

Conscious Sedation in Dentistry

A UK Perspective



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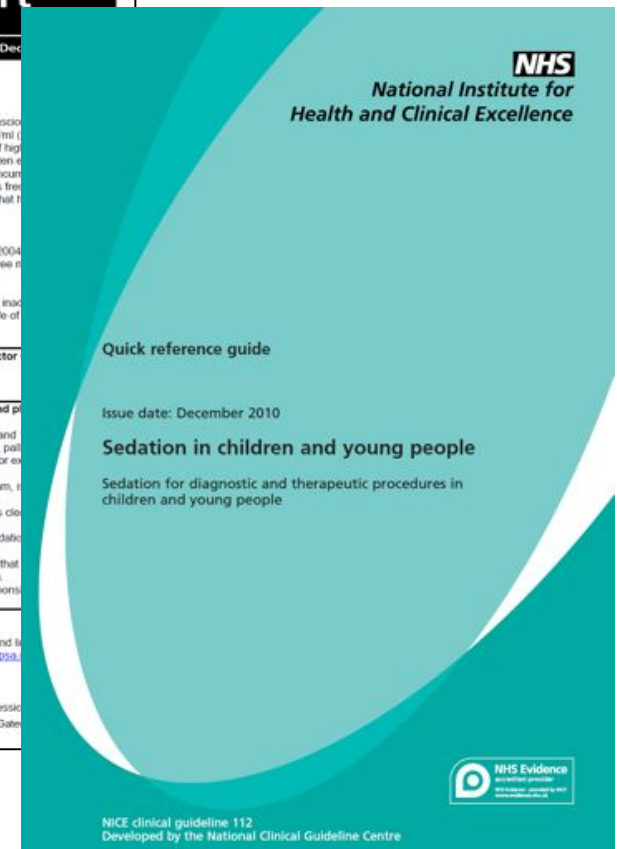
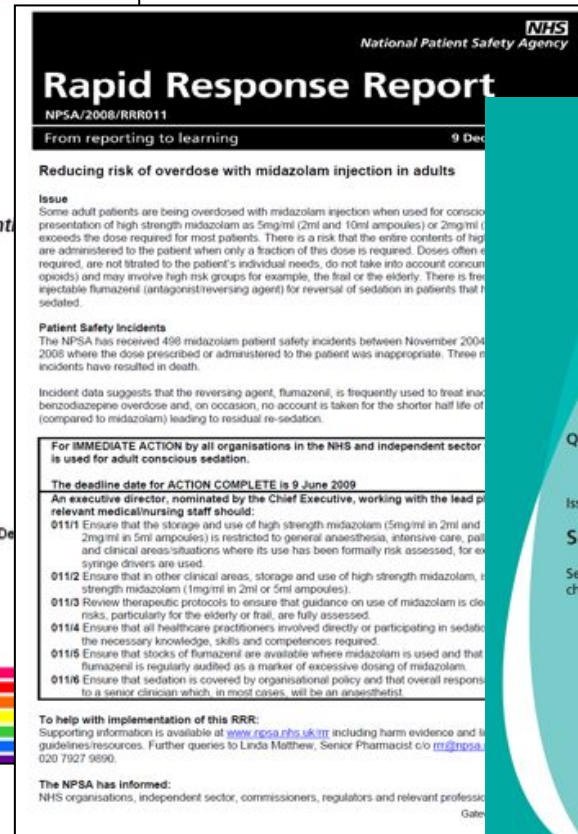
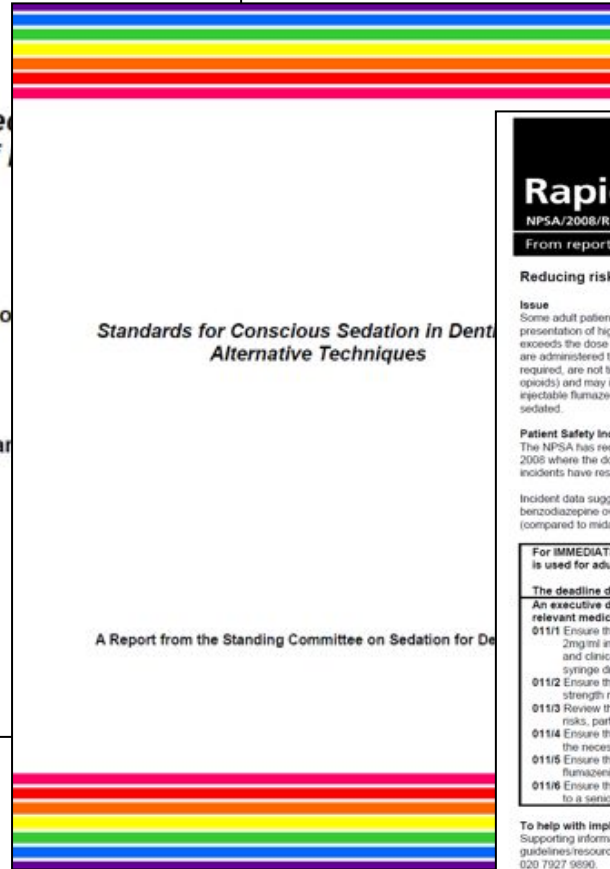
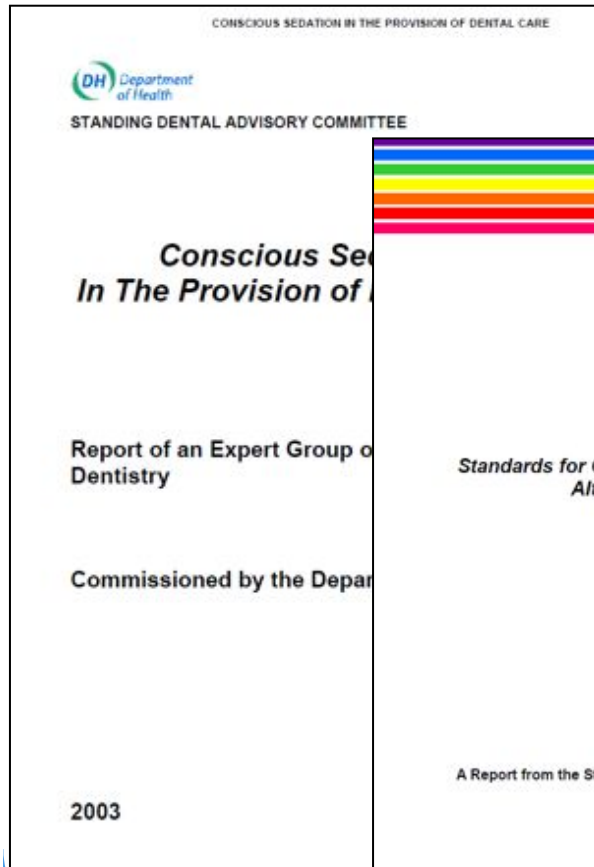


