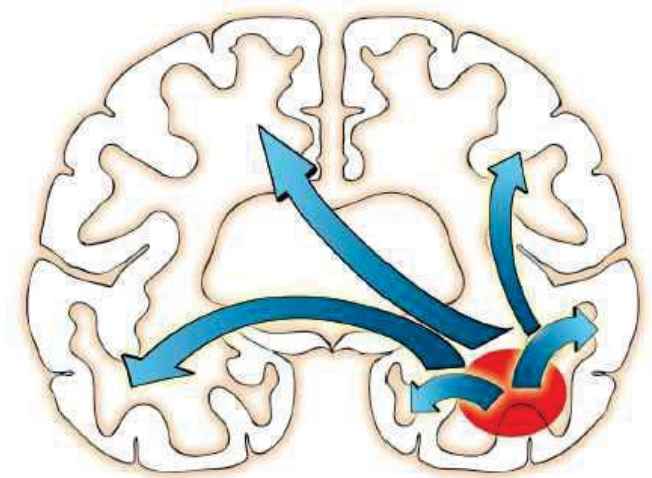
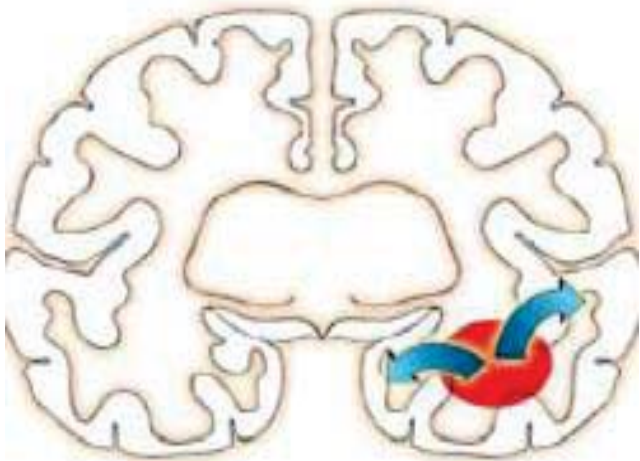
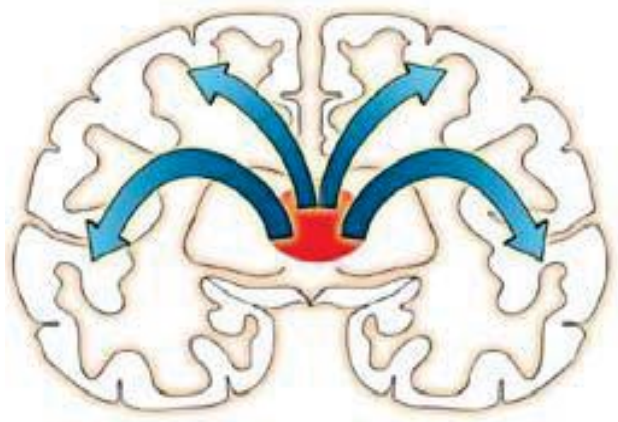
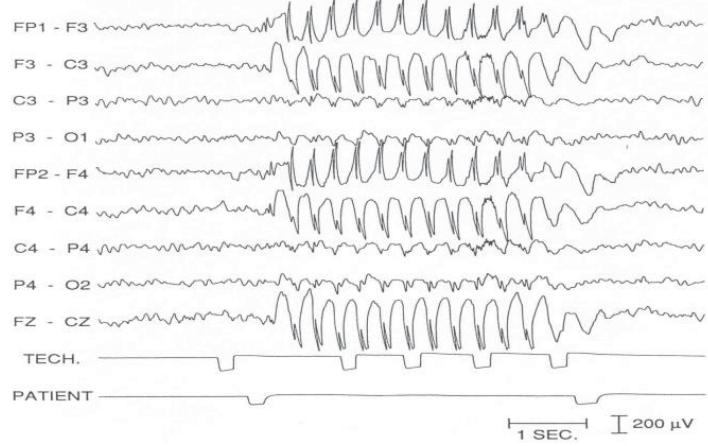


Klassifikation

- **Dauer (Lothman, 1990):**
 - initialer CSE (< 20 - 30 min)
 - definitiver CSE (30 - 60 min)
 - refraktärer CSE (> 60 min)

