A comparison of sleep assessment tools by nurses and patients in critical care

ABSTRACT

Aim: The aim of this Critical Care Sleep Assessment pilot study was to evaluate the usefulness of three sleep assessment tools to identify which, if any, provided the closest comparison between the nurses' judgement and the patients' experience of their sleep.

The study objectives were to:

- Compare patients and nurses assessment of sleep using three different rating tools.
- Ascertain patients' preferences with non-interventional, user friendly, practical tools in critical care.
- Recommend changes and improvements to the way that sleep is assessed and documented.

Background: Sleep is important for promoting critical care recovery and sleep disturbance is known to cause irritability, aggression and increased stress levels. The availability and use of valid critical care sleep assessment tools is limited.

Design: A descriptive comparative study using three sleep assessment-rating scales were constructed to provide easy to understand tools for completion by both patients and nurses in critical care.

Methods: Structured interviews were undertaken with 82 patients and 82 nurses using a convenience sample from four multi-specialty critical care units in one large teaching trust. Patients were included in the study if they met a list of pre-defined criteria to obtain responses from lucid orientated patients.

Results: No tool produced a close association between the nurses' assessment of the patients sleep and the patients' assessment of their sleep. Patients found two of the three tools easy to use when rating their sleep.

Discussion: Objective invasive measurements of sleep as well as complex subjective tools appear inappropriate to be used as a part of daily critical care practice. The application of simple rating scores has a high degree of error when nurses assess patients' sleep, even though high levels of patient observation and assessment are practised in critical care.

Conclusions: More research is needed to examine the assessment of sleep in critical care, particularly linking rating scales to alternative methods of physiological assessment of sleep. Finding indicates nurses are unable to accurately assess critical care patients' sleep using rating assessment tools. However patients were found to prefer two sleep assessment tools, one banded in hours to assess sleep quantity and one as a comparison against normal sleep to assess sleep quality.

INTRODUCTION

Sleep is important for promoting hospitalised patients recovery (Richards 1998). It is well recognised that the disturbance of sleep is detrimental to patients with an acute illness (Aurell & Elmqvist 1985, Perez de Ciriza 1996, Soehren 1995, Wilson 1987) and sleep disturbance may have long-term effects on health outcomes and patient's morbidity (Tamburri *et al* 2004). Specifically within intensive care many studies have identified that critically ill patients' report sleep disturbance as one of the biggest causes of stress (Aurell and Elmqvist 1985, Perez de Ciriza 1996, Soehren 1995, Wilson 1987).

Many diverse methods are available to measure and assess sleep in hospitalised acutely ill patients. The most reported methods are polysomnography, actigraphy, self-report, observation, sleep charts and interviews (Closs 1988, Redeker 2000). Despite tools being available, an informal review by the research team of sleep assessment practices within four critical care areas found sleep assessment was often undertaken in an unsystematic manner. Nurses' assessment of patients' sleep was regularly based on their own interpretation of the patients sleep occasionally supplemented by asking the patient. Only one of the four critical care units informally reviewed had an available sleep assessment tool, which had been designed at a local level. This tool was designed for nurses to measure periods (in minutes) when patients' eyes were shut to judge sleep, without directly measuring or asking patients about their sleep.

The purpose of this paper is to review the literature to examine available sleep assessment tools and to present a research study to test and identify the most effective tool for assessing sleep within a critical care environment.

Why Sleep is important?

Sleep is a physical need for all humans. Sleep quality is seen as precious because complaints regarding sleep quality are common (Dogan 2005) plus sleep promotes recovery in the hospitalised patient (Richards 1998).

Studies have also shown that when sleep is reduced you become more irritable, tired and aggressive (Chuman 1983), more likely to have confused reactions (Dogan 2005) and pain tolerance is decreased (Wetzman *et al* 1974). Eveloff (1995) and Gabor *et al* (2001) discovered that sleep actually had an impact on

respiratory function, with disrupted sleep causing respiratory dysfunction, which may prolong mechanical ventilation support.

A study by McGonigal (1986) found that hospital staff did not allow for the importance of sleep when planning patient care even though effective sleep assessment by nurses can help to measure improvements in patients sleep patterns (Richardson 1997). Snyder-Halpern and Verran (1987) found this could be due to nurses having no access to a reliable and valid tool to help them assess their patients sleep patterns fully. A recent study evaluating sleep quality in the hospitalised patient recommended nurses should develop a way for collecting data to determine and assess patients sleep quality (Dogan 2005).

