked about how long to wait before initiating their second choice, less than one-half of surveyed health professionals would intervene within the first 10 min after administration of the first dose of anticonvulsant (41.1% of physicians and 42.4% of nurses). In all, 47.6% of physicians preferred to wait for a period up to 30 min before administering a second dose of anticonvulsant compared with 33.3% of nurses. One physician chose to wait 1 h before taking further action. Of all respondents, 9.5% of physicians and 21.2% of nurses reported not knowing the appropriate waiting time. There was no significant difference between doctors and nurses with regard to the length of time to wait before initiating their second-choice therapy ($p=0.18$) (Table 2).

Third choice (Step 4)

Step 4 concerns patients who failed to respond to two correctly administered anticonvulsant doses. In this circumstance, 55.6% (35/63) of physicians decided to give further antiepileptic drugs. Twenty-eight (44.4%) of them chose to transfer the patient to the pediatric intensive care unit (PICU) for coma induction. Of the 35 doctors who chose to administer another anticonvulsant, 12 (34%) preferred to continue with their previous selection, 12 proposed phenobarbital, three proposed phenytoin, two proposed the combination of phenobarbital and diazepam, five proposed a benzodiazepine different from their first choice and one suggested a combination of two antibiotics.

Among the nurses, 36 (54.5%) were in favor of the continuation of anticonvulsants, and 30 (45.5%)

chose to transfer the patient to the PICU. Of the 36 nurses who chose to administer another anticonvulsant, five preferred to continue with the second-line drug, 23 proposed phenobarbitone alone, one proposed a benzodiazepine different from the first choice and seven were not able to propose the name of any anticonvulsant. This survey did not reveal a significant difference between doctors and nurses as far as the therapeutic approach adopted after failure of the second dose of anticonvulsant was concerned ($p = 0.908$) (Table 2).

If epileptic seizure did not stop after the administration of two doses of anticonvulsant, more than one-half of the physicians (57.1%) and two-thirds of nurses (65.1%) surveyed did not know how long to wait before intervening again.

Two doctors and four nurses said they were prepared to wait at least 30 min in the hope that the convulsion will stop spontaneously. Only 12% of physicians and 10.6% of nurses chose to intervene within 10 min after administration of the second dose of anticonvulsant, with no statistically significant difference between physicians and nurses ($p = 0.102$) (Table 2).

Fourth choice (Step 5)

If the epileptic seizure did not stop after three doses of anticonvulsant, 79.4% (50/63) of physicians chose to transfer the patient to the PICU vs. 62.1% (41/66) of nurses. One-fifth of doctors (19%) and more than one-quarter of nurses (27.3%) did not know what to suggest (Table 2). We noted that 98.4% of physicians and 95.5% ($p = 0.332$) of nurses surveyed requested that training be organized on how to manage prolonged epileptic seizures in children.

Discussion

According to the 'Basic Paediatric Protocol' published in October 2011 by the Ministry of Health of the Republic of Rwanda [6], the management of convulsions in children older than 30 days begins with ensuring airway patency, proper cardiorespiratory function and the administration of oxygen (Step 1, non-pharmacological management). A dose of diazepam is administered either intravenously or intrarectally (Step 2), followed by a second dose (Step 3) if the convulsion does not stop within 10 min after administration of the first dose. The protocol calls for the administration of a loading dose of phenobarbitone (Step 4) if the seizure does not stop within 15 min after Step 3.

This protocol is similar to the 'Guidelines of the Working Group on the Pharmacological Management of Status Epilepticus in Children' published in 2000 [7] and 'The National Institute for Health and Clinical Excellence (NICE) Guideline Form UK' revised in January 2012 [8]. The first four steps of the Rwandan pediatric protocol are different from these two guidelines only in the benzodiazepine available in Rwanda and the delay between Steps 3 and 4. This period is 5 min longer in the Rwandan protocol. All these three protocols limit to 5 min, the maximum duration of convulsion before initiating drug therapy. Indeed, on average, tonic–clonic seizures last ~62 s, with a range from 16 to 108 s [9]. More than 90% of seizures last <5 min [9, 10]; those that exceed this period may persist and should therefore benefit from immediate management [11].

Among health professionals interviewed, 93.7% of physicians and 90.9% of nurses chose a benzodiazepine as first-choice emergency medicine. The choice of phenobarbital at this step (6.3% of physicians and 9.1% of nurses) is justified neither by the age of the child nor by the official protocol [6]. Curiously, 6.3% of physicians chose the intramuscular route to administer the anticonvulsant selected. The choice of the sublingual lorazepam (4.8% of physicians and 9.1% of nurses) is not supported by the local protocol. However, it could suggest an unexpressed need to explore other routes of administration of anticonvulsants. Indeed, achieving venous access in children admitted to the emergency with convulsions takes from 1 to 25 min, with an average of 4 min, even if performed by someone experienced [12].

Contrary to what the national protocol advocates in Step 3, only 41.9% (54/129) of respondents chose to administer the second dose of anticonvulsant within 10 min and 45% (58/129) repeated the drug administered in Step 2.

The fourth step of the national protocol [6] proposes administering phenobarbitone within 15 min after Step 3. Among the respondents, 44.4% of physicians chose to send the patient to the PICU for coma induction. In the group of those who chose to continue to treat the patient outside the PICU, only 34% chose to comply with the national protocol. The waiting time between Steps 3 and 4 was not known by 57% of doctors. There was no statistically significant difference between physicians and nurses regarding the action to be undertaken and the waiting time ($p = 0.908$ and $p = 0.102$, respectively)

In protocols quoted earlier [7, 8], the waiting time before moving from Step 4 (the administration of second-line anticonvulsants) to the induction of coma is 20 min. In this study, 19% of doctors and 27% of nurses did not know what to do in case of a refractory status epilepticus.

The survey revealed that, in particular, Steps 3 and 4 of the management of prolonged convulsion in children are not in harmony with the national protocol. This poor adherence however involves the initiation of treatment and the whole sequence leading up to the induction of coma for refractory status epilepticus. Williams *et al.* [13] list some possible reasons for this trend. First, the guideline cannot easily be implemented unless the caregiver feels a need to change due to the ineffectiveness of what is commonly done.

Habits are ingrained and caregivers are reluctant to change. We believe that clinical trials evaluating the short- and long-term outcomes of children treated for prolonged seizures should be performed to encourage behavioral change. However, these studies are difficult to perform at present due to lack of qualified personnel in pediatric neurology in the Republic of Rwanda [4].

The ignorance of the existence of the guidelines and their content and the difficulties experienced when attempting to follow them are other possible reasons for the poor adherence to the existing protocol [13]. The results of this survey corroborate this hypothesis. In fact, 98.4% of physicians and 95.5% ($p = 0.332$) of nurses surveyed requested that training be organized on how to manage prolonged epileptic seizures in children.

The other barrier that may hinder the implementation of the national protocol could be that the medical staff (often young) assigned to the emergency services do not stay there long and are obliged to perform rotations in other departments [14, 15]. In such circumstances, regular training would be important for the maintenance of any proposed protocol.

Conclusions

The results of our study suggest that adherence to the national protocol for the management of children's seizures in Southern Rwanda is poor. The management of pediatric seizures in our settings needs major improvement. Barriers to improvement could include lack of local opinion leaders (i.e. pediatric neurologists) and lack of data from clinical trials demonstrating the short- and long-term outcomes of children treated for prolonged seizures.

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