So what about our sedation practice?

- Guidance
- Training
- Techniques
- Research



GUIDELINES



Why We Need Guidelines

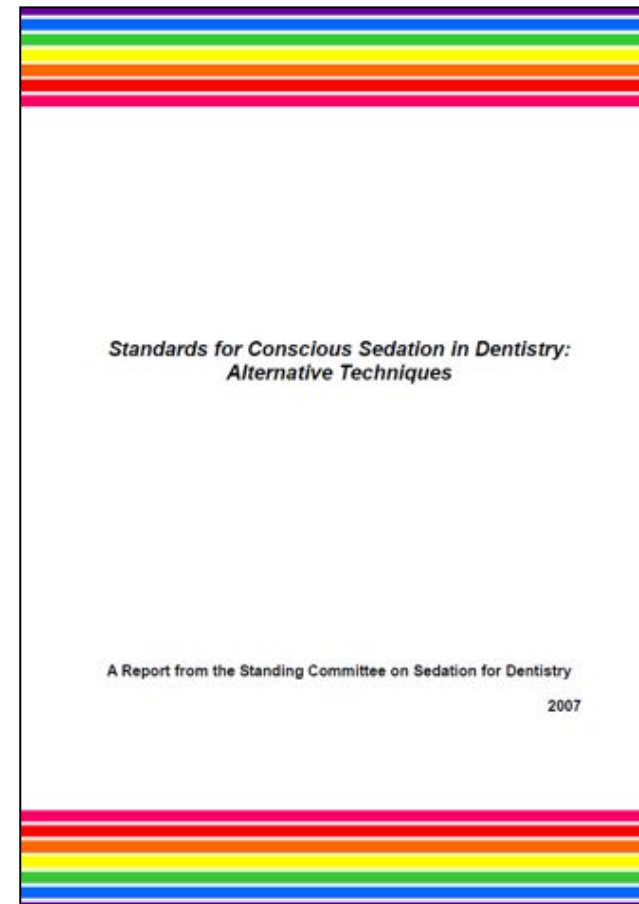
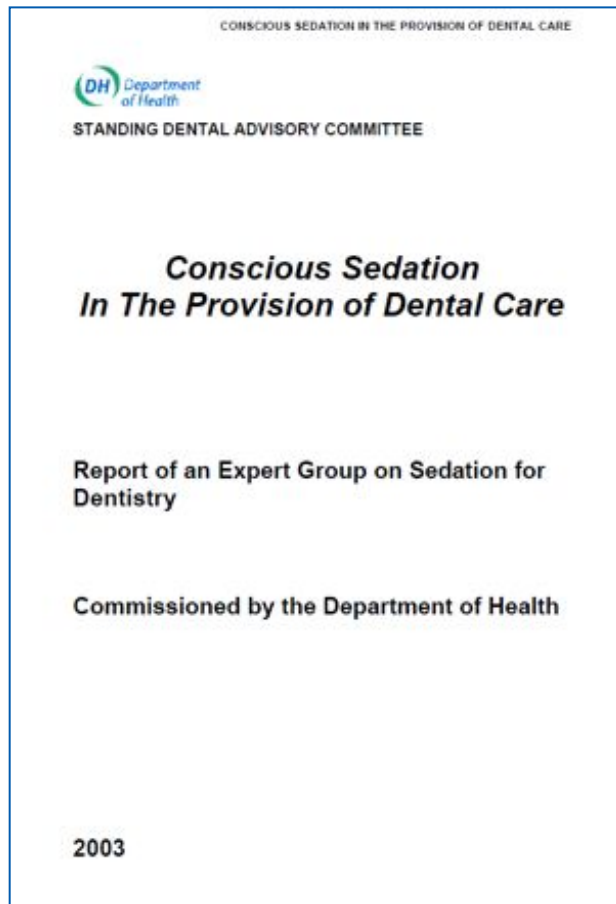
- To ensure the various techniques utilised continue to have a high level of safety and effectiveness
- Ensure the highest possible standards for our patients – as patients rightly expect
- Guide research and clinical governance