Sleep assessment tools

Over the years the assessment of sleep has been examined within the laboratory setting and the hospital environment. Objective and subjective methods have been used to assess both healthy volunteers' sleep patterns within the laboratory and the hospital environment and the hospital patient in the ward and critical care environment. The majority of the studies that have been undertaken in laboratory settings have used objective physiological measurements (Snyder-Halpern and Verran 1987). These polysomnograph sleep measurements include electroencephalogram (EEG) the measurement of electrical brain activity, electromyogram (EMG) the recording of muscle activity during sleep and electroculogram (EOG) the monitoring of eye movements. These measurements have been seen as the most effective and accurate way to assess the physiological attributes of sleep (Chuman 1983, Tamburri *et al* 2004). However, polysomnograph methods are difficult to use outside the laboratory setting

(Snyder-Halpern and Verran 1987) and are expensive and difficult to access (Richardson 1997), limiting their use in critical care areas (Tamburri *et al* 2004). An alternative, less invasive behavioural measurement of sleep, is actigraphy (Tamburri *et al* 2004) involving a small wrist or leg worn devise to record gross motor activity, but have similar interpretation and access problems.

However, it may not be necessary to use such invasive methods. Closs (1998) felt that there is evidence to show subjective sleep assessment results that compare closely with EEG measurements. Knabb and Engle-Sittenfeld (1983) suggested physiological assessment methods cannot accurately measure the subjective nature of sleep. However Redeker *et al* (1998) disagreed, believing subjective measures cannot replace objective sleep measures, but they may complement each other.

Many subjective sleep assessment tools have examined sleep patterns over the years and again have been tested within and outside the hospital environment. An early study by Baekeland and Hoy (1971) assessed the sleep of 21 healthy adults in their own homes and the laboratory setting. This was evaluated using an eleven item multiple choice and short answer sleep log using complex rating scores on a scale assessing items such as soundness of sleep, movement during sleep and rest upon wakening.

A subjective sleep tool called the St. Mary's Hospital Sleep Questionnaire (SMH) was designed specifically to assess patients' sleep whilst in hospital. This SMH tool was a 14 item multiple choice and short answer instrument which examined individuals' previous nights sleep. Patients within this study were not from the

critical care environment, but were from surgical, medical and psychiatric wards in a general hospital unit. A further group of healthy volunteers were included to test the tool's reliability and validity (Ellis *et al* 1981).

Another subjective sleep assessment tool, developed by Snyder-Halpern and Verran (1987) called the VSH sleep scale, measured sleep patterns in relation to visual markers in healthy volunteers within their own home environment. This tool was adapted from early work measuring self-reported sleep patterns (Atkin 1969, Herbert *et al* 1976, Parrott and Hindmarch 1980). The tool's validity was tested by using it in conjunction with the Baekeland and Hoy Sleep Log and the SMH. The VSH Sleep Scale required participants to place a point between a 100cm line and zero scale (100 was deep sleep and Zero no sleep) for eight items relating to their sleep. The higher the total score, the better the quality of sleep. Snyder-Halpern and Verran (1987) recommended that the scale should be repeated in a non-hospitalised population as well as a clinical population and to test its validity against the objective measurements obtained from polysomnography.

The VSH tool was retested within the hospital environment and many difficulties found. Patients reported problems seeing or reading the tool due to medication side effects, position and tubes and dressings that interfere with the use of reading glasses. Patients also had difficulties writing because hands and arms were often immobilised by monitoring, treatment and illness (Richardson 1997). Despite these difficulties, Richardson (1997) found this tool could be used in the critically ill and tested its use with quadriplegic patients. The tool was applied by the nurse who held the scale at right angles to the patient's face, and each item was read to them. The nurse then indicated the position on the scale with a pencil once confirmed by

the patient. This method was found to be a useful approach in the critical care clinical environment, but presented no information regarding the tool's reliability and validity when used in this 'by proxy' manner (Richardson 1997).

