

**NEPEAN BLUE MOUNTAINS  
LOCAL HEALTH DISTRICT**

**LEARNING PACKAGE  
FOR THE  
ADMINISTRATION OF  
PROCEDURAL SEDATION  
IN THE  
CARDIAC CATHETER LAB**

Compiled By  
April 1 1998  
M. Owens, CNE, Cardiology  
E. Dodd, CNS, Medical Imaging

Revised & updated by S. Verhoeven NUM CCL  
March 2011

## CONTENTS

---

1.	Introduction	3
2.	Goal and Goal Outcomes	4
3.	Library Search	5
4.	Short Answers	8
5.	True/False Questions	9
6.	Multiple Choice Questions	11
7.	Case Studies	13
8.	Airway Management	19
9.	Nursing Assessment	20
10.	Evaluation	24
11.	Conclusion	25
12.	References	26

Created by Elizabeth Dodd

## **INTRODUCTION**

This learning package has been implemented for registered nurses who, in the course of their practice, are required to deliver intravenous sedation either bolus or infusions of Midazolam and Fentanyl for investigative procedures being conducted in their departments.

This self-directed package comprises both a theoretical and practice component and practical assessment. Competency needs to be achieved in the practical assessments on pages 19-23. Benner (1984 p. 25,26) states that competency develops when the nurse begins to see his or her actions in terms of long range goals or plans for which he/she is aware, so revealing an ability to prioritise care.

All registered nurses in those departments where intravenous sedations of Midazolam and Fentanyl are administered will be required to complete both the theoretical and practical components. In order to assist you complete the questions on pages 6-18 the texts recommended on page 5 may need to be referred to.

It is envisaged that this learning package will enable the participants to meet the goal and goal outcomes as set out on pages 4 and 19. At the successful completion of this package your name will be placed on the Sedation Register.

Bon Voyage and Good Luck!

**GOAL AND GOAL OUTCOMES****GOAL:**

To increase the working knowledge for registered nurses in the administration of the intravenous sedation of Midazolam and Fentanyl.

**GOAL OUTCOMES:**

At the completion of this package it is anticipated that, the participant will be able to:

- Review current knowledge in relation to Midazolam and Fentanyl.
- Develop and advance knowledge of these sedations in order to integrate it into current practice.
- Demonstrate competent nursing practice based on knowledge gained.
- Evaluation (on completion) of the knowledge gained and the relevance of integration into clinical practice.

## **LIBRARY SEARCH**

In order to assist you complete this package a number of references are provided below. By requiring you to conduct a library search, it is envisaged that you will become more familiar with the library and enhance your library skills. Some of these texts may also be found in your department.

### **Recommended Texts**

- Aitkenhead,A. Rowbotham,D. Smith,G. (2001)  
*Textbook of Anaesthesia* Harcourt Publishers Ltd
- Australian & New Zealand College of Anaesthetics (2002) *Guidelines on Conscious Sedation for Diagnostic, Interventional Medical & Surgical Procedures*  
<http://www.anzca.edu.au/publications/profdocs/prostandards/ps92001htm>.
- *Drug Protocol Manual for Medical Imaging* (2002)  
The Nepean Hospital.
- Hardman, J., Limbird, L., Melinoff, P., Rudden, R., and Gilman, A., (Eds.). (1996)  
*The Pharmacological Basis of Therapeutics* (9th ed.) U.S.A.: McGraw -Hill Companies.
- Hien, C., Hart, G., Thomson, K., and Hennessy, O., (1995), Analgesia and sedation in international radiological procedures, in *Australian Radiology Journal*, (39), pp. 128-13
- Mins Annual
- Shelley,Marie,P. (1995) *Assessment of Sedation in Sedation & Analgesia in the Critically Ill*\_ed Park & Sladen 51-61. Hoffermann-La Roche Ltd, Basal, Switerland
- Whitwam,, J., (Ed.). (1994), *Day-Case Anaesthesia and Sedation*. Oxford: Blackwell Scientific Publications.

**SHORT ANSWERS**

This section consists of a series of short answers that will test your current knowledge base, and relates to the first part of your goal outcome on page 4.

Your answers should be brief and written in the space provided below for each question.