Who Do They Relate to

- **All** providers of *Conscious Sedation* for the provision of dental care in general dental practice, community and hospital settings



Current National Guidelines



Conscious Sedation is defined as:

‘A technique in which the use of a drug or drugs produces a state of depression of the central nervous system enabling treatment to be carried out, but during which verbal contact is maintained throughout the period of sedation. The drugs and techniques used to provide conscious sedation for dental treatment should carry a margin of safety wide enough to render loss of consciousness unlikely’

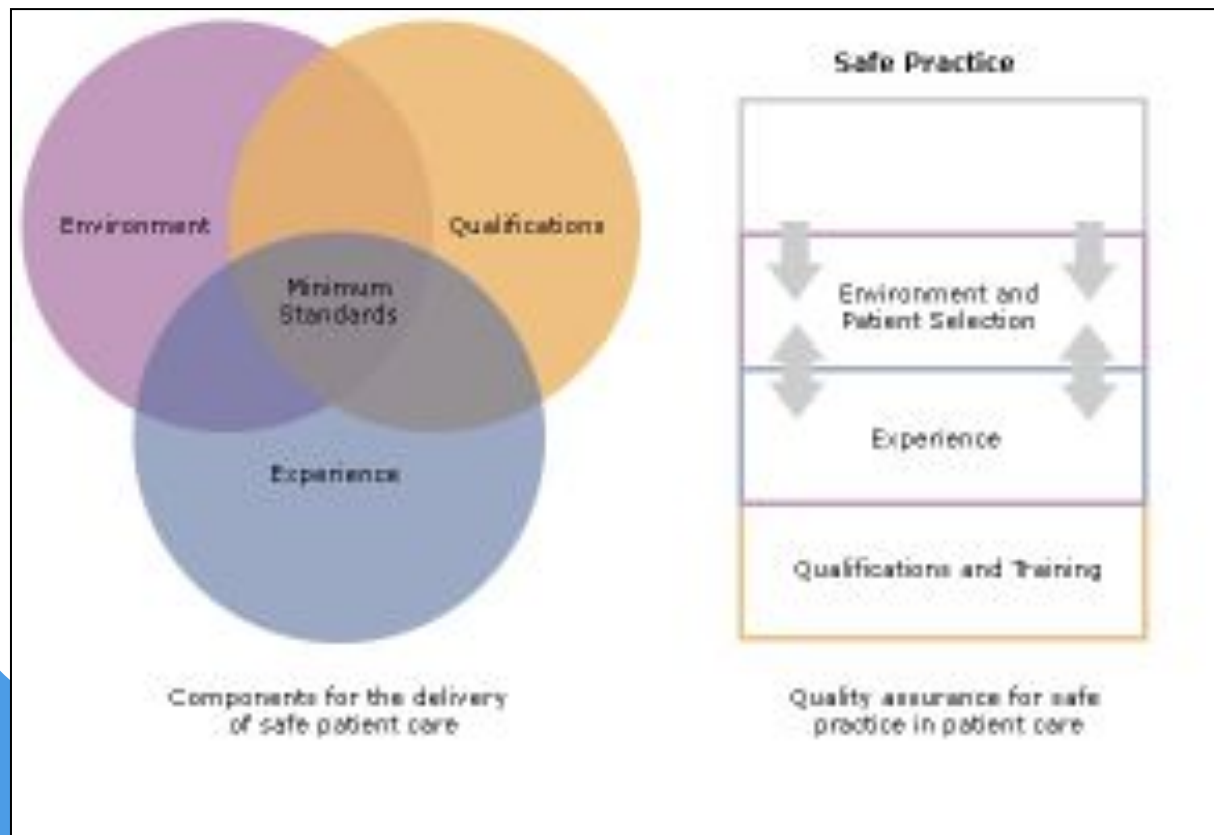
Important Note

- Any technique resulting in loss of consciousness is defined as general anaesthesia in the UK and is **not** acceptable under the guise of *conscious sedation* due to the risks to patient safety



Key Aspects of the Guidelines

- Delivery of safe patient care



These components together with:
CPD and Clinical audit
provide a dynamic
framework underpinning
safe practice

Patient selection to match
training and experience is
key for patient care

Areas considered in Guidelines

- **Techniques**
 - Standard and Alternative
- **Conscious Sedation in Children**
- **Environment and Equipment**
- **Management of medical emergencies**
- **Education and Training**
 - Theory
 - Practical element
 - Clinical skills
 - CPD