An early study using a four-point sleep behaviourally tool found nursing observations of sleep correlated with patients' polysomnograph data (Fonatine, 1989). Another study compared a staff nurse observation tool with polysomnograph using a three point check list (sleep, not asleep or unable to determine) on 21 critically ill patients and found nurse observations were correct 74% of the time (Edwards and Schuring, 1993). Similarly a study by Aurrell & Elmqvist (1985) compared nurses' assessment of sleep with patients' polygraphic data. However, their findings discovered nurses overestimated patients sleep time. Another study by Freedman et al (1999) used a questionnaire to examine sleep disturbances in four intensive care units (ICU). Patients were asked to rate their sleep quality on a scale of 1 to 10 (1=poor, 10= excellent) and the degree of daytime sleepiness on a scale of 1 to 10 (1= unable to stay awake, 10=fully alert and awake). This subjective examination was unable to determine patients' true sleep architecture and the reliability and validity were reported as limitations of the tools, which may have been due to the study making no comparison with patients' polysomnographic data. A later study using the Freedman et al (1999) subjective questionnaire to measure perception of sleep along with objective polysomnography measurements discovered that participants' perception of their sleep disruption did not match the polysomnograghy data (Gabor *et al* 2003).

Other studies have developed simple rating scales for nurses to assess patients' sleep with the critically ill (Olsen *et al* 2001). They used the tool previously

developed and validated by Edwards and Schuring (1993) where nurses were asked to indicate patients sleep following a five second observation of patients at eight pre-determined periods throughout 24 hours. Difficulties were encountered by nurses undertaking the assessment due to their need to be close to the patient resulting in waking the patient during their sleep. They suggested more objective methods should be used to enhance the validity of sleep assessment methods.

A review of the literature has identified a number of key issues, influencing the development and use of sleep assessment tools with critical care patients. These key issues include the fact that critically ill patients often experience difficulties in communicating and recalling information and writing may be difficult as their hands/arms may be weakened or immobilised by monitoring devices and intravenous access. Patients have difficulty responding to detailed visual analogue scales and many critical care patients have been anaesthetised, sedated and are often intubated resulting in an inability to speak. Therefore the development and testing of simple, easy tools for patients to understand and complete in critical care was considered desirable by the research team.

Whilst simple subjective sleep assessment tools exist for nurses to assess patients' sleep and tools have been used for patients to assess their own sleep, no studies have been published that compare the nurses' assessment with the patients' perception of sleep. The requirement to ensure that users are involved in decisions and service developments (DOH 1999, DOH 2000; DOH 2001) support the need to ask patients their views on sleep assessment .

AIMS

The aim of this Critical Care Sleep Assessment pilot study was to evaluate the usefulness of three sleep assessment tools to identify which, if any, provided the closest comparison between the nurses' judgement and the patients' experience of their sleep.

The study outcomes were to:

- Compare patients and nurses assessment of sleep using three different rating tools.
- Ascertain patients' preferences with non-interventional, user friendly, practical tools in critical care
- Recommend changes and improvements to the way that sleep is assessed and documented.

Design/Methodology

This was a pilot study attempting to test three sleep assessment tools that nurses could use to accurately assess and record sleep of individual patients in four critical care units. The study compared the judgement of nurses and the experiences of patients with regards to sleep using three separate sleep assessment tools (see Appendix One). Three different tools were chosen to provide a variety of ways to assess sleep in terms of both quantity and quality of sleep experienced. As shown in Box 1.

These tools were designed by the research team using a similar format to sleep assessment tools identified in the literature review (Snyder-Halpern and Verran1987, Richardson 1997), whilst acknowledging the known difficulties associated with assessment of sleep in the critically ill. The rating scores were constructed to provide an easy to understand tools for completion by both patients and nurses in critical care.

Enlarged versions of the sleep assessments tools were printed and laminated so patients could easily see and point to the scale. If individual patients' were unable to point, talk or see the scale then the researcher used a number of ways to obtain the patients response. These included the researcher pointing to the score and asking the patient for confirmation using facial gestures, obtaining verbal responses and reading out the scores to patients. A large easy to visualise clock was placed at each patients bed area to help them in their assessment of their own sleep.

Sample/Participants

This was a pilot study in which the lack of previous research prevented the research team from making a power calculation. However, following advice from a statistician, it was agreed that to make inferential statistical analysis possible a minimum quota sample of 50 different patients and 50 different staff was believed to be necessary for the pilot study. In reality, 82 patients and 82 nurses participated in the study.

