

Implicit Memory and Psychological Disturbance in Intensive Care Unit Patients

Thesis submitted in partial fulfilment for the requirements of the
Doctorate in Clinical Psychology

by

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Statement of Originality

I confirm that this is an original piece of work and that the literature review and research report which form this thesis have not been submitted previously towards any other degree, in this or any other university.

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31st December, 2009

Word Count

Part One: Literature Review	6,452 words
References	1,132 words
Part Two: Research Report	19,743 words
References	2,261 words
Part Three: Critical Reflection	2,670 words
References	77 words
TOTAL (excluding references)	28,865 words
(with references/tables)	32,335 words

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THESIS ABSTRACT

Title: Implicit Memory and Psychological Disturbance in Intensive Care Unit Patients
Sherley M. Tordoff, Trainee Clinical Psychologist

Part One: Literature Review

Background: People who experience an intensive care unit admission may also experience post-traumatic stress and other forms of psychological distress. Such phenomena are only partly explained by the reason for admission. This distress can impede physical recovery and full participation in everyday life.

Method: Using specified criteria, several databases were systematically searched and 279 abstracts highlighted; 215 articles were subsequently screened with a total of 104 articles being retained for specified quality criteria screening and critique.

Results: Following critique, a total of 19 articles were retained for their relevance to the research question.

Conclusions: The literature presented sufficient information to enable the investigator to propose a model describing the mechanism for PTSD development in ICU. Despite the extensive selection and screening process, most articles contained methodological flaws, however the investigator advocates that the information provided by the literature should not be dismissed and that future research might be directed towards replication of such research to RCT standards.

Part Two: Research Report

Introduction: Despite the literature indicating that PTSD and other forms of psychological distress are significant problems for intensive care unit patients, the mechanisms involved in the development of PTSD remain largely unexplained. The investigator hypothesised that PTSD may occur as a result of implicit learning/classical conditioning/pairing of auditory stimuli to emotional distress experienced in the intensive care unit.

Aim: To test the hypothesis that classical conditioning (pairing) of ICU environment sounds to patient distress or anxiety in the ICU which can then be detected after discharge as an emotional conditioned response to the presentation of a range of sounds (Train/Rain and ICU) sounds whilst monitoring skin conductance.

Method: Thirty-three patients were recruited into the study and twenty participants were able to provide data to permit testing relating to the main hypothesis at 4-5 weeks post-ICU discharge.

Results: A non-significant trend was noted in the relationship between presentation of ICU sounds and increased skin conductance responses, but the investigator was unable to find significant evidence of any relationship between skin conductance responses to ICU sounds and measures of psychological distress. There was significant evidence to suggest that the presence of memories as measured by the ICU Memory Tool at one-to-two weeks post-discharged from ICU were related to PTSD development.

Conclusion: Patients demonstrating increased memories of feelings at one-to-two weeks, should be monitored carefully for any subsequent signs of PTSD and other forms of psychological distress. Future research should perhaps attempt to replicate the ICU sounds findings in a larger sample size with comprehensive recording of ICU sedation and memory phenomena details. Any attempts to find evidence of implicit memory using prompted recall questions should plan to capture this within 24 hours of stimuli presentation.

Part Three: Critical Appraisal

Reflections regarding the research process and content are discussed

Word Count: 454

1. CRITICAL LITERATURE REVIEW: WHAT FACTORS ARE ASSOCIATED WITH
THE DEVELOPMENT OF POST TRAUMATIC STRESS DISORDER IN INTENSIVE
CARE UNIT PATIENTS?