Standard Techniques

- Inhalation sedation with nitrous oxide and oxygen
- A titrated dose of midazolam alone for 12 year olds and older
- Midazolam combined with IHS for cannulation only (if continued strictly classed as alternative technique)
- Oral sedation*
- Transmucosal sedation*

— * **Where the practitioner is competent in IV cannulation**

Alternative Techniques

- Benzodiazepine plus any other IV agent e.g. Opioid, ketamine
- Continuous infusion of a drug or drugs e.g. propofol
 - should only be used in selected circumstances and restricted to an experienced practitioner and team in an appropriate environment



Conscious Sedation in Children

- Any one under 16 is for the basis of guidelines is classed as a child
- Should only be undertaken by teams with adequate training and experience
- Inhalational sedation with nitrous oxide/oxygen should be the first choice in paediatric dental patients.
- Some children irrespective of age may not be suitable for conscious sedation in which case general anaesthesia should be considered



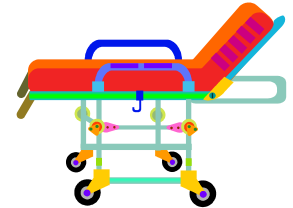
Intravenous Sedation in Children

- IV sedation may be indicated if Inhalational Sedation has been unsuccessful or the clinical team feel it is likely to be unsuccessful
- It requires additional training/experience in child sedation and use of IV drugs
- **Standards for Conscious Sedation in Dentistry: Alternative Techniques (2007)** now classifies patients above the age of 12 as coming under the “standard techniques umbrella” and it is up to the treating team to determine the most appropriate setting to manage the child on an individual basis



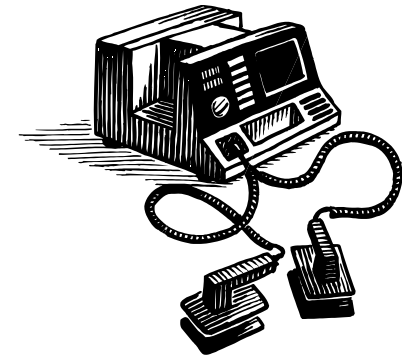
Environment & Equipment

- Appropriate waiting area, surgery and recovery facilities
- Operating chairs and trolleys must be capable of being placed in a head-down tilt position
- Appropriate drugs and kit for the type of sedation and monitoring
- Medical emergency and resuscitation equipment must be readily available



Management of Complications

- Requires the **whole** team to be:
 - Fully trained and able to manage medical emergencies
 - Appropriately trained and regularly rehearse emergency procedures including CPR and use of an AED
 - Dental sedationists and ideally DCPs trained in ILS (BLS for DCPs as a minimum)



Education and training

- **All** members of the dental team using *conscious sedation* should have received appropriate **supervised theoretical, practical and clinical training** before undertaking independent practice



Clinical Governance



- Good practice requires all professional clinicians monitor and maintain the quality of the care that they provide for their patients
- Attention must be given to risk awareness, risk control and risk containment
- Involves showing evidence of:
 - Active participation in continuing professional development (CPD)
 - Personal clinical audit

Summary

- To ensure the highest possible standards for our patients
- Developed nationally by dental bodies
- Importance of risk assessment
- Need for continual professional development



TRAINING AT NEWCASTLE

- **Dentists**
 - Undergraduate level
 - Postgraduate level
- **Dental Nurses**



Undergraduates

- Variable throughout UK
- Introduction to sedation
- Newcastle University
 - Series of lectures
 - Cannulation training
 - Week on IV Sedation clinic
 - Week on Inhalation Sedation clinic



Postgraduates

- **Core Sedation Course**
 - Provided by local deaneries
 - 2 days didactic teaching
 - 6 clinical sessions

- **Diploma**
 - 1 year
 - Didactic and clinical teaching
 - Academic component (50%)



Postgraduates

- **Masters**
 - Taught course
 - Research based

- **PhD**
 - Original research



Dental Nurses

- **Certificate in Dental Sedation Nursing**

- Gold standard
- Run by NEBDN
- Portfolio of experience
- Examination



- **In house training**

- In a suitable practice already offering a Conscious Sedation service at an acceptable level
- The onus is on the individual/employer to assess the adequacy of the training provided



STANDARD TECHNIQUES

- **Inhalation Sedation**



- **Intravenous Sedation**



Assessment

- All patients should be assessed prior to receiving sedation
- Assess need for and fitness for sedation
- Include
 - Dental History
 - Medical History
 - Social History
 - Vital signs
 - Consent
 - Pre and post op instruction



Inhalation Sedation

- Using nitrous oxide and oxygen
- Purpose designed sedation unit
- Main form of sedation for children (< 16 yr)
- Increase use in ASA III patients as a safe technique
- Service provision
 - Limited provision in GDS
 - Community Dental Service
 - Dental Hospitals



Intravenous Sedation

- Single drug technique – midazolam 5mg/5ml
- Administered by slow titration
- Dentist assisted by trained nurse
- Monitoring
 - Clinical
 - Oxygen saturation
 - Blood pressure
 - Heart rate
 - Respiration rate
- Discharge and Recovery





RESEARCH & AUDIT NEWCASTLE UNIVERSITY



Research & Audit - Why?