A convenience sample was used to collect data from four multi-specialty critical care units in one large teaching trust. The four units sampled were:

1. Cardiothoracic Intensive Care Unit: specialising in post cardiac and thoracic surgery including heart and lung transplantation
2. Neuro Intensive care Unit: specialising in neurosurgery, neurology, trauma, oral and maxillofacial surgery, home ventilation and infectious diseases.

3. General Intensive care unit: specialising in vascular surgery, renal & liver Transplantation, Hepatobiliary and Pancreatic surgery, ENT, general medicine and general surgery.
4. General Intensive care unit: specialising in upper and lower gastro-intestinal surgery, burns and plastics, obstetrics and gynaecology, cardiac surgery and endocrine medicine and surgery

Data Collection

Four critical care nurse researchers not directly involved in patient care collected the data from March to July 2004. Each researcher obtained background demographic data from the patients' medical and nursing notes. Then the participating nurse (nurse caring for the patient overnight) participated in a short structured interview to identify their assessment of the patients sleep using the three rating scales. Subsequently the patient also participated in a short structured interview, which was independent of the nurse interview and normally less than five minutes duration, to identify their assessment of their own sleep using the same rating scales. The data were collected from the nurse at the end of their night shift between 7.00-7.30am and then from the patient when awake, at a convenient time between 7.30-9.30am, so that neither nurse nor patient was aware of the other's rating.

Inclusion criteria, guided by previous sleep studies, aimed to select from lucid orientated patients able to provide the most appropriate responses using the criteria identified by Cooper *et al* (2000). It was important to ensure patients were not still under the effects of an anaesthetic or intravenous sedation so a period of 24 hours was set as an appropriate length of time to wait following administration

of these drugs. In addition, due to the many disturbances associated with the admission of patients to critical care and to allow time to become familiar with a new environment, a length of stay in the ICU greater than 24 hours was set, which is an approach supported by Baekeland and Hoy (1971). As resources available for translation were limited, participants unable to speak and read English were excluded from the study, though in reality all potential participants spoke English as their first language.

Therefore the sleep assessment criteria for inclusion into the study were defined as:

- More than 24 hours following any intravenous sedation.
- Length of stay greater than 24 hours
- More than 24 hours since a general anaesthetic
- A judgement made by the nurse caring for the patient that the patient is sufficiently lucid to understand the nature of the study and indicate a decision as to whether or not they wish to participate.

Once patients were identified as fulfilling the criteria for inclusion, nurse participation was limited to those nurses caring for the patient for a full night shift who would be responsible for assessing their patients' sleep.

Ethical Considerations

Approval for this study was gained in a number of ways. Ethical approval for the study was obtained from the Trust, University and Local Research Ethics Committee.

Consent was obtained from all participants. The study was discussed with each participant, a written information sheet was provided and this was followed by written consent. A small number of patient participants were unable to provide written consent due to limb weakness so written assent was obtained from the patients' next of kin once the patient indicated, either verbally, by head movement or by pointing to a word board, that they were agreeable to participation.

Data Analysis

Data analysis was undertaken by an independent researcher not involved in data collection. The data analysis began after the collection of 52 subjects. Findings from this analysis led to development of the data collection methods to capture additional information. Data were entered into the Statistical Package for Social Science (SPSS 11.0). Descriptive statistics such as percentages and frequency counts were used to summarise data.

As the purpose of the study was to compare similarity between patient and nurse sleep assessment using a specific tool, data collected from the patient and the nurse for a specific rating scale were analysed comparing the level of agreement between patients and staff for each tool using a measure of association for ordinal data, Gamma test. This test measured the degree of association between two ordinal variables, i.e. patient and nurse assessment for a specific sleep assessment tool. The test compares patient and nurse assessments on a case-by-case basis to calculate the level of association between assessors by producing a value on a scale from –1 to +1. A value of 1 indicates a strong relationship between the two variables, patient and nurse assessment, whilst a value of zero indicates

little or no association between assessors. A value of -1 indicates an inverse relationship between assessors.

FINDINGS

82 patients and 82 nurses participated in the study. 45 (54.9%) patients were male whilst 37 (45.1%) were female. A total of 55 (69.6%) patients were extubated, 22 (27.8%) had a tracheostomy and two (2.5%) were either orally or nasally intubated. Data on the nature of three patients' airways was not collected. Length of patients' stay in the ICU varied; though the greatest proportion had only been in the unit for no more than three days, (Table 1).

