This Patient Group Direction (PGD) must only be used by Critical Care Paramedics (CCPs) who have been named and authorised by their organisation to practice under it. The most recent and in-date final signed version of the PGD must be used.

Patient Group Direction

for the administration of

MIDAZOLAM

by Critical Care Paramedics for

first-line anti-convulsant therapy for seizures

in South East Coast Ambulance Service NHS Foundation Trust

Date Issued:	**01/08/2019**
Issued By:	
PGD Reference:	**PGD-CCP017**
Review Date:	**31/01/2022**
Expiry Date:	**31/07/2022**

Upon issue of this version of the PGD, all previous versions must be removed from use. No supply or administration may be made under the terms of this PGD after the expiry date above.

Change history

Version number	Change details	Date
0.1	New PGD	25/08/2017
0.2	Review and transfer to new template	25/08/2017
0.3	Reviewed	12/10/2017
0.4	Review by Medical Directorate	17/10/2017
1.0	Published version	18/10/2017
2.0	Review	19/07/2019

MIDAZOLAM 5mg in 1mL injection	MDZ	POM CD3

PGD development

Name	Job title and organisation	Date
Lead HCP		25/08/2017
Lead Doctor		18/10/2017
Lead Pharmacist		18/10/2017
Other Paramedics/ Nurses involved in development/ review		18/10/2017

PGD Authorisation

Senior Doctor	**Name**: **Position**: Executive Medical Director **Signature**: **Date**: 23/07/2019
Senior Pharmacist	**Name**: **Position**: Chief Pharmacist **Signature**: **Date**: 24/07/2019
Senior Representative of Profession Using this PGD	**Name**: **Position**: Consultant Paramedic **Signature**: **Date**: 19/07/2019
Organisational Authorisation	**Name**: **Position**: Director of Nursing and Quality **Signature**: **Date**: 24/07/2019

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Training and competency of Critical Care Paramedics

	Requirements of registered Paramedics working under the PGD
Qualifications and professional registration	Professional registration with HCPC as a Paramedic. And Current contract of employment with SECAmb and Authorised to practice as a Critical Care Paramedic (CCP).
Initial training	CCPs must have undertaken appropriate training and demonstrated the competencies in the clinical application of this medicine, including clinical assessment, knowledge of the indicated conditions, knowledge of the applied pharmacology. CCPs must be competent to recognise and treat unintended but expected side effects including loss of airway reflexes, respiratory depression and anaphylaxis.
Competency assessment	CCPs should self-declare that they are competent to use this PGD, assuring themselves that they have the necessary clinical skills and knowledge for treatment of the conditions included and use of the drugs involved. Support for self-assessment will be provided by • A self-assessment competency framework for the use of PGDs. • Regular contact with the CCP Practice Leads during CCP shared governance time. CCPs should also understand the legislation surrounding use of PGDs and their responsibilities as a PGD user.
Ongoing training and competency	The CCP must meet the requirements of the current prevailing level of education required for PGD use at this level of practice. This must include completion of the Trusts SOPs for medicine management and regular peer review. Attend CCP Clin8 weeks in line with the Clin8 CCP training week policy. Ongoing competency with CCP governance and skills assurance time. All ongoing regular training requirements (e.g. statutory and mandatory training) as required by the Trust for this role must be completed. The clinician is responsible for keeping him/herself aware of any changes to the recommendations for the medicine listed. It is the responsibility of the individual to keep up-to-date with continued professional development and to work within the limitations of their own individual scope of practice.

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	Ensure compliance to Trust policies and process relating to medicines.

Clinical condition

Clinical condition or situation	As first-line anti-convulsant therapy for seizures.
Inclusion criteria	Adults and children (all ages) who: • Are actively convulsing and having seizures lasting more than five minutes. • Having repeated convulsions with no recovery in between seizures.
Exclusion criteria	• Known allergy to midazolam or any of the excipients (water for injections, sodium chloride, hydrochloric acid) • Patients who have mental capacity and decline treatment.
Cautions (including any relevant action to be taken)	High risk patients: • Elderly and frail patients. • Chronically ill/ debilitated patients e.g. chronic respiratory insufficiency, chronic renal failure, impaired hepatic function, impaired cardiac function. • Children, especially with cardiovascular instability. • Infants under six months – greater risk of drug accumulation due to hepatic immaturity. (Note higher incidence of paroxysmal reactions in children and the elderly). Consider half doses, slower administration and increased time between doses therefore accepting slower titration to effect. Suspected Brain Injury: Use with caution as any episodes of iatrogenic hypotension or hypoxia (from midazolam's side effects) will increase mortality. Consider half doses, slower administration and increased time between doses therefore accepting slower titration to effect. Myasthenia gravis – use with caution due existing muscle weakness, and muscle relaxant properties. Consider half doses, slower administration and increased time between doses therefore accepting slower titration to effect. **Interactions** Drugs which inhibit or induce CyP3A4: CyP3A4 inhibitors (increase midazolam plasma concentration): • Azole antifungals (ketoconazole, voriconazole, fluconazole, itraconazole, posaconazole) • Macrolide antibiotics (erythromycin, clarithromycin) • HIV protease inhibitors (e.g. saquinavir, ritonavir)