- Research allows an evidence base to be established
- Used to enable guidelines to be formulated
- Ultimately leads to most appropriate high standard of practice
- Continual monitoring of standards

Audit Topics



- **Complications associated with IV sedation**
- Knowledge of patient escorts
- Standard of referrals
- Record keeping
- Compliance with nitrous oxide levels
- Patient satisfaction

Complications Associated with IV sedation

- **Aim**
 - Prospective audit
 - Nature, frequency and sequelae of complications arising in dental patients receiving IV sedation.
- **Materials and methods**
 - All patients attending the Sedation Department at NDH for IV sedation
 - Six-month period
 - Pro forma to collect data relating to the:
 - Patient, Sedation episode, Dental treatment , Complications arising.
- **Standard**
 - The published standard used in this study states that the incidence of complications should be no more than 8%.

Complications Associated with IV sedation

- **Results:**

- 401 patients
- Mean dose of midazolam 7.6 mg
- Mean titration rate of 0.9 mg/min
- Complications were reported in 12 patients (3%), 11 of which were minor and one moderate.
- All complications were managed successfully within the department with no lasting sequelae.
- Treatment was completed in 382 (95.7%) patients, with failure to complete treatment in 17 (4.3%) patients due to disinhibition (1), poor cooperation (10), and the sedation wearing off (6).

Complications Associated with IV sedation

- **Conclusion:**
- The audit standard was met
- Complications were managed conservatively and effectively, with all patients being discharged home the same day with no lasting sequelae.
- The audit demonstrates that intravenous midazolam provides a safe sedation technique, suitable for adult dental patients in primary care, when administered by trained personnel on carefully selected patients and in accordance with nationally agreed protocols and guidelines.

Wilson KE, Thorpe RJ, McCabe JF, Girdler NM. Complications Associated with Intravenous Midazolam Sedation in Anxious Dental Patients. Primary Dental Care 2011(Oct): 101-106

Research Topics

- **Paediatric Sedation**

- Benzodiazepines

- **Adult Sedation**

- Propofol sedation
- Anxiety studies
- Capnography



PAEDIATRIC SEDATION RESEARCH

Intravenous ?



Inhalation ?



Transmucosal ?



Oral ?



Benzodiazepine Sedation in Paediatric Dental Patients

- Series of RCT studies (work commenced 2000) for PhD
- Comparing Inhalation Sedation and midazolam for orthodontic premolar extractions
 - Oral
 - Intravenous
 - Buccal
- Is midazolam sedation as safe and effective as inhalation sedation with nitrous oxide and oxygen?

Background

- **Sedation used extensively for dental procedures**
- **Safe alternative to GA**
- **Inhalation Sedation mainstay for children, but not for all**
- **A need to consider other forms of sedation**
- **Midazolam has favourable pharmacology**

Oral Midazolam

- **Prospective, randomised, crossover trial**
- **46 patients, aged 10 to 16 years, ASA I & II**
- **Referred for orthodontic extractions**
- **Two treatment sessions**
 - 2 extractions - oral midazolam sedation
 - 2 extractions - nitrous oxide sedation
- **Randomly allocated to receive nitrous oxide or midazolam at first visit**

Study groups

Oral Midazolam

- **Oral midazolam (0.5mg/kg) 45 minutes pre-op**
- **Monitored by sedation trained Dental Nurse**
- **Treatment carried out (LA & Extraction 2 premolars)**
- **Recovery for at least 20 minutes**
- **Discharged when fit**

Inhalation sedation

- **Nitrous oxide titrated 10% every minute (max 30%)**
- **Treatment carried out (LA & Extraction 2 premolars)**
- **Recovery for at least 20 minutes**
- **Discharged when fit**

Assessment

- **Vital signs – baseline/every 5 minutes**
 - BP, Pulse, Weight, Respiratory Rate, Oxygen Saturation
- **Level of Sedation**

1 – irritated & awake	2 – awake & calm
3 – tired, hardly moving	4 – drowsy, without reaction but rousable
- **Behaviour during treatment (Frankl Behaviour Rating Scale)**

1 – Refusal / Distress	2 – Uncooperative / Reluctant
3 – Cooperative / Reserved	4 – Interested / Enjoyed
- **Overall behaviour/treatment outcome (Haupt Scale)**

1 – Aborted	4 – Good
2 – Poor	5 – Very good
3 – Fair	6 – Excellent

Post-Operatively

- **Post-operative Questionnaire**
 - Recall of treatment
 - Same sedation again
 - Preference for sedation

Results

- **Lowest O₂ saturation**

- Midazolam = mean 94.4% (range 90-100%)
- Nitrous oxide = mean 97.6% (range 93-100%)