The nurse caring for the patient during the night of patient participation was either a D grade, E grade, F grade or Bank Nurse. As Table Two indicates, the majority of nurses taking part in the study were E grades (Table 2)

The following findings indicate that any possible effect of the order that the rating tools were presented to participants did not influence either the level of nurse-patient association or patient preference, as no specific tool was significantly different to any other.

The results for all three-assessment tools indicated a slight degree of association between patient and nurse assessment of the nature of the patients' sleep (Table 3).

Whilst Tool Two had the greatest level of association, it was not appreciably greater than either of the other two assessment tools. Furthermore, the findings suggest no tool produced a significantly close association between patient and nurse in making judgements about the nature of sleep experienced by a patient.

After data collection on 52 patients interim analysis indicated no association therefore the study was extended by a further 30 patients. Two questions were added and patients were asked to nominate the tool they found easiest to complete. As Table 4 indicates, there was the similar degree of preference for both Assessment Tools One and Two at 33.3% and 30.0%. It is worth noting the low level of preference for Tool Three (13.3%).

Patients were also asked for reasons why their preferred tool was easiest. Table Five presents the most common responses.

DISCUSSION

Previous studies have examined how sleep has been assessed using many different objective and subjective assessment tool and in different settings (Baekeland and Hoy, 1971, Snyder-Halpern and Veran, 1987, Richardson 1997). However many of the available sleep assessment tools use intrusive methods to obtain objective measurements and seem inappropriate to use as a part of daily critical care practice.

Subjective methods are available but their validity has been questioned and their use in critical care areas may also be difficult. The application of complex tools in critical care has been found to be problematic due to difficulties patients encounter understanding and completing the tool as well as the nurses ability to interpret the information (Snyder-Halpern and Verran 1987, Redeker and Tamburri 1999). This study, using three different, easy to complete, sleep assessment tools, found no close association between nurses' assessment of patients sleep compared to the patients' perception of their sleep. Therefore this questions the nurses' ability to accurately judge patients sleep using the sleep assessment tools.

Results of this study conflict with previous research where nurses can assess the actual number of patients' sleep episodes experience (Fontaine 1989; Edwards and Schuring 1993). This research indicated nurses were inaccurate at judging quantity (based on number of hours) of sleep and quality (based on average) of sleep. Similar nurse inaccuracies were found in critical care with nurses ability to assess critical care patients sleep correctly (Freedman *et al* 1999, Gabor, 2003). Even though these study were conducted in critical care, with a high nurse to patient ratio and high levels of patient observation throughout the night, patient observation by the nurse alone has a high degree of error when assessing patients' sleep. It may well that the most accurate way for nurses to assess patients' perceptions of their sleep should be to ask the patient to rate their own sleep.

This observer bias finding when assessing patients sleep reported in other studies (Redeker *et al* 2000) may be associated with patients who are not moving very much or have their eyes closed for a large proportion of the 24-hour period. It could

be that nurses have difficulty making a judgement of exactly when these patients are asleep or awake. Also due to the open nature of the ICU environment, often associated with open bedded bays in critical care, nurses are very aware of the activity and noise level throughout the night. Such awareness may have an impact on the nurses' judgement, resulting in an inaccurate assumption of when patients are able or unable to sleep in this environment. Therefore the daily practice of nurses assessing patients' sleep, based on how long their eyes are shut or open, appears to be an inaccurate subjective measurement of sleep.

Of the three tools tested in this study, tool two had the closest association between the patient and nurse, and would therefore be more appropriate than the other two tools if nurses assess patients' sleep solely in this way. Therefore nurses' assessment of patients sleep using tool two, may be informative only with patients who are unable to respond and complete a subjective assessment tool.

Involving patients in this study found critical care patients preferred tool one and two as these were the easiest to complete, therefore both may be useful to assist with the measurement of patients perceptions of their sleep.

LIMITATIONS

This study did not measure objective sleep measurements so no comparisons were made with the patient's physiological sleep pattern compared to the nurse and patient perception of their sleep pattern. In addition, no examination of the patient's previous nights sleep or the sleep experienced through the day was undertaken. Freedman *et al* (1999) found 40-50% of an intensive care patient's

sleep actually occurs during the day, so this needs to be considered when interpreting the data.

Participants were critical care patients who were awake and orientated limiting generalisability of findings to all critical care patients. Due to some patients immobility and inability to speak because of their critical illness, the researchers may have introduced some observer bias when obtaining the patients perspective. Although this is recognised as a limitation the researchers were experienced and trained to communicate with the critically ill.