31st December, 2009

Word Count: 6452

1.1 Introduction

A considerable amount of research evidence exists to demonstrate that psychological disturbance, including post-traumatic stress disorder (PTSD), is a problem for a substantial proportion of patients discharged from an intensive care unit (ICU) (Twigg, Humphris, Jones, Bramwell & Griffiths, 2008; Cuthberston, Hull, Strachan & Scott, 2004). Evidence also exists to challenge the commonly-held assumption that these difficulties are intrinsically related to the reason for admission, indicating that these are more related to the intensive care unit process itself (Jones & Griffiths, 2006; Tedstone & Tarrier, 2003; Skirrow, Jones, Griffiths & Kaney, 2001). Whilst some studies have focussed upon prevalence rates of PTSD found in ICU (Capuzzo, Valpondi & Cingolani, 2005; Richter, Waydhas & Pajonk, 2006; Sukantarat, Greer, Brett & Williamson, 2007), some have focussed upon developing accurate, valid and reliable measures with which to assess PTSD symptomatology (Stoll *et al*, 1999; Jones, Humphris & Griffiths, 2000) and others have explored the occurrence of PTSD along with other outcomes (Holbrook, Anderson & Sieber, 1999; Kaphammer, Rothenhausler & Krauseneck, 2004; Nelson, Weinert & Bury, 2000). Many other studies have explored potential psychological and physical correlates of PTSD, for example, de Leur, Der Chans, Loef and Deelman (2004).

The current review attempts to encompass the arguments and evidence gathered from a number of selected studies, and to summarise and synthesise these as best as possible. Several substantial reviews have been conducted in this area in the last decade, for example, Griffiths, Fortune, Barber and Young (2007) concluded that rigorous longitudinal studies were needed to assess prevalence rates of PTSD in ICU. Davydow, Gifford, Desai, Needham and Bienvenu (2008) called for investigations into how individual patient factors and ICU-specific factors relate to each other and the development of PTSD in ICU. Rattray

and Hull (2008) concluded that early rehabilitation, avoidance of sedative build-up and patient diaries can help reduce symptoms of PTSD over time and Griffiths and Jones (2007) highlighted the demand for specific post-ICU care to help meet the increasingly-recognised emotional needs of these patients. Whilst anxiety and depression are known to be more closely linked with physical health, the mechanisms involved in the development of PTSD remain largely unexplained (Skirrow, Jones, Griffiths & Kaney, 2001). There is therefore recognition that this is a problem for a significant number of patients which requires further exploration. Justification for the current review is that the last review was conducted more than three years ago and in the rapidly-changing demanding environment of intensive care, this literature requires updating in order to include any relevant studies published within the last three years.

1.2 Method

Using the search criteria detailed in Figure 1.1, various databases and journals were perused for relevant articles pertaining to PTSD in ICU, and a total of N=279 abstracts were highlighted.

Figure 1.1: Search criteria for initial screen

Subject heading(s)/setting	Intensive care/posttraumatic stress stress/memories/sedation (and variations)
Search within	Article headings and text
Search in	All Journals
Language	English Language only
Participants	Human/Adult/all
Date	1955-2009 (various)
Article type	Research articles only

Details of the databases searched, together with search terms and dates are as follows: Cochrane Reviews database, the NHS Evidence Health Information Resources Website and Cinahl databases, British Library Catalogue Integrated Database of Grey Literature 2003 onwards, Psychinfo (1993-2009), Scopus (1992-2009), Web of Science and Ovid Medline (1982-2009), Embase (1955-2009). Search terms used were “intensive care” AND “posttraumatic stress” AND “memories” AND “sedation”/”posttraumatic stress” AND “sedation” and “intensive care” (subject heading/title and then all text) “posttraumatic stress” AND “sedation” AND “intensive care” (subject heading/title and then all text)/ and database-specific variations of spelling/nomenclature (for example, post* and “posttraumatic/post-traumatic) “implicit memory” (subject/heading/title), all in English

Language. Google Scholar was also searched for details of any ongoing prospective research and any conference information on the subject. Figure 1.2 presents a detailed flow diagram illustrating the search and screen-out pathway. Details of the data extraction tool can be found in Appendix A.

Figure 1.2: Literature Review Screen-out Pathway

Research Question: What factors are associated with the development of post-traumatic stress disorder in ICU patients?