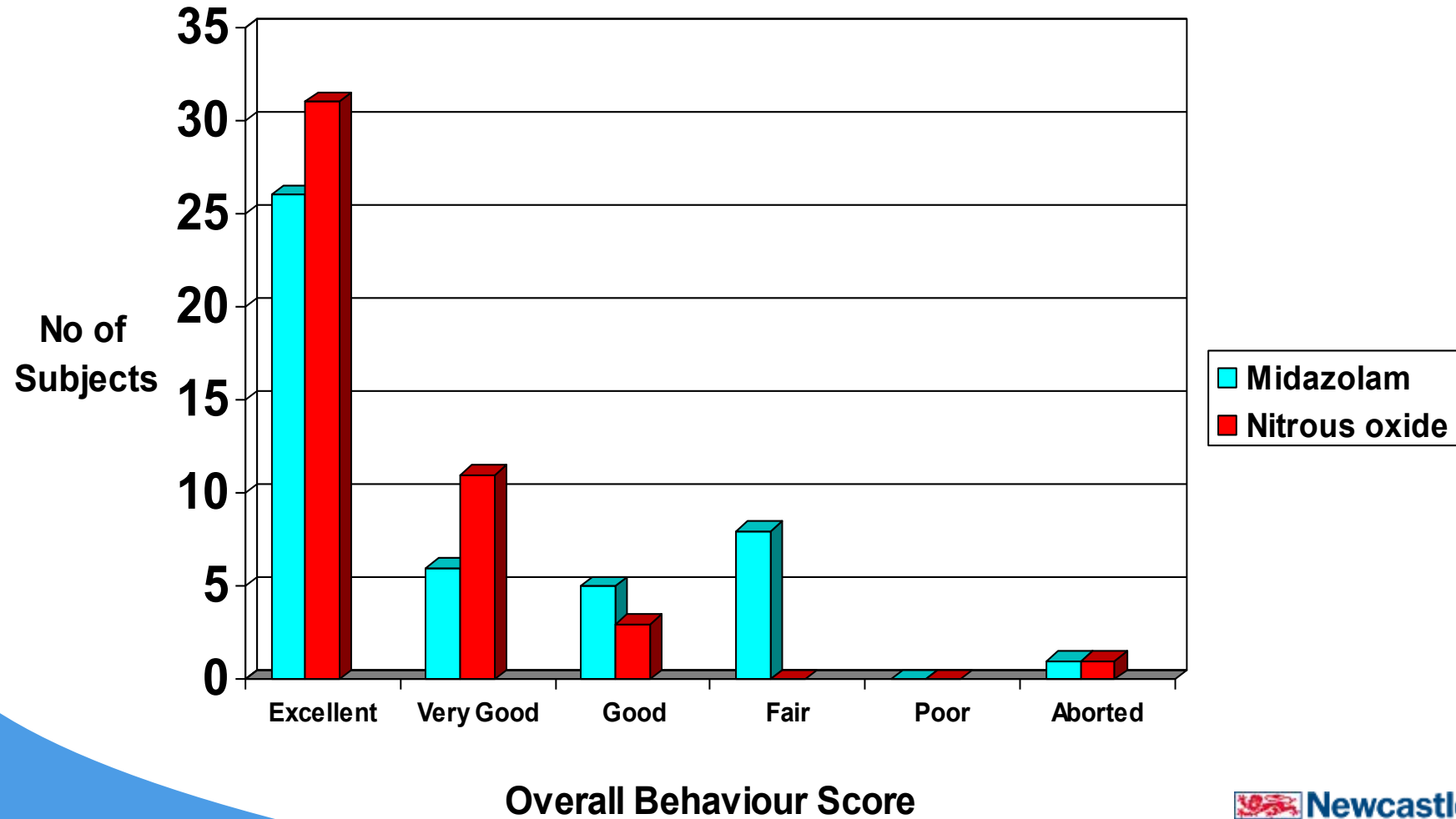
- **Time to Maximum Level of Sedation**

- Nitrous oxide = mean 5.8 mins (5-10 mins)
- Midazolam = mean 24.0 mins(5-65mins)**

