The use of midazolam for the emergency treatment of seizures out of hospital

The medical treatment of epilepsy aims to reduce or eliminate seizures with minimal side effects of treatment on patient quality of life. With appropriate treatment plans, tailored to the individual, approximately 70% of people with epilepsy have the potential to become seizure free. Where seizures do occur, a minority of patients will experience seizures which are prolonged and potentially life threatening. Convulsive status epilepticus (CSE) is a seizure or series of seizures lasting more than 30 minutes. CSE carries risks for the patient and rapid treatment is essential.

There are situations where it is unrealistic to wait for an ambulance response and early administration of medication would be beneficial. There is no agreement on the use of benzodiazepines in acute seizure management outside hospitals, and neither midazolam nor rectal diazepam is formally approved for use in this setting. It should be emphasised that the legal situation in regards to use of drugs outside their registered indications has not been tested in an Australian court, and this should be considered by prescribing doctors. However where a benzodiazepine is considered appropriate, rectal diazepam has been the medication most commonly prescribed for use by parents and carers in the community setting. The benzodiazepine midazolam can be administered as an intranasal or buccal therapy and offers an effective alternative to rectal diazepam. This mode of delivery has obvious advantages, particularly for larger patients and those in wheelchairs. Most state ambulance services carry midazolam for intramuscular injection where emergency seizure treatment is required.

Where the need for emergency care out of hospital is anticipated, patients require an individual written protocol recommended by their treating doctor. It is emphasized that neither midazolam nor rectal diazepam is formally approved for use in this setting. The guidelines below for midazolam have grown out of clinical practice and limited clinical trials.

Midazolam is available in plastic ampoules, which eliminates the use of glass ampoules and syringes as it can be administered directly from the plastic ampoule. It is important to note that various concentrations and packaging of midazolam are on the market. Plastic ampoules containing 1ml of 5mg/ml are generally most appropriate.

As with rectal diazepam the institution of therapy and the use of midazolam should be subject to specialist guidelines, clear protocols and adequate training for those providing emergency seizure care. In some circumstances an initial test dose under supervised conditions may be appropriate. If administered intranasally the patient should be returned to the lateral (recovery) position. Disadvantages of midazolam when compared to diazepam include unpleasant taste for conscious patients, swallowing the preparation may reduce the intended dose, and it has a shorter duration of action than diazepam, though this may also confer some advantages. Dosage guidelines are provided below, but individual variation in dose should be noted. A lower dose should be trialed before using higher doses, should they prove necessary:

- **Adults:** 5-10mg (1-2 ampoules of 5mg in 1ml)
- **Children:** 0.2 -0.5mg/ kg/ dose, to a maximum of 10mg (as a guide, some practitioners suggest 2-3 yrs 2.5mg = ½ ampoule, 4-10 yrs get 5mg = 1 ampoule, those 11 yrs and above get 10 mg = 2 ampoules.)

It is reasonable to consider prescribing midazolam for out of hospital use in the following situations:

- Patient has a pattern of prolonged generalised seizures (where convulsive activity lasts longer than 5 minutes).
- Patient is known to have ‘clusters’ of seizures and oral therapy is not appropriate. Midazolam may abort the cluster.
- Patient has a history of spontaneous status epilepticus.

It is recommended that an ambulance be called in all cases where a convulsive seizure lasts for more than 5 minutes, even where emergency medications are administered to the patient in the community setting, as the patient may require hospital care. Exceptions may occur when this is part of the known pattern of seizures. Giving repeat doses in the community setting should be discouraged as this could increase the possibility of life-threatening respiratory depression, though it should be noted that single doses may also rarely cause respiratory depression. This protocol should only be varied by the patient’s treating doctor.

It is not proposed that midazolam be used for seizures other than in the case of prolonged generalised tonic clonic seizures, except with specific medical guidance. Midazolam need not be considered in the management of patients with well-controlled epilepsy. If other therapies have been established to be effective for a given individual, there is no indication to change to midazolam. It is stressed that the administration of Midazolam should not be seen as a substitute for emergency treatment, particularly in convulsive status epilepticus, and should not be allowed to introduce inappropriate delay in seeking hospital attention.

2. Controlling seizures in the prehospital setting: diazepam or midazolam? 

3. RCPE (2002). Final Consensus Statement. Consensus Conference on Better Care for Children and Adults with 
   Epilepsy, Edinburgh, Royal College of Physicians of Edinburgh. 
   [http://www.rcpe.ac.uk/esd/consensus/better_care_02.html]