1. State ONE major point for BOTH Midazolam and Fentanyl in each of the following:

**Mode of action:**

Fentanyl\_\_\_\_\_

Midazolam\_\_\_\_\_

**Contraindication for use:**

Fentanyl\_\_\_\_\_

Midazolam\_\_\_\_\_

**Adverse reactions:**

Fentanyl\_\_\_\_\_

Midazolam\_\_\_\_\_

**Precautions:**

Fentanyl\_\_\_\_\_

Midazolam\_\_\_\_\_

**Half-life:**

Fentanyl\_\_\_\_\_

Midazolam\_\_\_\_\_

**Short Answers Cont,**

2. Define the term 'sedation'

---

---

3. Differentiate between light and heavy sedation:

---

---

---

---

4. Name the antagonists for the sedation agents mentioned in question 1.

---

---

5. State the indications for the use of one of those antagonists, and for which sedative agent is it used?

---

6. What are the nursing implications in relation to the use of intravenous sedation?

---

---

---

---

---

**SHORT ANSWERS (Cont'd)**

7. Identify the observations that are necessary when administering these intravenous sedations and explain why.

---

---

---

---

---

8. Name three (3) causes of changes in haemodynamic status that will adversely affect a patient who is receiving those sedations.

---

---

---

9. A 75kg man undergoing a short EPS procedure requires a bolus dose of Midazolam of.....mg over..... mins if his age is 70 years. This is followed by a bolus of Fentanyl of.....mcgs over .....mins. Where an infusion is required the maintenance dose of.....mgs/hr for Midazolam is administered and for Fentanyl.....mcgs/hrs in order to obtain a sedation level of 2 or where the patient is rousable and responds to verbal commands.



**TRUE/FALSE QUESTIONS**

This section consists of 14 true/false questions and relates to the testing of current knowledge and the development of new knowledge. You are required to indicate by a tick () whether you consider these statements true or false.

1. Patients should be nil by mouth 4-6 hours prior to giving conscious sedation.  
True   False
  
2. Clear fluids can be ingested up to two Hours prior to procedure.  
True   False
  
3. Infusions of Midazolam and Fentanyl can be delivered via the same IV cannula providing the connection is at the cannula site.  
True   False
  
4. Midazolam is a short acting benzodiazepine.  
True   False
  
5. Loss of Consciousness due to sedation has the same risk as General Anaesthesia  
True   False
  
6. Sedation Nurse is allowed by Australian & New Zealand College of Anaesthetists to have a Dual role of sedating and scouting  
True   False
  
7. Naloxone administration may cause cardiac arrhythmias.  
True   False
  
8. Fentanyl is an analgesic, 10 times more potent than morphine sulphate.  
True   False

**True/false cont**

9. Naloxone duration of action is the same as most opioid therefore re-sedation cannot happen.
- True False
10. Naloxone's half-life is 1 hour.
- True False
11. Anexate is metabolised in the liver and its half-life is 1 hour.
- True False
12. Naloxone when given intravenously has a rapid onset of action, which occurs within five minutes.
- True False
13. When the patient becomes apnoeic and does not respond to verbal commands, an intravenous bolus dose of anexate 0.2mgs should be given.
- True False
14. Dose of 0.2mgs Anexate can be given repeatedly as it does not have a maximum dose
- True False

## MULTIPLE CHOICE QUESTIONS

This section contains 6 multiple-choice questions. It is proposed that these questions will assist you in developing your knowledge in regard to the intravenous sedations in this package. You are required to indicate your choice of correct answer for each question below.

1. Opioid can cause
  - a. Respiratory depression
  - b. Bradycardia
  - c. Muscle rigidity
  - d. a and b
  - e. All of the above
  
2. Fear of a procedure can cause which of the following.
  - a. Hypertension
  - b. Arrhythmias
  - c. Hyperventilation
  - d. a and c
  - e. All of the above
  
3. Benzodiazepines can cause:
  - a. Apnoea
  - b. Hypotension
  - c. Amnesia
  - d. a and b
  - e. All of the above
  
4. Midazolam's action is:
  - a. Amnesic
  - b. Hypnotic
  - c. strong Analgesic
  - d. a and b
  - d. All of the above

**MULTIPLE CHOICE QUESTIONS (Cont'd)**

5. Which of the following statements are correct.  
(you can mark more than one)

- a. All patients undergoing conscious sedation must have oxygen therapy.
- b. Midazolam can adversely increase agitation. The nurse is allowed to continually give extra bolus doses til agitation stops
- c. Midazolam is a long acting benzodiazepine
- d. Midazolam penetrates the brain rapidly with peak effect at 2-5 minutes.