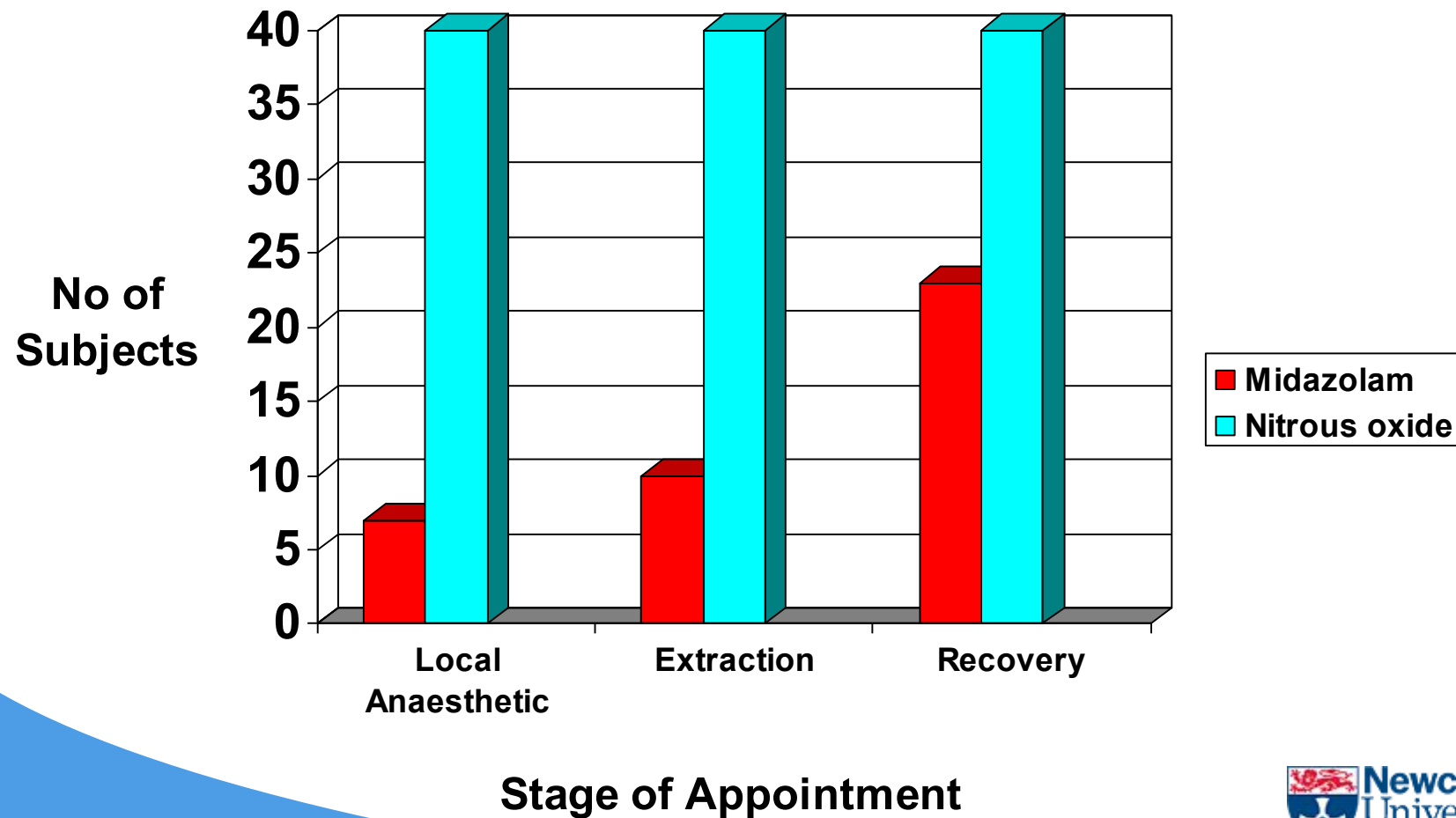
- **Time to Maximum Level of Sedation**

- Nitrous oxide = mean 5.8 mins (5-10 mins)
- Midazolam = mean 24.0 mins(5-65mins)**

Overall Behaviour



Positive Recall



Patient preference

- **74% would have midazolam again**
- **75% would have nitrous oxide again**
- **Comments**
 - Bitter taste, unpredictability
 - Amnesia, good level of sedation
- **Preference**
 - *54% preferred midazolam*
 - *44% preferred nitrous oxide*
 - *2% had no preference*

Conclusion

- Oral midazolam sedation (0.5mg/kg) appears to be a safe and effective form of sedation for 10 to 16 year old paediatric dental patients.

K E Wilson, R R Welbury, N M Girdler. A randomized, controlled, crossover trial of oral midazolam and nitrous oxide for paediatric dental sedation. *Anaesthesia* 2002,57;860-867

IV Midazolam

- **Prospective, randomised, crossover trial**
- **42 patients, aged 10 to 16 years**
- **Referred for orthodontic extractions**
- **Two treatment sessions**
 - 2 extractions - IV midazolam sedation
 - 2 extractions - nitrous oxide sedation
- **Randomly allocated to receive nitrous oxide or midazolam at first visit**
- **Assessment as for Oral midazolam**

Intravenous midazolam

- **Intravenous midazolam titrated at :**
 - 0.5mg/min (max 5mg)
 - 24 gauge cannula
- **Monitored by sedation trained Dental Nurse**
- **Treatment carried out (LA & Extractions)**
- **Recovery for at least 1 hour after last increment**
- **Discharged when fit**

Results

- **Lowest O₂ saturation**

- Midazolam = median 97% (range 91-100%)
- Nitrous oxide = median 97% (range 92-100%)

- **Time to Maximum Level of Sedation**

- Midazolam = median 8 mins(4-20 mins)**
- Nitrous oxide = median 6 mins (2-18 mins)

- **Total appointment time**

- Midazolam = mean 69.2 mins (65-80 mins) ***
- Nitrous oxide = mean 34.8 mins (25-50 mins)

Patient preference

- **80% would have midazolam again**
- **80% would have nitrous oxide again**
- **Preference**
 - *51% preferred midazolam*
 - *38% preferred nitrous oxide*
 - *11% had no preference*
- **Comments**
 - **Intravenous midazolam**
 - Feeling more relaxed
 - Not having mask
 - Sedation worked more quickly
 - **Nitrous oxide**
 - Wore off more quickly
 - Feeling relaxed but more aware