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	• Calcium-channel blockers (verapamil and diltiazem) CyP3A4 inducers (reduce midazolam plasma concentration) • Rifampicin • St John's Wort Ulcer treating drugs such as Cimetidine, Ranitidine, Omeprazole (reduce clearance of benzodiazepines and may potentiate their actions.) Antipsychotics (potential fatal respiratory arrest have been reported in patients taking benzodiazepines and clozapine). **These cases must always be discussed with, and permission granted by the senior on call clinician.** Other drugs which may increase midazolam plasma concentration: • Atorvastatin Ensure that any such identified interactions are handed over at hospital. Sedative effects from any other sedative / hypnotic agents or CNS depressants, including alcohol. Consider half doses, slower administration and increased time between doses therefore accepting slower titration to effect.
Pregnancy and breast feeding	Midazolam has not been subject to controlled clinical studies in pregnancy. Midazolam crosses the placenta but it is unknown what the effect on the baby is. Midazolam is excreted in breast milk. Nursing mothers should be advised to discontinue breast-feeding for 24 hours following administration of midazolam. There is some data on the effects in the infant. Animal studies do not indicate a teratogenic effect, but foetotoxicity was observed as with other benzodiazepines. No data on exposed pregnancies are available for the first two trimesters of pregnancy. The administration of high doses of midazolam in the last trimester of pregnancy, during labour or when used as an induction agent of anaesthesia for caesarean section has been reported to produce maternal or foetal adverse effects (inhalation risk in mother, irregularities in the foetal heart rate, hypotonia, poor sucking, hypothermia and respiratory depression in the neonate) The benefits of administration must outweigh any potential risk.

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	Consideration of the cause of seizures in pregnant or recently post-partum females should be taken into account and if eclampsia is strongly suspected follow the CMP for eclampsia.
Arrangements for referral for medical advice	Patients who receive midazolam should be conveyed to the nearest appropriate facility or handed over to an enhanced care team who are able to manage a patient who has had midazolam administered. The receiving clinical team must be verbally informed and the patient record should clearly show: □ At what time the patient had midazolam administered. □ How much midazolam the patient has had administered. □ Whether the patient had mental capacity and consented to treatment or whether the patient lacked capacity and was being treated in their best interest.
Action to be taken if patient excluded	Ensure exclusion is recorded in patient records.
Action to be taken if patient declines treatment	It may be likely in the context of seizures the patient may not be able to make an informed choice. Therefore, the CCP should act in the best interests of the patient at all times.

Details of the medicine

Name, form and strength of medicine	Midazolam 5mg / 1ml, solution for injection (for IM use) Midazolam 1mg / ml (5ml ampoule), solution for injection (for IV / IO use)
Legal category	POM CD Schedule 3
Route/method of administration	Intravenous injection (IV) Intraosseous injection (IO) Intramuscular injection (IM)
Dose and frequency	Midazolam may be given by the IV, IO or IM route. As detailed in the CMP for seizures, the IM route should be considered when IV access may be difficult to achieve quickly. **The IM preparation is a higher strength than the IV dose and represents a potential risk for drug error. Doses and concentrations must be checked before administration.** Repeat doses (described below) may be administered at 5 – 10 minute intervals whilst considering the clinical picture including the patients' frailty, level of consciousness, hemodynamic state and the following:

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IV midazolam has an onset time of approx. 2 min
IV midazolam has a peak effect time of approx. 5 – 10min.
IV midazolam has a half-life of 1.5 -2.5 hours

Adults and Children:

- IM dose (5mg / ml ampoule): 0.1mg / kg to max of 10mg. Repeated **ONCE** 5 – 10 minutes later if the patient is still fitting.

- IV / IO dose (1mg / ml ampoule): 0.05mg / kg to max of 5mg. Repeated **EVERY** 5 – 10 minutes TO A MAXIMUM OF FOUR DOSES if the patient is still fitting.

For practical purposes small doses have been rounded to the nearest 0.5mg to aid administration.

FRAIL Adult or Child (e.g. elderly, debilitated or comorbid patients) – consider half dose.