Bibliographic database search: Psychinfo 1993-2009, Scopus (1992-2009), Web of Science, Ovid Medline 1982-2009/Embase 1955-2009, Cochrane and British Library Catalogue Integrated Database of Grey Literature plus hand-search of last 5 years of British Journal of Clinical Psychology

Search Terms: “intensive care” AND “posttraumatic stress” AND “memories” AND “sedation”/ “intensive care” AND “posttraumatic stress” AND “memory” (subject heading/title and then all text)/ “posttraumatic stress” AND “sedation” AND “intensive care” (subject heading/title and then all text)/ and database-specific variations of spelling/nomenclature (eg. post* & “posttraumatic/post-traumatic etc)”) “implicit memory” (subject heading/title)

(All Results: Duplicates Removed) N=279 (Scopus=132/Ovid Embase=46/WOS=32/Psychinfo=66/Database of Grey Literature=0/Cochrane=0/Hand-search=3)

SCREEN 1: screen-out using abstracts: PUBLICATION LANGUAGE = exclude all non-English-Language/ JOURNAL TYPE = Include all Medical/Psychology studies/ AUTHOR = Include all by Griffiths & Jones (UK Leaders in the field)/TYPE OF PUBLICATION: All research articles, reviews, and metanalysis. SETTING = include all in ICU and experimental, exclude all in Mental Health/Community/ PARTICIPANTS = all but Paediatrics & Child/ CONTENT (via title & abstract) = include all focussed upon potential ID of causative factors and mechanisms and prevention, exclude all focussed upon treatment. RESEARCH DESIGN = include RCT’s/controlled trial/prospective/follow-up studies, exclude single-case design/case studies. SAMPLING = recruitment from intensive care population only, exclude samples from other high-dependency settings (head-injury, coronary care, end-stage renal failure units etc). DATE OF PUBLICATION: not considered at this stage, only considered at final screen-out in combination with methodological qualities and publication & citation status of study **N=160 (119 removed)**

Confirmation of relevance by perusal of actual documents plus retrieval of potentially relevant articles from references and prospective and retrospective search of prominent authors **n=55. Total N=215**

Reading of relevant non-research articles/reviews (retained for potential references but excluded for consideration of review). Exclusion of marginal research not obvious in above-stages. **Excluded n=111 Total N=104**

Database creation for systematic methodological/quality screening of research articles. Excluded **n=83. Total included in review N=21** but **2** removed during writing due to “piecemeal” duplication of publication. Total number of articles fully reviewed **N=19**

In total, 334 article abstracts were perused for content, relevance and quality and duplicates removed. Abstracts pertaining to randomised controlled trials, controlled trials, prospective, follow up and retrospective cohort studies were then used to obtain a total of 160 articles via the University of Leicester Main, Clinical, Educational, Digital/Electronic libraries and British/Interlibrary loan service and the University of Newcastle Medical and General Libraries. Added to this selection were 55 additional articles from forward and backward searches for prominent authors and significant studies emanating from the literature. These were then screened based upon an initial quality ranking (comprising a combination of citation score, quality rating of journal and quality ranking of study) the remainder (n=104) of which were then entered into a review database which allowed the reviewer to total scores based upon over 20 possible ratings for methodological and quality criteria detailed in Appendix B. This systematic process resulted in 19 of the top-ranking research articles being selected and reviewed in the remainder of this report.

1.3 Results

1.3.1 Prevalence

Several studies have investigated the extent to which PTSD exists in the ICU patient population. Hepp et al. (2008), investigated the prevalence of PTSD-type problems in severely-injured patients, in a prospective observational study of 90 ICU survivors at one-month, 6-months, 12-months and 3 years post-injury. By using well-validated and reliable measures (Impact of Event Scale (IES) and the Clinician-Administered PTSD Scale (CAPS), and the Symptom Check-List-90 (SCL-90), the authors determined the prevalence of PTSD symptomatology was 35% across the three years. Limitations of the study were only including German-speaking participants and using an ordinal approach to documenting PTSD at the expense of details on frequency, intensity and duration of symptoms.