6. There is a diminished E.T.CO<sub>2</sub> trace on the monitor.  
What ought to be your first action? List in order of  
priority

- a. Check the position of the probe in case the  
Patient is mouth breathing. ....
- b. Check that the SaO<sub>2</sub> probe is monitoring  
above 95% .....
- c. Check the patients airway and respiratory rate  
.....
- d. Instruct the patient to breath up.  
.....
- e. Check the respiratory rate on the monitor  
.....

**PROGRESSIVE CASE STUDIES (CARDIAC CATH LAB)**

These case studies, which are presented in the form of a scenario, is aimed at demonstrating how your knowledge has developed so far, in relation to Midazolam and Fentanyl and their antagonists, is integrated into your current clinical practice.

By completing this section it is envisaged that your knowledge will be advanced further, therefore, enhancing the development of competent nursing practice in this highly specialised field.

Mr. Smith, a 54-year-old executive admitted with alcoholic cardiomyopathy. He is booked to have a Bi Ventricular pacemaker insertion. His weight is 84kgs and peak flow is less then 50% of predicted value for his age group. You take note of his history, elevated liver function blood tests, and assess his condition. You are required to prepare Midazolam and Fentanyl for administration of bolus doses.

1. What should you consider when asked to give sedation to Mr Smith due to his diagnosis, the metabolism and the action of fentanyl and midazolam.

---

---

---

2. What would your next step be ?

---

---

---

Mrs Reynolds is a 52-year-old woman with a history of breast cancer, and has been having palpitations for the past 6 months. She has been booked in for an EPS  $\pm$  RFA. Her weight is 73 kilos and peak flow is 50% of predicted values for her age group. She is placed on the angiogram table and monitored for ECG, heart rate, B/P, SaO<sub>2</sub>, ETCO<sub>2</sub> and respiratory rate. You are required to administer conscious sedation

1. What are the standard infusion pump syringe doses drawn up and where did you find this information?

Midazolam \_\_\_\_\_

Fentanyl \_\_\_\_\_

2. What would be the bolus doses over 5 minutes ordered by the doctor via the syringe pump for Mrs Reynolds?

Midazolam \_\_\_\_\_

Fentanyl \_\_\_\_\_

3. State why the bolus dose should be given over five minutes.

\_\_\_\_\_  
\_\_\_\_\_

4. What would be the infusion rate of Fentanyl and midazolam ordered by the doctor for Mrs Reynolds?

\_\_\_\_\_  
\_\_\_\_\_

5. Mrs Reynolds less than 50% peak flow value would necessitate what action?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PROGRESSIVE CASE STUDY (Cont'd)**

6. You are documenting five (5) minute observations and twenty minutes into the case you notice her BP has dropped gradually from 130/84 to 90/50. What could be the rationale for this and what interventions should be taken? Give your rationale.

---

---

---

---

7. You observe that the  $S_aO_2$  waveform flattens and the  $O_2$  percentage figure drops to zero each time the BP cuff functions. Identify the cause. What interventions do you take?