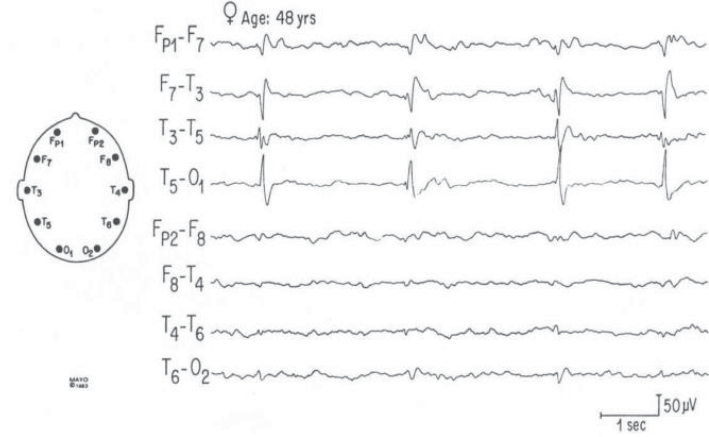


**CHILDHOOD ABSENCE EPILEPSY
ABSENCE SEIZURE**

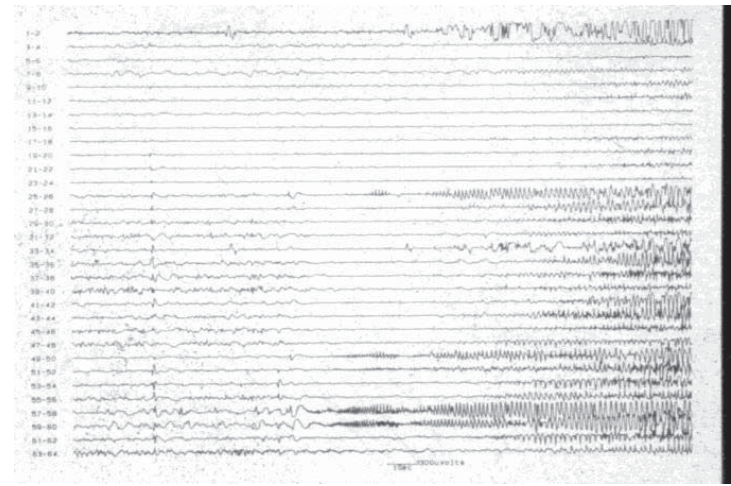


generalisiert

LEFT TEMPORAL SPIKES



fokal



**sekundär
generalisiert**

Klassifikation

- **Ätiologie**

- Identifikation der Ätiologie von
therapeutischer und prognostischer
Relevanz

- Verschiedene ätiologische
Klassifikationen

Ätiologie – ILAE 1993

- Previously healthy children with a first prolonged febrile convulsion; Previously healthy children with an existing diagnosis of prolonged febrile convulsion
- Previously healthy children at the first manifestation of an idiopathic epilepsy; Previously healthy children with an existing diagnosis of idiopathic epilepsy
- Children with an existing diagnosis of symptomatic epilepsy (both generalized and focal)
- Children with a history of previous neurologic disorder
- Previously healthy children with an acute CNS insult
- Children with a first episode of CSE, not included in any of the above groups

Ätiologie – ILAE 1993

- Am häufigsten FK, akute ZNS Insulte, neurologische Erkrankungen
- In **8.5 - 47.8%** Ätiologie unbekannt
- **Prognose abhängig von Ätiologie:**
 - Anoxie ZNS Infektionen, SHT assoziiert mit erhöhter Mortalität
 - Prolongierte FK und CSE bei IGE assoziiert mit signifikant niedrigerer Mortalität und Morbidität

**Berg et al., 1999; Chin et al., 2006;
Singh et al., 2009, 2010; Raspall-Chaure et al., 2007**

Klassifikation entsprechend 4 Achsen

- Semiologie
- EEG
- Ätiologie
- Alter
 - Neonaten (0 - 30 Tage)
 - Kleinkind (1 Monat - 2 Jahre)
 - Kinder (> 2 - 12 Jahre)
 - Jugendliche/Erwachsene (> 12 - 59 Jahre)
 - Senioren (\geq 60 Jahre)

FAZIT

- **Prävention von (irreversiblen) ZNS Schäden und systemischen Komplikationen!!!**
 - **rasche Diagnostik potentiell lebensbedrohlicher Ursachen**
 - i.e. Elektrolytstörungen, Hypoglykämie,, Meningitis, intranielle Hypertension, ...
 - MRI; Labor, inklusive neurometabolische Diagnostik; LP