Schnyder, Moergeli, Klaghofer, and Buddeberg (2001) interviewed 106 consecutively-admitted patients at one month and 12 months post-admission using the IES, CAPS and Social Network Index (SNI) and concluded that 66% of variance in PTSD symptoms was unaccounted for. No justification for time points or sample size was reported, but they found a decrease in full-blown or sub-syndromal PTSD between one month (4.7% PTSD and 20.8% sub-syndromal) and at 12 months (1.9% PTSD and 12.3% sub-syndromal). All potential PTSD predictors at 12 months correlated significantly with the CAPS total score ($r=0.10 - 0.29$), although severity of injury did not (e.g. death threat $r= 0.07$; accident severity $r= 0.07$).

Using the Posttraumatic Stress Disorder Checklist (PCL), the Severity of Body Injury Score (SBIS), and the SF-36 General Health Assessment (SF-36), Zatzick et al. (2007) found 23% of patients demonstrated signs of PTSD 12 months after ICU admission. Lower

SF-36 scores were associated with a significantly higher risk of PTSD symptoms, previous benzodiazepine prescription, R.R. =1.46 (95% CI = 1.17 -1.84) $p<0.001$, previous depression R.R.= 1.33 (95% CI= 1.15 – 1.54) $p< 0.000$ and ICU admission R.R. =1.17 (95% CI=1.02-1.35) $p<0.023$. Limitations were use of self-report measures for pre-injury health status and telephone assessments, which might mask any avoidance. The reader would benefit from more detail regarding population size, characteristics, eligibility and refusals.

1.3.2 Severity of Illness

Illness severity and younger age were found to be associated with increased PTSD in the ICU setting by Boer et al. (2007), who concluded that PTSD was related to traumatic memories. They assessed prevalence in a retrospectively-identified ICU cohort using a single time-point measure of PTSD and severity of illness (using the PTSS-10, Apache II, Adverse Experiences Questionnaire (AEQ) and demographics) over a long timescale (spanning 6 years - January 1994-January 2000). One-hundred and four (88%) survivors of acute peritonitis returned a questionnaire sent to 118 patients. The investigators found the proportion of patients scoring above the 35 point cut-point on the PTSS-10 was 24% (95% CI= 17-33%), and the overall prevalence of PTSD including borderline (cut-point 27+) was 38% (95% CI= 29-48%). In terms of difference between those patients admitted to ICU and those admitted to an acute surgical unit, the ICU patients demonstrated a higher Apache II score (mean difference = 2.2 points $p=0.036$). Fifty-four patients (89% of the ICU group) required mechanical ventilation. Eighteen per-cent, (7:39) of the non-ICU group compared to 28% (17:61) of the ICU group experienced PTSD ($p=0.21$). Females were more likely to experience PTSD than males (O.R. 3,5 95% (CI=1.2-10.6). For each

one year reduction in age, there was a decrease in the likelihood of experiencing PTSD (O.R. 0.93 95% CI= 0.89 – 0.98), however this was before taking into account that the ICU patients were older on average than the non-ICU group. For each one point increase in Apache II score the chance of experiencing PTSD also increased (O.R. 1.1 95% CI= 1.002 – 1.25). The authors concluded that almost one quarter of patients undergoing emergency peritoneal surgery developed subsequent PTSD with those admitted to the ICU being at greater risk but only after age had been considered. The limitations of the study were that it used the PTSS-10 which measures symptomatology, not diagnosis and although it drew upon data over a long time-span, it did not document post-admission or more importantly, post-discharge trauma.