---

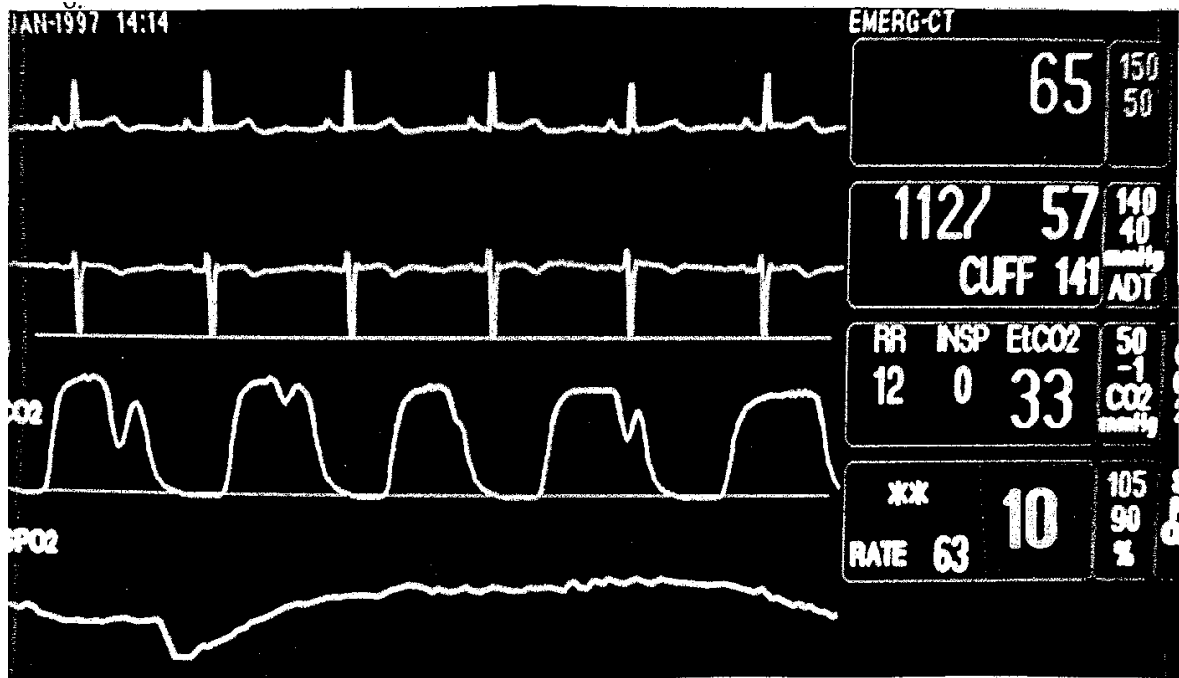
---

---

**PROGRESSIVE CASE STUDY (Cont'd)**

Questions 8 and 9 require you to look at the illustrations, interpret the waveforms and state what actions you would take, if any. You are required to state rationale for any actions you feel are necessary.

8.



Interpretation:

---



---

Actions:

---



---

Rationale:

---



---



PROGRESSIVE CASE STUDY (Cont'd)

9.



Interpretation:

---



---

Actions:

---



---



---

Rationale:

---



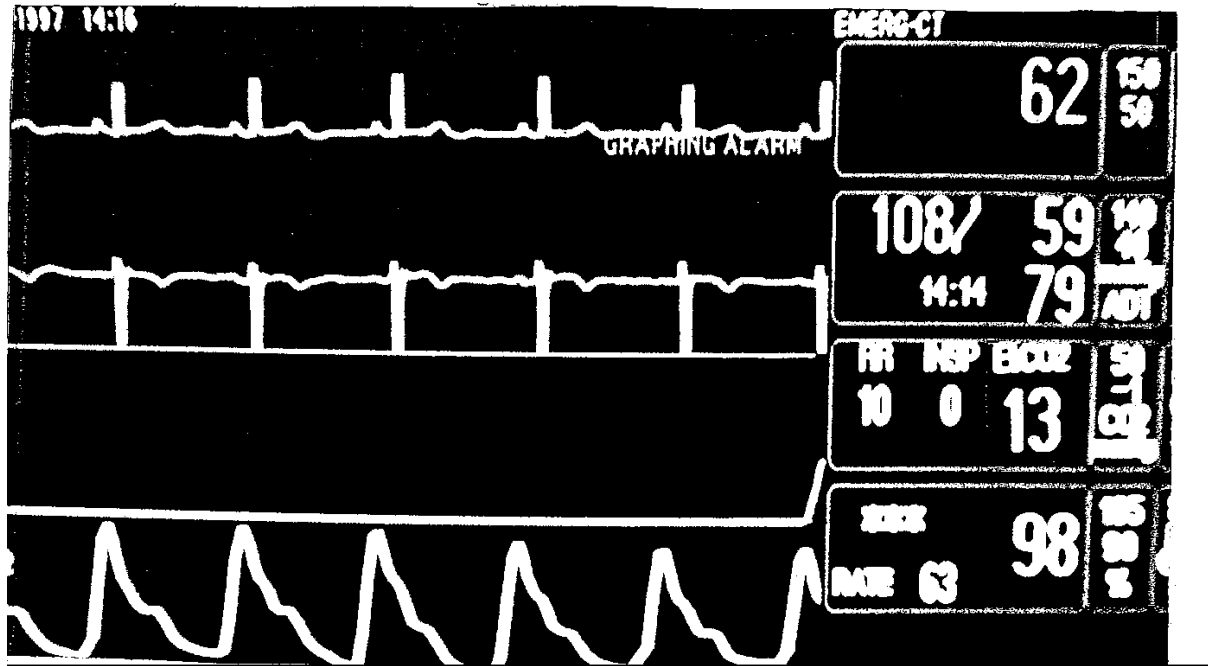
---



---

**PROGRESSIVE CASE STUDY (Cont'd)**

10. During the procedure the patient becomes unresponsive to verbal commands and you notice the following waveforms.



10. What is your response? Prioritise your actions.

---



---



---



---

11. The patient remains unresponsive, her ETCO<sub>2</sub> drops to 5 and her respiratory rate to zero. Give a rationale for your actions and prioritise your care.

---



---



---



---

## **AIRWAY MANAGEMENT**

It is proposed that a minimum of four (4) hours of airway management experience be obtained in the clinical setting of Cardiac Cath Lab general anaesthetic list on Tuesday afternoon, with the supervision of the anaesthetic nurse and anaesthetist, in order for participants to complete this package.

Airway management forms a vital aspect of nursing practice in the administration of these intravenous sedations. The following goal and goal outcomes have to be met in order to ensure the nurse is competent to deliver effective nursing care.

### **GOAL:**

To develop airway management skills in order to provide competent nursing care during administration of intravenous sedations of Midazolam and Fentanyl.

### **GOAL OUTCOMES:**

At the completion of this session it is anticipated that the participant will be able to:

- Identify Guedel airway, Laryngeal mask and select correct size.
- Identify adult endotracheal tubes.
- Give a rationale for the use of Guedel airway and endotracheal tubes & Laryngeal masks
- Assist with airway management using a resuscitator bag.
- Demonstrate an effective seal using a mask.
- Explain the mechanism of airway management.

Supervisors' Signature	Date
------------------------	------

**PATIENT SEDATION NURSING ASSESSMENT.** (Medical Imaging)

Approved assessors for this section are:  
 Nurse Educator for the department.  
 Clinical Nurse Specialist

1. Correctly identifies drug dosage per oral orders by Medical Officer.
2. Checks oral order with medical officer and second nurse.
3. Identifies need for Anaesthetist to deliver sedation to patient if:
  - Peak flow <50% of expected.
  - Patient age (this is at the Medical Officer's discretion).
4. Checks patient identification with armband.
5. Checks allergies with patient.
6. Explanation of procedure to patient.
7. Monitors patient appropriately:
  - Sets and enables alarms.
  - Cardiac monitor.
  - Oximetry.
  - Capnography.
  - Oxygen at 6L/H via Hudson mask.
8. Flushes cannula to check patency.
9. Baseline observations taken prior to procedure.
10. Informs patient when commencing sedation.

Competency Endorsed	
Date:	Initial:

| |

**Competency Endorsed****Date:****Initial:**

11. Commences bolus dose No. 1 at time and dosage designated by Medical officer, followed by bolus dose No. 2 after first bolus infusion completed in 5 minutes.
12. Monitors and documents patient response:
  - Conscious level.
  - Haemodynamic status.
13. Documents observations at 5 minute intervals for 30mins, then 10mins if patient stable
14. Delivers incremental doses where further sedation is required.
15. Maintains sedation level:
  - titrate incremental doses according to level of consciousness required.
16. Assesses patient for complications i.e. airway obstruction and manages appropriately.
  - Chin lift
  - Jaw thrust
  - Guedel airway
  - Laerdal resuscitator
17. Is aware of changes in haemodynamic status and manages appropriately.
  - Notifies Medical Officer
  - Use of reversal drugs

**TROUBLESHOOTING.**

The assessor may select any two of the following to verbally assess the participant's knowledge in relation to troubleshooting.