Conclusion

- Intravenous midazolam sedation titrated at 0.5mg/min (max 5mg) appears to be a safe and effective form of sedation for exodontia in 12 to 16 year old paediatric dental patients.
- KE Wilson, NM Girdler, RR Welbury. Randomized, controlled, cross-over clinical trial comparing intravenous midazolam sedation with nitrous oxide sedation in children undergoing dental extractions. *British Journal of Anaesthesia* 2003; 91(6): 850-6

Buccal Midazolam



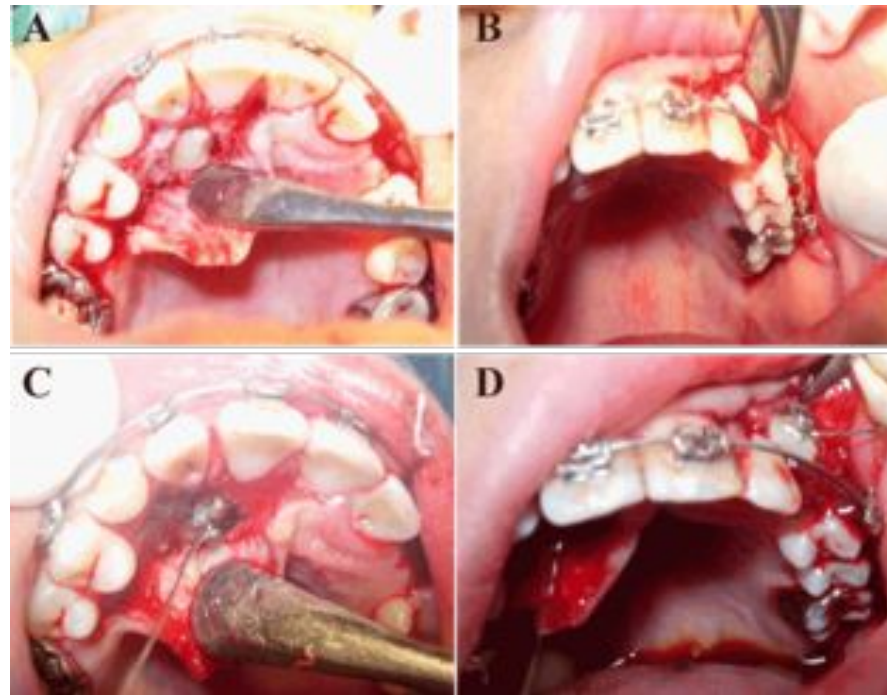
Wilson KE, Welbury RR, Girdler NM. Comparison of transmucosal midazolam with inhalation sedation for dental extractions in children. A randomized, cross-over, clinical trial. *Acta Anaesthesiol Scand* 2007;51:1062-1067

Limitations of Buccal Midazolam

- Not well tolerated in this form
- Some gets swallowed reducing accuracy
- BUT
- Onset more rapid than oral
- Further work on vehicle for the midazolam

Wilson KE, Welbury RR, Girdler NM. Comparison of transmucosal midazolam with inhalation sedation for dental extractions in children. A randomized, cross-over, clinical trial. *Acta Anaesthesiol Scand* 2007;51:1062-1067

IV midazolam for surgical orthodontic procedures



Case Series

- LA and IV midazolam sedation
- 11 to 15 year olds requiring surgical orthodontic procedures
- Retrospective review of patient records 2001 to 2004
- 107 patients required surgical orthodontic procedures
- 28 (26%) – IV sedation 79 (74%) – GA
- 25/28 IV sedation cases successfully completed treatment

Conclusion

- Based on this case review, IV sedation would appear to offer a safe and effective alternative to GA in this age group
- Patients must be appropriately selected
- The procedure must be carried out by an appropriately trained and experienced team.
- Further prospective case review and research is recommended

M L Dorman, K Wilson, K Stone, L F A Stassen. Is intravenous conscious sedation for surgical orthodontics in children a viable alternative to general anaesthesia? – a case review. *Br Dent J* 2007;202: E30



ADULT SEDATION RESEARCH

Propofol ?



Anxiety ?



Capnography ?



Acupuncture ?



Propofol

- **Aim:** To compare 'Patient controlled' and 'Operator controlled' propofol sedation
- Computerised pump system
- Patients maintain their own sedation level (Lock out system)



Propofol

- Appears to be a safe and acceptable form of sedation for dentally anxious patients
- May require less propofol compared to operator controlled sedation
- High level of satisfaction from dentist providing treatment
- NOTE: At present must only be used in secondary care setting in presence of an anaesthetist

Girdler NM, Rynn D, Lyne JP, Wilson KE. A prospective randomised controlled study of patient-controlled propofol sedation in phobic dental patients. *Anaesthesia* 2000; 55(4):327-33

MSc Studies



- **Capnography**
 - “A study to investigate the clinical significance of changes in End Tidal CO2 levels during IV sedation for oral surgical procedures”
- **Acupuncture**
 - “A prospective randomised controlled study in the use of acupuncture to supplement conscious sedation”
- **Anxiety**
 - “How do dentally anxious patients account for the onset of their dental anxiety?”
 - “A profile of patients attending a dental access centre”



Summary

To ensure high standards of sedation practice

- Guidelines
- Standard Techniques
 - Training
- Research and Audit