1.3.3 Previously History of Psychological Problems

There is some suggestion that patients with a previously history of psychological problems may be more vulnerable to developing PTSD, through a variety of mediating factors. Jones et al. (2007) conducted a European multi-site prospective cohort study of 238 recovering post-ventilation patients, to explore links between PTSD, ICU memories and sedative dose using the PTSS-14, PDS, MAAS and CAM-ICU in ICU, at 2-weeks and 3-months post-ICU discharge. Patients with a previous psychological history were more likely to receive prolonged sedation (Mann-Whitney U $p=0.0001$) and were also more likely to recall delusional memories ($p= 0.0001$). Patients who received high daily doses of benzodiazepines or opiates were noted to experience more delirium. Structural equational modelling was used to determine links between previous history of psychological problems and prolonged sedation and opiates, prolonged sedation and opiates to PTSD and from physical restraint with little or no sedation to PTSD. This model showed good fit to the

data (Chi-square = 7.88 $p = 0.72$, RMSEA = 0.0001, 90% CI= 0.0001-0.05; comparative fit = 1.00 GFI=0.90, AGFI= 0.75). The conclusions were that PTSD developed through recall of delusional memories rather than factual traumatic memories and that previous psychological problems and prolonged sedation, sedation and physical restraint, and physical restraint with minimal or no sedation but high levels of agitation were the biggest contributing factors. Levels of sedation and restraint differed across the European sites although some sites using restraint in the absence of sedation used opiates for pain relief.

Another study suggested that PTSD might be related to previous psychological history. Nickel et al. (2004) studied whether accurate PTSD diagnosis is instrument-dependent and whether it is related to pre-existing psychological morbidity or to a worsening of physical condition. They prospectively identified and followed 41 randomly-selected ICU gastroenterological and pulmonary patients, using the PTSS-10 and Apache II at recruitment in ICU, and then used the Structured Clinical Interview (SCID) for DSM IV diagnosis of PTSD at interview carried out between 3 and 15 months (average = 6.2 months) after ICU discharge. More than 50% of patients in this study had previously-documented psychological histories and no link was found between illness severity and PTSD. The study was carried out in what may be seen as only a section of general medical (as opposed to a generic medical, surgical and trauma case mix) ICU patients with a small sample size and is therefore perhaps less generalisable to the general ICU population.

1.3.4 Mechanical Ventilation

There is evidence to suggest that higher rates of PTSD might be associated with extra-corporal membrane oxygenation (ECMO) (a unique and highly intricate form of mechanical ventilation) in the ICU as found by Schelling et al. (1998) in a retrospective

case control study on 80 patients with ARDS. Using the SF-36, PTSS-10, Adverse Experiences Questionnaire (AEQ), and a structured questionnaire for anxiety, respiratory distress, pain and nightmares patients with ARDS showed higher PTSS-10 scores than all of the controls, <0.001 and a higher PTSD score in ECMO patients (35.7% ECMO v 25.8% conventional treatment $p=0.449$). Patients who experienced none/one adverse experience (self-report) during ICU stay ($n=34$) reported low median PTSS-10 scores, and those reporting 2-3 had scores of 17-28 points, ($p = 0.15$ Kruskal-Wallis); those who reported 4 events or more ($n=11$), scoring 30-40 points, ($p < 0.001$). The study may carry the risk of selection and referral bias due to it being based in one large centre.

1.3.5 Sedation

One explanation of hallucinations, delusions and nightmares is that sedatives can affect visual and auditory processing which might lead to perceptual difficulties and distortions in the ICU. Clifford and Buchman (2002) conducted a prospective observational study to explore the relationship between sedative medication and information processing and adaptive functioning in 22 intubated and ventilated surgical ICU patients. They looked at the dosage of propofol, fentanyl and benzodiazepines, presented fixed and random stimuli and documented the event-related potentials (an averaged electrophysiological brain response) collected during these. They presented either audio tones or visual flashes intermittently for 20% of the time during sedation administration. Analysis indicated a significant dose regimen (fixed v random stimulus) interaction occurred during analysis of variance for vector magnitude responses both to auditory ($df= 3, 109$ $p < 0.001$) and visual ($df=3, 109$ $p < 0.001$) stimulations, confirming the response to stimulation varied as a function of dose. Propofol was found to have a selective effect on visual processing, and

fentanyl appeared to specifically alter responses to auditory information. The investigators concluded that routine sedatives can alter brain biophysiological state and subsequent information processing of auditory and visual stimuli.