- IM dose (5mg / ml ampoule): 0.1mg / kg to max of 5mg. Repeated **ONCE** 5 – 10 minutes later if the patient is still fitting.
- IV / IO dose (1mg / ml ampoule): 0.05mg / kg to max of 2.5mg. Repeated **EVERY** 5 – 10 minutes TO A MAXIMUM OF FOUR DOSES if the patient is still fitting.

If the patient has already been administered one full initial dose of a benzodiazepine (i.e. patient own buccal midazolam, Ambulance crew PR / IV diazepam) one further full subsequent dose of midazolam may be given.

CCPs should have a good understanding of both the pharmacodynamics of benzodiazepines and the pathophysiological processes of seizures and be aware of the decreased efficacy of benzodiazepines on GABA receptors the longer convulsions last.

In complex patients one dose may be administered whilst the CCP finds an appropriate opportunity to contact the duty senior on call clinician to discuss subsequent doses, a tailored care plan and triage.

Midazolam by IM route:

MIDAZOLAM SEIZURES : IM ROUTE 5mg/ml ampoule						
WEIGHT		**Initial Bolus dose 0.1mg/kg**	**VOLUME (5mg/ml ampoule)**	**DOSE INTERVAL**	**Total Max Dose**	**Max Volume**
6mths	**8kg**	0.5mg	0.1mls	5 - 10min	1mg	0.2mls
12mths	**10kg**	1.0mg	0.2mls	5 - 10min	2mg	0.4mls
18mths	**11kg**	1.0mg	0.2mls	5 - 10min	2mg	0.4mls
2yrs	**12kg**	1.5mg	0.3mls	5 - 10min	3mg	0.6mls

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3yrs	**14kg**	1.5mg	0.3mls	5 - 10min	3mg	0.6mls
4yrs	**16kg**	1.5mg	0.3mls	5 - 10min	3mg	0.6mls
5yrs	**19kg**	2.0mg	0.4mls	5 - 10min	4mg	0.8mls
6yrs	**21kg**	2.0mg	0.4mls	5 - 10min	4mg	0.8mls
7yrs	**23kg**	2.5mg	0.5mls	5 - 10min	5mg	1mls
8yrs	**26kg**	2.5mg	0.5mls	5 - 10min	5mg	1mls
9yrs	**29kg**	3mg	0.6mls	5 - 10min	6mg	1.2mls
10yrs	**32kg**	3.5mg	0.65mls	5 - 10min	7mg	1.3mls
11yrs	**35kg**	3.5mg	0.65mls	5 - 10min	7mg	1.3mls
40kg		4mg	0.8mls	5 - 10min	8mg	1.6mls
45kg		4.5mg	0.9mls	5 - 10min	9mg	1.8mls
50kg		5mg	1.0mls	5 - 10min	10mg	2mls
60kg		6mg	1.2mls	5 - 10min	12mg	2.4mls
70kg		7mg	1.4mls	5 - 10min	14mg	2.8mls
80kg		8mg	1.6mls	5 - 10min	16mg	3.2mls
90kg		9mg	1.8mls	5 - 10min	18mg	3.6mls
100kg		10mg	2mls	5 - 10min	20mg	4mls
110kg		10mg	2mls	5 - 10min	20mg	4mls
120kg		10mg	2mls	5 - 10min	20mg	4mls

Midazolam by IV / IO route:

MIDAZOLAM SEIZURES : IV / IO ROUTE 1mg/ml ampoule						
WEIGHT		**Initial Bolus dose 0.05mg/kg**	**VOLUME (1mg/ml ampoule)**	**DOSE INTERVAL**	**Total Max Dose**	**Max Volume**
6mths	**8kg**	0.25mg	0.25mls	5 - 10min	1mg	1mls
12mths	**10kg**	0.5mg	0.5mls	5 - 10min	2mg	2mls
18mths	**11kg**	0.5mg	0.5mls	5 - 10min	2mg	2mls
2yrs	**12kg**	0.75mg	0.75mls	5 - 10min	3mg	3mls
3yrs	**14kg**	0.75mg	0.75mls	5 - 10min	3mg	3mls
4yrs	**16kg**	0.75mg	0.75mls	5 - 10min	3mg	4mls
5yrs	**19kg**	1.0mg	1mls	5 - 10min	4mg	4mls
6yrs	**21kg**	1.0mg	1mls	5 - 10min	4mg	4mls
7yrs	**23kg**	1.25mg	1.25mls	5 - 10min	5mg	5mls
8yrs	**26kg**	1.25mg	1.25mls	5 - 10min	5mg	5mls
9yrs	**29kg**	1.5mg	1.5mls	5 - 10min	6mg	6mls
10yrs	**32kg**	1.5mg	1.5mls	5 - 10min	7mg	7mls
11yrs	**35kg**	1.75mg	1.75mls	5 - 10min	7mg	7mls