FAZIT

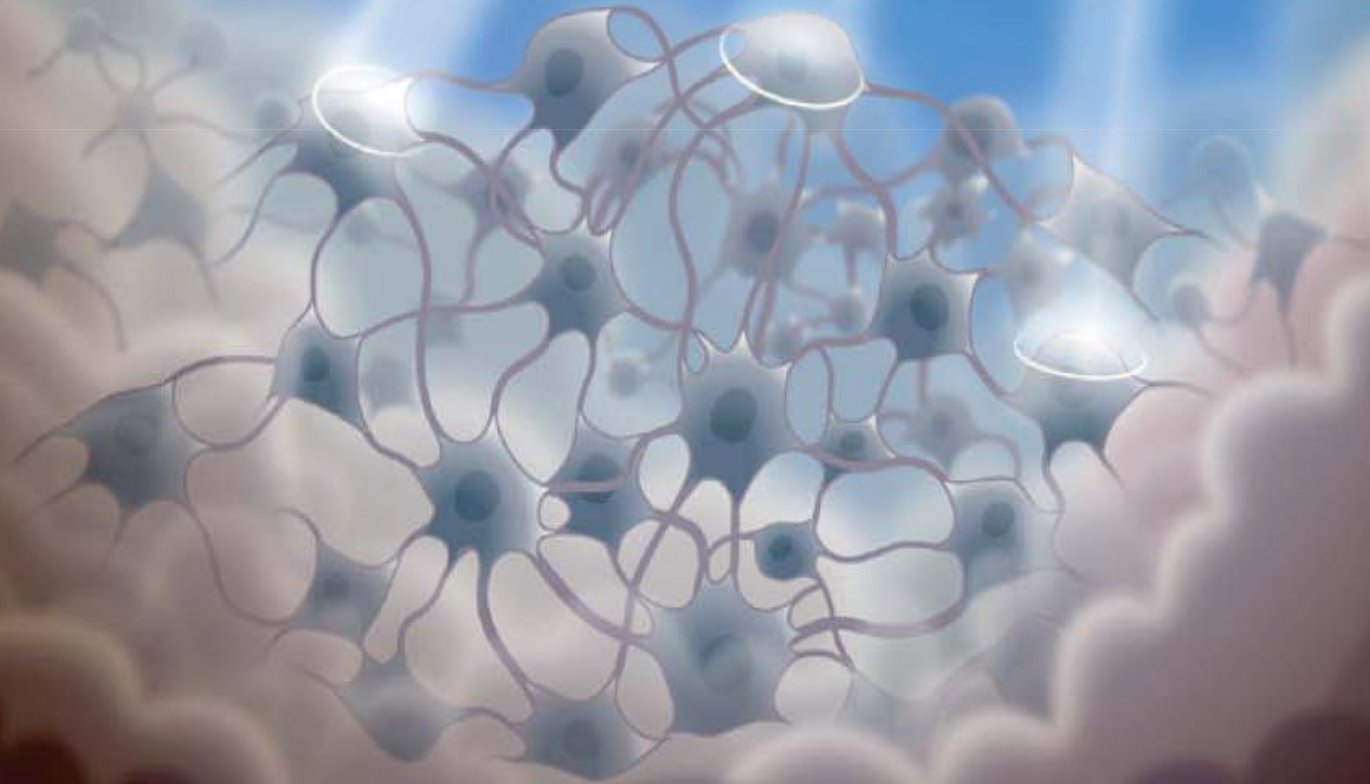
- **Prävention von (irreversiblen) ZNS Schäden und systemischen Komplikationen!!!**

– rasche Diagnostik potentiell lebensbedrohlicher Ursachen

– **Behandlung sofort und parallel**

- Stabilisation der Vitalparameter
- Anfallsbehandlung mit AEDs

Medikamentöse Therapie



- **Grade A**
 - Level 1: Evidence from meta-analysis of randomized controlled trials (RCTs);
 - Level 1B: Evidence from at least one RCT;
- **Grade B**
 - Level 2: Evidence from at least one prospective nonrandomized controlled trial;
 - Level 2B: Evidence from at least one other type of well designed, quasi-experimental study;
 - Level 3: Evidence from nonexperimental descriptive studies such as comparative retrospective studies, correlation, and case–control;
- **Grade C**
 - Level 4: Evidence from expert committee opinions or clinical experience of respected experts, in the absence of good-quality studies.