A further limitation may have been experienced with patients recall bias (Fontaine 1989, Richardson 1997). However, patients were only selected for the study if they had not received a general anaesthetic or had not received intravenous sedation for 24 hours and it is typically this group who do not remember much of their ITU stay (Freedman *et al* 1999). Also subjects were asked about their previous nights sleep during the next morning to maximise the opportunity for recall. The study did not attempt to control the nature of patient sedation or analgesia as this would introduce an unacceptable degree of influence upon clinical decision-making that met the diverse range of patient needs in the participating units.

The ICU illness is complex particularly with the affects of illness itself and/or the affects of medications administered, making it difficult to know and control how these factors affect patients in different ways. Consequently an awareness of this should be taken into account when interpreting the results from such a complex patient population.

The study did not examine any possible correlation between the nurses length of critical care experience and their ability to assess patients sleep.

CONCLUSIONS

This study measured the association between patients' perceptions and nurses' judgements of sleep, plus the patients' views on three sleep rating scales. The study made no association between patients self-assessment of sleep with the physiological measures of sleep as the aim of the study was to ascertain the usefulness of non-interventional, user friendly, practical tools in critical care. Despite the effectiveness of polysomongraphy (Chuman 1983,Tamburri *et al* 2004) as a detailed physiological assessment of sleep, the expense and intrusiveness of such invasive techniques were not seen as feasible for use in every day critical care practice.

Further studies could focus on testing the tools in this study with patients' vital signs or actigraphy to provide more valid subjective tools to assess sleep. In addition assessment over a complete 24-hour period plus making comparisons with the environmental noise and light could prove to be informative in the critical care environment.

The tools tested for use, which indicated patients' preferences within the critical care environment, were seen as a first step to understanding and measuring practical solutions to assessing patients' sleep in the future. It is suggested that tool one could assist in the assessment of patients' perception of their sleep quantity and tool two to assist in the assessment of patients' perception of their sleep quality, but it is stressed that nurses, where possible, should ask the patient to rate their sleep using these tools.

Contributions

Study design:

Study Design: Annette Richardson, Chris Turnock, Wendy Crow

Data collection and analysis: Annette Richardson, Chris Turnock, Wendy Crow, Elaine Coghill, Margaret Douglas Manuscript preparation: Annette Richardson, Chris Turnock, Elaine Coghill

REFERENCES

Atkin, R.C.B. (1969) Measurement of feelings using visual analogue scales. Proceedings of Royal Society of Medicine. **62** 989-993.

Aurell, J. and Elmqvist, D. (1985) Sleep in the surgical intensive care unit: continuous polygraphic recording in nine patients receiving postoperative care. British Medical Journal. **190** 1029-1032.

Baekeland, F. & Hoy P. (1971) Reported vs Recorded Sleep Characteristics. Archives of General Psychiatry. **24** 548-551.

Bergbom-Engberg, I & Haljamae, H. (1988) A Retrospective Study of Patients Recall of Respirator Treatment: Nursing Care Factors and Feelings of Security/Insecurity. Intensive Care Nursing. **4** (3) 95-101.

Bourne, R.S. and Mills, G.H. (2004) Sleep disruption in critically ill patients-pharmacological considerations. Anaesthesia. **59** 374-384.

Calvert Vazquez, R., Garcia Arufe, M.B., Uriel Latorre, P., Fernadez Lope, V. and Catoira, B. (2000) Patients' sleep in intensive care units and sleep-modifying factors. Enfermeria Intensiva. **11** (1) 10-16.

Chuman, M.A. (1983) The neurological basis of sleep. Heart and Lung. **12** 177-181.

Closs, J. (1988) Assessment of Sleep in Hospital Patient: A review of methods. Journal of Advanced Nursing. **12** 501-510.

Cooper, A.B., Thornley, K.S., Young, G.B., Slutsky, A.S., Stewart, T.E. and Hanley, P.J. (2000) Sleep in critically ill patients requiring mechanical ventilation. Chest. **117** 809-818.

Department of Health (1999) Patient and Public Involvement in the new NHS. London, Department of Health.

Department of Health (2000) The NHS Plan. London, Department of Health.

Department of Health (2001) Health and Social Care Act. London, Department of Health.