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	40kg	2mg	2mls	5 - 10min	8mg	8mls
	45kg	2.25mg	2.25mls	5 - 10min	9mg	9mls
	50kg	2.5mg	2.5mls	5 - 10min	10mg	10mls
	60kg	3mg	3mls	5 - 10min	12mg	12mls
	70kg	3.5mg	3.5mls	5 - 10min	14mg	14mls
	80kg	4mg	4mls	5 - 10min	16mg	16mls
	90kg	4.5mg	4.5mls	5 - 10min	18mg	18mls
	100kg	5mg	5mls	5 - 10min	20mg	20mls
	110kg	5mg	5mls	5 - 10min	20mg	20mls
	120kg	5mg	5mls	5 - 10min	20mg	20mls

Quantity to be administered and/or supplied	**IM dose:** required dose of midazolam to be drawn up from the 5mg / ml ampoule into a labelled syringe. The label should clearly show "IM only". A syringe cap should then be fitted. **IV / IO dose:** required dose of midazolam to be drawn up from the 1mg / ml ampoule into a labelled syringe. The label should clearly show the concentration. A syringe cap should then be fitted. After administration flush with 2.5-5mls.of 0.9% sodium chloride. All patients must be fully monitored including EtCO2, SpO2, ECG and BP. Resuscitation equipment must always be available and accompany the patient.
Maximum or minimum treatment period	IM route: to a maximum of 2 doses. IV / IO route: to a maximum of 4 doses. If the patient is still fitting after appropriate benzodiazepine dosing, consider second-line seizure treatment as per the CMP for seizures (i.e. phenytoin, keppra etc) whilst en route to hospital.
Administration details	Midazolam should be counter checked to ensure the medication being drawn up is midazolam, is the correct concentration (**IM** use 5mg / ml, **IV/IO** use 1mg / ml) and is in date. IV/IO Midazolam should be injected slowly over 30 seconds – 1 minute to avoid adverse effects.
Adverse effects Adverse effects should be reported via the	Adverse effect rates not known from available data. Refer to product data sheet for full details of reported adverse reactions. Generalised hypersensitivity reactions; anaphylactic shock Confusional state, euphoric mood, hallucination, delirium

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Yellow Card scheme, and via Datix (IRW	Paradoxical reactions e.g. agitation, involuntary movements, hyperactivity, hostility, rage reaction, aggressiveness Prolonged sedation, decreased alertness, somnolence Headache Dizziness Ataxia Anterograde amnesia Severe cardiorespiratory events have been reported, included cardiac arrest, hypotension, bradycardia, respiratory depression, apnoea, laryngospasm Nausea, vomiting, constipation, dry mouth Skin rash, urticarial, pruritis Fatigue, injection site pain/ erythema, thrombophlebitis
Record to be kept (*in cases where the patient lacks the ability to communicate or does not have capacity this may be omitted if reasonable efforts have failed to obtain this information)	• Record that valid, informed consent was given by the patient. • In cases where the patient lacks mental capacity, a record of how mental capacity was assessed and how the administration of this medicine was in the best interest of the patient. • CAD incident number. • *Patient's name, address, date of birth • *Contact details of GP (if registered) • Diagnosis or working diagnosis • Dose given and route given by • Batch number and expiry date of drugs given • Time of administration • Advice given to patient • Signature and name of staff who administered medication • Details of any adverse reactions and action taken Details must be stored on CCPbase including any Advanced Life Saving Interventions Procedure calls to the senior on call clinician.
Indicate any off-label use (if relevant)	Midazolam's use for seizures is supported by nationally recognised guidelines from JRCALC, the RAMPART study and other well established prehospital critical care systems.

Patient information

Written information to accompany the patient	The patient record must show: • Which medications have been administered. • The strength of medications administered. • The batch number of medications administered. • What time medications were administered.

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	• The effect (intended or unintended) of medications administered The patient record must demonstrate that informed patient consent has been gained. If the patient lacks mental capacity a record of how the administration of the medicine is in the best interest of the patient. In cases where the patient has mental capacity: • Consent had been gained for IV access and to administer medication. • The patient must be informed why treatment is required and what the intended effects of the medication are • Potential side-effects of the medication must be explained
Follow-up advice to be given to patient or carer	Patients who receive midazolam should be conveyed to the nearest appropriate facility or handed over to an enhanced care team who are able to manage a patient who has had midazolam administered. The receiving clinical team must be verbally informed and the patient record should clearly show: • At what time the patient had midazolam administered. • How much midazolam the patient has had administered. • Whether the patient had mental capacity and consented to treatment or whether the patient lacked capacity and was being treated in their best interest.

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Appendices

Appendix A Key references

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