Prähospitales Setting

Benzodiazepine

- **Sofortige Gabe von Benzodiazepinen bei Anfallsdauer > 5 min verbessert nachweislich den Outcome =>**
 - **Behandlungsbeginn prä-hospital, auch wenn kein i.v. Zugang möglich**
- **Rektales Diazepam 0.5 mg/kg seit Jahren erste Wahl**

Safety and efficacy of buccal midazolam versus rectal diazepam for emergency treatment of seizures in children: a randomised controlled trial

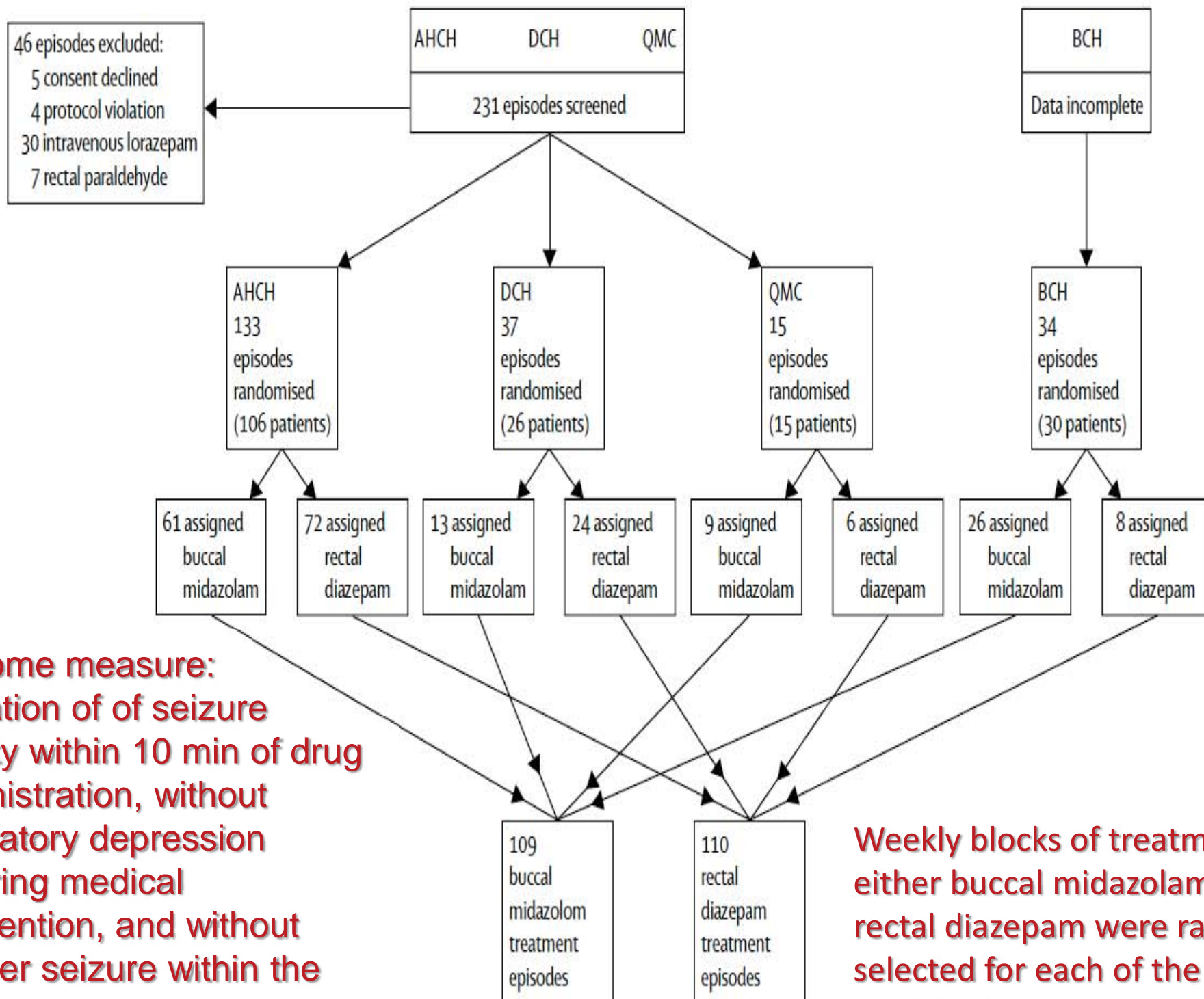
John McIntyre, Sue Robertson, Elizabeth Norris, Richard Appleton, William P Whitehouse, Barbara Phillips, Tim Martland, Kathleen Berry, Jacqueline Collier, Stephanie Smith, Imti Choonara