Dogan, O., Ertekin, S. and Dogan, S. (2005) Sleep Quality in hospitalized patients. Journal of Clinical Nursing. **14** 107-113.

Dyer, I. (1995) Preventing the ITU Syndrome or How not to Torture a Patient: Part 2. Intensive and Critical Care Nursing. **11** 223-232.

Edwards, G.B. and Schuring, L.M. (1993) Pilot study: validating staff nurses' observations of sleep and wake staes among critically ill patients, using polysomnography. American Journal of Critical Care. **2** (2) 125-131.

Ellis, B.W., Lancaster, R., Raptopoulos, P., Angelopoulos, N. and Priest, R.G. (1981) The St. Mary's Hospital sleep questionnaire: a study of reliability. Sleep. **4** (1) 93-97.

Eveloff, S.E. (1995) The disruptive ICU: an issue to lose sleep over? Chest. **107**1483-1484.

Fontaine, D. K. (1989) Measurement of nocturnal sleep patterns in trauma patients. Heart and Lung. **18** 402-410.

Freedman, N. S., Kotzer, N. and Schwab, R. J. (1999) Patient perception of sleep quality and etiology of sleep disruption in the intensive care unit. American Journal of Respiratory Critical Care Medicine. **159** 1155-1162.

Freedman, N.S., Gazendam, J., Levan, L., Pack, A.L. and Schwab, R.J. (2001) Abnormal sleep/wake cycles and the effect of environmental noise on sleep disruption in the intensive care unit. American Journal of Critical Care Medicine. **163** 451-457.

Gabor, J.Y., Cooper, A.B. and Hanly, P.J. (2001) Sleep disruption in the intensive care unit. Current Opinion in Critical Care. **7** 21-27.

Gabor, J.Y., Cooper, A.B., Crombach, S.A. and Lee, B. (2003) Contribution of the intensive care unit environment to sleep disruption in mechanically ventilated patients and healthy subjects. American Journal of respiratory and Critical Care Medicine. **167** (5) 708-719.

Herbert, M., Johns, M.W. and Dore, C (1976) Factor analysis of analogue scales measuring subjective feelings before and after sleep. British Journal of Medical Psychology. **49** 373-379.

Honkus, V.L. (2003) Sleep deprivation in critical care units. Critical Care Nursing Quarterly. **26** (3) 179.

Knabb, B. and Engel-Sittenfeld, P. (1983) The many facets of poor sleep. Neuropsychobiology. **10** 141-147.

McGonigal, K. (1986) The Importance of Sleep and the Sensory Environment to Critically Ill Patients. Intensive Care Nursing. **2** 73-83.

Novaes, M., Aronovich, A., Ferraz, M. and Knobel, E. (1997) Stressors in ICU: patients' evaluation. Intensive Care Medicine. **23** 1282-1285.

Olsen, D.M., Borel, C.O., Laskowitz, D.T., Moore, M.S. and McConnell, E.S. (2001) Quiet time: a nursing intervention to promote sleep in neurocritical care units. American Journal of Critical Care. **10** (2) 74-78.

Parrott, A.C. and Hindmarch, I. (1978) Factor analysis of a sleep evaluation questionnaire in psychological investigations- a review. Psychopharmacology. **71** 173-179.

Perez de Ciriza, A., Otamendi, S., Ezenarro, A. and Asiain, M. C. (1996) Factors causing stress in patients in intensive care units. Enfermeria Intensiva. **7** 95-103.

Rdeker, N.S., Tamburri, L. and Howland, C.L. (1998) Prehospital correlates of sleep in patients hospitalised with cardiac disease. Research in Nursing and Health. **21** 27-37.

Redeker, N.S. and Tamburri, L. (1999) Self-report measures of sleep in patients hospitalised cardiac patients. Sleep. **22** 5289- 5290.

Redeker, N. S. (2000) Sleep in acute care settings: an integrative review. Journal of Nursing Scholars. **32** 31-38.

Richards, K.C. (1998) Effect of back massage and relaxation intervention on sleep in critically ill patients. American Journal of Critical Care. **7** 288-299.

Richardson, S.J. (1997) A Comparison of Tools for the Assessment of Sleep Pattern Disturbance in Critically Ill Adults. Dimensions of Critical Care Nursing. **16** (5) 223-239.