1. Monitor malfunctioning.
  - a) Inappropriate alarms:
    - Checks alarm parameters.
    - Re-alarm monitor.
  - b) No trace:
    - Checks nasal probe.
    - Checks patient is breathing.
    - Checks ECG leads/dots.
    - Checks that equipment is working.
    - Monitor turned on?
2. Recognition of and appropriate actions for changes to waveforms.
  - a) Diminished SaO<sub>2</sub>:
    - Poor trace.
    - Poor circulation.
    - Probe dislodged.
    - Change probe to another site.
    - Select limb site where there is no blood pressure cuff.
  - b) Diminished ETCO<sub>2</sub>:
    - Hypoventilation.
    - Probe dislodged.
    - Mouth breathing.
    - Instructs patient to breath

Competency Endorsed	
Date:	Initial:

**Competency Endorsed****Date:****Initial:**

- c) High ETCO<sub>2</sub>:
- Over sedated.
  - Sleep apnoea.
  - Respiratory disease.
  - Instructs patient to breath.
3. Identifies changes in patient's hemodynamic parameters.
- a) Arrhythmias/Bradycardia  
Drug induced:
- Fentanyl
  - Midazolam
- b) Tachycardia:
- Anxiety
  - Pain/discomfort
  - Shock
- c) Hypotension:  
Drug induced:
- Midazolam
  - Fentanyl
  - Other factors:
    - Depleted intravascular volume
    - Nausea and vomiting

**ASSESSED R.N.:** \_\_\_\_\_**ASSESSOR R.N.:** \_\_\_\_\_ **DATE:**

\_\_\_\_\_

Adapted from Clinical Competencies. Greenlane Hospital, New Zealand

## EVALUATION

We invite your participation in this evaluation and seek constructive comments on how best we can improve this self-directed learning package.

- Has this package enabled you to meet the goals and goal outcomes as set out on pages 4 and 19. If not why not?
  
- Is there an aspect or aspects of this learning package that you consider needs changing? Give your reasons please.
  
- Overall has this package been beneficial in improving you standard of nursing care?



## CONCLUSION

Congratulations on completing this self-directed learning package and evaluation. We trust that this has been a valuable learning experience for you and that it provides you with the confidence and assurance in providing competent nursing care for those patients receiving intravenous sedations of Midazolam and Fentanyl.

Expectations are that having completed this package and achieved a satisfactory assessment, you will maintain a competent standard of nursing practice for yourself and continually review the standard of nursing practice in others, who are also on this register. Reassessment is by way of ongoing Peer Review, literature review and reflection on your own practice.

Registers should be kept in unit areas with evidence of successful assessment sent to Staff Education Department for name and date of assessment to be placed on computer.

**REFERENCES**

Aitkenhead,A. Rowbotham,d. Smith,G. (2001)  
Textbook of Anaesthesia Harcourt Publishers Ltd.

Australian & New Zealand College of Anaesthetics (2002)  
Guidelines on Conscious Sedation for Diagnostic, Interventional Medical & Surgical Procedures  
<http://www.anzca.ed.au/publications/profdocs/prostanards/ps92001htm>.

Benner,P. (1984) From Novice to Expert. Menlow Park California. Addison - Wesley

Drug Protocol Manual, Medical Imaging (2002)  
The Nepean Hospital.

Foster,F. (2000) Conscious Sedation.....coming to a unit  
Near you Nursing Management,(Chicago)31,4,45,48-52

Greenland Hospital. New Zealand. Clinical Competencies.

Gookman & Giolman's (1996) The Pharmacological Basis of Therapeutics, (9th ed).

Hardman,J. Limbird,L. Melinoff,P. Rudden,R. & Gilman,A.  
(1996) The Pharmacological Basis of Therapeutics(9<sup>th</sup> ed)  
McGraw – Hill Companies U.S.A.

Hiew, C., Hart,, G., Thomson, K., Hennessy, O., (1995). Analgesia and sedation in interventional radiological procedures. Australian Radiology Journal (39) p.128-134.

**REFERENCE LIST cont.**

Kost,M. (1999) Conscious Sedation; guarding your patient against complications.  
Nursing,29,4,34-40

Martindale, the Extra Pharmacopoeia (31st ed.).

Mins Annual

Nagoulhout,J. Zaglaniczny,K. (2001) Nurse Anaesthesia  
WB Saunders Company

Shelly,Marie,P. Assessment of Sedation in  
Sedation & Analgesia in the Critically Ill ed Park & sladen, 51-61. Hoffmann-La  
Roche Ltd Switerland.

Whitwam, J., (Ed.) (1994), Day-Case Anaesthesia and Sedation. Oxford:  
Blackwell Scientific Publications.