	Number of times entered into trial						Total
	1	2	3	4	5	6	
AHCH	106	17	4	3	2	1	133
DCH	26	6	4	1	..	..	37
BCH	30	2	2	..	..	..	34
QMC	15	..	..	..	..	..	15
Total	177 (81%)	25 (11%)	10 (5%)	4 (2%)	2 (1%)	1 (<1%)	219

Data are number or number (%). AHCH=Alder Hey Children's Hospital. DCH=Derbyshire Children's Hospital. BCH=Birmingham Children's Hospital. QMC=Queen's Medical Centre.

Table 1: Recruitment from the different centres

Eligible were children aged 6 months and older, who presented to the emergency room still having a seizure, and who did not already have established intravenous access.



Outcome measure:
cessation of seizure activity within 10 min of drug administration, without respiratory depression requiring medical intervention, and without another seizure within the hour

Weekly blocks of treatment of either buccal midazolam or rectal diazepam were randomly selected for each of the four participating centres

	Buccal midazolam (109 episodes, 92 initial episodes)	Rectal diazepam (110 episodes, 85 initial episodes)
Male		
All episodes	59 (54%)	64 (58%)
Initial episodes	52 (57%)	46 (54%)
Admission temperature (°C)		
All episodes	37.3 (36.2–38.5)	37.1 (36.3–38.1)
Initial episodes	37.3 (36.3–38.2)	37.6 (36.3–38.5)
Age (years)		
All episodes	2 (1–5)	3 (1–6)
Initial episodes	2 (1–5)	3 (1–6)
Previous seizures		
All episodes	78 (72%)	79 (72%)
Initial episodes	61 (66%)	55 (65%)
Receiving antiepileptic drugs		
All episodes	52 (48%)	63 (57%)
Initial episodes	37 (40%)	42 (49%)
Episodes with prehospital emergency treatment		
All episodes	35 (32%)	33 (30%)
Initial episodes	28 (30%)	22 (26%)
Seizure duration before treatment (mins)		
All episodes	30 (10–49)	41 (10–61)
Initial episodes	30 (14–45)	37 (10–60)

Data are number (%) or median (IQR).

	Buccal midazolam (109 episodes)	Rectal diazepam (110 episodes)	Percentage difference (95% CI)
Therapeutic success (%)			
All episodes	61 (56%)	30 (27%)	29% (16 to 41)
Initial episodes	49 (53%)	24 (28%)	25% (11 to 39)
Time (mins) to stop seizing after treatment (median, IQR)			
All episodes	8 (5–20)*	15 (5–31)*	
Initial episodes	10 (5–22)†	15 (6–32)†	
Stopped seizing within 10 min (%)			
All episodes	71 (65%)	45 (41%)	24% (11 to 37)
Initial episodes	56 (60%)	36 (42%)	18% (4 to 33)
Given intravenous lorazepam (%)			
All episodes	36 (33%)	63 (57%)	24% (12 to 37)
Initial episodes	33 (36%)	47 (55%)	19% (5 to 35)
Seizure stopped, then further seizure‡			
All episodes	10 (14%) (n=71)	15 (33%) (n=45)	19% (4 to 36)
Initial episodes	7 (13%) (n=56)	12 (34%) (n=31)	22% (4 to 40)
Respiratory depression (%)			
All episodes	5 (5%)	7 (6%)	2 (–4 to 8)
Initial episodes	4 (4%)	6 (7%)	3% (–4 to 10)

Data are number (%) unless otherwise indicated. * $p=0.01$, hazard ratio 0.7 (95% CI 0.5–0.9). † $p=0.03$, hazard ratio 0.7 (0.5–0.96). ‡Seizure stopped within 10 min, but further seizure within 1 h requiring treatment.