Shiihara, Y., Nogami, T., Chigia, M., Sakai, Y., Takahashi, S., Kodama, M. and Kunimoto, F. (2001) Sleep-wake rhythm during stay in an intensive care unit: a week's long-term recording of skin potentials. Psychiatry and Clinical Neuroscience. **55** (3) 279-280.

Simpson, T., Lee, E. and Cameron, C (1996b) Patients' perceptions of environmental factors that disturb sleep after cardiac surgery. American Journal of Critical Care. **5** 173-181.

Soehren, P. (1995) Stressors perceived by cardiac surgical patients in the intensive care unit. American Journal of Critical Care. **5** 71-76.

Snyder-Hapern, R. & Verran, J. A. (1987) Instrumentation to Describe Subjective Sleep Characteristics in Healthy Subjects. Research in Nursing and Health. **10** 155-163.

Tamburri, L. M., DeBrienza, R., Zozula, R. and Redeker, N. (2004) Nocturnal care interactions with patients in critical care units. American Journal of Critical Care. **13** (2) 102-112.

Weitzman, E.D., Nogliere, A.B., Perlow, C.D., Fukuslima, E.F. and Sassin, H.G. (1974) Effects of prolonged 3-hour sleep-wake cycle on sleep stages, plasma cortisol, growth hormone and body temperature in man. Journal of Clinical Endocrinology and Metabolism. **38** 1018-1030.

Wilson, V.S. (1987) Identification of stressors related to patients' psychological response to the surgical intensive care unit. Heart and Lung. **16** 267-2.

BOX 1

1. A rating on the number of hours slept (banded in hours)

ASSESSMENT TOOL ONE

	0-2 Hours	**2-4 hours**	**4-6 hours**	**6-8 hours**	**More than 8 hours**
Nurse					
Patient					

2. A rating based on a comparison with their normal/average sleep

ASSESSMENT TOOL TWO

	Much less than Average	**Less than Average**	**Average**	**More than Average**	**Much more than Average**
Nurse					
Patient					

3. A numerical rating score (1-10)

ASSESSMENT TOOL THREE

No Sleep **Average Sleep** **Slept Well**

1 2 3 4 5 6 7 8 9 10

Nurse

Patient

Table 1: Length of Patient Stay in ICU

Length of Stay	Number	Percentage
1 – 3 days	34	41.5%
4 – 6 days	20	24.4%
7 – 9 days	5	6.1%
10 – 12 days	3	3.7%
13 –15 days	4	4.9%
More than 15 days	15	18.3%
Unknown	1	1.2%
TOTAL	82	100%

Table 2: Grade of Nurse

Grade of Nurse	Number	Percentage
D	27	32.9%
E	39	47.6%
F	1	1.2%
Bank Nurse	15	18.3%
TOTAL	82	100%

Table Three: Similarity of Nurse-Patient Assessment of Sleep for each Tool

Sleep Assessment Tool	Gamma Value of Association
Tool One: **0-2 hours; 2-4 hours; 4-6 hours; 6-8 hours; More than 8 hours**	**.334**
Tool Two: **Much less than average; Less than average; Average; More than average; Much more than average**	**.452**
Tool Three: **1 (No sleep) – 5 (Average sleep) – 10 (Slept well)**	**.345**

Table 4: Patients' Preference of Assessment Tool

Sleep Assessment Tool	Number	Percentage
Tool One: **0-2 hours; 2-4 hours; 4-6 hours; 6-8 hours; More than 8 hours**	**10**	**33.3%**
Tool Two: **Much less than average; Less than average; Average; More than average; Much more than average**	**9**	**30.0%**
Tool Three: **1 (No sleep) – 5 (Average sleep) – 10 (Slept well)**	**4**	**13.3%**
None particular preference	**7**	**23.3%**

Table 5: Patients' Reasons for Preference of Assessment Tool

Sleep Assessment Tool	Reasons Stated
Tool One: **0-2 hours; 2-4 hours; 4-6 hours; 6-8 hours; More than 8 hours**	**'Gives you hours'** **'Put into hours'** **'Because you can count hours'** **'Easier to look at clock'**
Tool Two: **Much less than average; Less than average; Average; More than average; Much more than average**	**'Able to compare to normal'** **'Easiest to use'** **'Can base it on usual experience'** **'Easiest to relate to own sleep'**
Tool Three: **1 (No sleep) – 5 (Average sleep) – 10 (Slept well)**	**no quotes**
None particular preference	**'All the same'** **'All easy to answer'**