- Buccales Midazolam beendete SE in 10 Minuten in 75–84% und in 2–20 Minuten in 87%
- Buccales Midazolam beendete SE schneller ($p=0.01$) und stoppte SE in 10 min bei mehr Kindern als rektales Diazepam
- Weniger Kinder benötigten Lorazepam i.v.
- von jenen, die innerhalb 10 min sistierten, hatten weniger ein Rezidiv innerhalb 1h

Prähospitales Setting

Benzodiazepine

- **Buccales transmukosales Midazolam (0.5 mg/kg)** mindestens so effektiv wie rektales Diazepam (0.5 mg/kg), gleich sicher und sozial besser akzeptiert



Abbildung 1



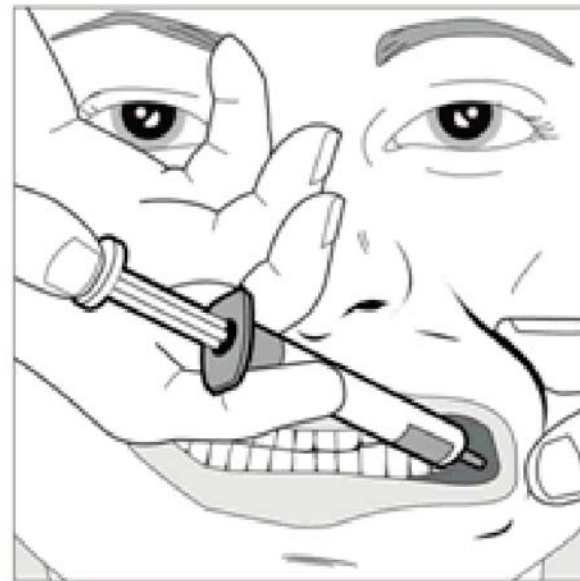
Abbildung 2



Abbildung 3



Abbildung 4



**Epilepsia, 54(Suppl. 7):23–34, 2013;
Journal of Paediatrics and Child Health 52 (2016) 147–150**

(Prä-)hospitales Setting

Benzodiazepine

- **Buccales transmukosales Midazolam (0.5 mg/kg)** mindestens so effektiv wie rektales Diazepam (0.5 mg/kg), gleich sicher, sozial besser akzeptiert
- **Nasal transmukosales Midazolam (0.2 mg/kg)** effektiver und sicherer als rektales Diazepam, gleich sicher und effektiv wie intravenöses Diazepam (0.3 mg/kg) mit kürzerer Dauer bis zum Wirkeintritt
- **Intramuskuläres Midazolam** gleich sicher und effektiv wie intravenöses Diazepam mit kürzerer Lösungszeit und sicherer als intravenöses Lorazepam

**Epilepsia, 54(Suppl. 7):23–34, 2013;
Journal of Paediatrics and Child Health 52 (2016) 147–150**

FAZIT

- Um Outcome zu verbessern, sollten CSE bereits prähospital behandelt werden (Level 1B, Grade A)
- Schulung von Eltern, Lehrern, betroffenen Berufsgruppen bzgl. Management ohne intravenösen Zugang (Level 2, Grade B)
- **Diazepam rektal** am häufigsten verwendet
- **Midazolam buccal transmucosal oder intramusculär** hat entscheidende Vorteile bzgl. Dauer bis zum Wirkeintritt und Dauer der Wirkung (Level 1B, Grade A)

Initialer SE – i.v. BZD

- **Lorazepam oder Diazepam i.v. indiziert für die initiale Behandlung des CSE bei Kindern (Rettung, Spitalsambulanz)**
 - **Lorazepam** vorzuziehen, da geringeres Risiko für Rezive und Atemdepression (Level 1B, Grade A)
 - Wenn kein Zugang, **Midazolam i.m.** (Level 1B, Grade A)
 - CAVE Atemdepression! => inkl. prähospitale Dosis **nicht >2 Dosen** (Level 3, Grade B)

**Epilepsia, 54(Suppl. 7):23–34, 2013;
Journal of Paediatrics and Child Health 52 (2016) 147–150**

- **Available venous access:**
 - **Intravenous lorazepam:** 0.1 mg/kg (maximum 4 mg)
 - Or:
 - **Intravenous diazepam:** 0.5 mg/kg (maximum 10 mg);
 - **Intravenous midazolam:** 0.2 mg/kg (maximum 5 mg)
- **No venous access available:**
 - **Buccal midazolam:** 0.5 mg/kg (maximum 10 mg)
 - **Intramuscular midazolam:** 0.2 mg/kg (maximum 5 mg)
 - **Buccal lorazepam:** 0.1 mg/kg (maximum 2.5 mg)