Further evidence exists to link sedation with PTSD development, but the link between mechanical ventilation and consciousness was not so clear. Weinert and Sprenkle (2008) prospectively followed 80 ICU patients during the ICU stay, at 2-months post ICU and 6 months post-ICU discharge to determine the relationship between ICU sedation, analgesia, wakefulness and symptoms of PTSD, using the Minnesota Sedation Assessment Tool (MSAT), the PDS, summed sedative drug doses converted into mg/kg separated into 4-hour time blocks, and an 11-item likert scale created by the investigators to explore elements of episodic and explicit memories. A linear positive relationship was found between sedation intensity score (SIS) and delirious memories. Forty-two per-cent in the lowest quartile of SIS (lowest sedation exposure) had a delirious memory compared to other quartiles (66%, 58% and 71% $p = 0.05$). However, increasing consciousness was correlated with increased PTSD symptoms up to the highest quartile of consciousness. It is well known that benzodiazepines are known to obliterate or seriously affect explicit memory rather than levels of consciousness. Greater levels of consciousness were associated with increased factual memory for the ICU experience. The investigators concluded that the results indicated that levels of wakefulness (as measured by the Minnesota Sedation Assessment Tool Arousal threshold) during ventilatory support influence post-ICU recall and PTSD rather than illness severity or levels of sedation.

Long-term isoflurane sedation may result in lower levels of hallucinations or delusions in ICU and result in better post-sedative psychological progress. Sackey, Martling, Carlsward, Sundin and Radell, (2008), in a prospective follow-up study, assessed two

groups of 20 patients (randomly allocated to sedation with intra-muscular or inhaled isoflurane or midazolam sedation during ICU admission), for comparison of ICU memories, anxiety and depression, signs of post-traumatic stress and general well-being. Patients with moderately high HADS ($p=0.02$) or IES ($p=0.01$) scores reported significantly more memories of negative ICU feelings at 6-month follow-up, and the number of memories of feelings correlated with HADS and IES (Spearman's Rho $p=0.82$ $p<0.001$ and 0.82 $p<0.001$). There was a trend towards non-responders at 6-month follow-up demonstrating more psychological symptoms at the 96-hour follow-up stage, and avoidance is a known feature of PTSD.

Capuzzo et al. (2001) conducted a prospective cohort study of 152 patients (Group A - 45 patients without sedation, Group B - 85 patients on morphine and Group C - 22 patients on morphine and other sedatives) and concluded that sedation does not influence PTSD development. They found a lack of memory in 1:3 but this was more related to length of stay in ICU. Groups more associated with higher PTSD scores were females, emergency admissions, those with severe infection and patients receiving steroids. They used demographic information, Apache II, Simplified Acute Physiology Score (SAPS) to explore analgesia, sedation, memory and quality of life, they recruited and assessed in the ICU and then at 6-month follow-up. Mechanical ventilation occurred in 55% of Group A, 85% of group B and 100% in group C ($X^2 = 11.5$ $p<0.01$). Absence of ICU memory was reported by 38% of the group which did not receive any sedation (Group A), 34% of those receiving morphine (Group B), and 23% of those receiving combinations of morphine and other sedatives (Group C). There was no difference in the incidence of reported factual, sensational and emotional memories across the groups. Females reported on average one more emotional memory than males, O.R. = 4.17, (95% CI= 1.59 – 10.97). Lack of

memory occurred in 1:3 patients but appeared to be more influenced by length of stay than sedation levels. Response rate was relatively good with only 24% attrition rate, however it is notable that the study relied upon declarative memory rather than prompted retrieval. The investigators concluded that a lack of memory in one-third of patients is influenced more by reduced length of stay in ICU than by ICU sedation levels. No patient spontaneously recalled ICU but could recall pain when prompted. The authors concluded that analgesia and sedation do not influence the incidence of factual, sensation and emotional memories of ICU patients. Although the study explored possible relationships between analgesia, sedation and memory of intensive care, any potential relationship between factual memories and emotional memories was not explored. Previous Benzodiazepine use was also found to be related to lower SF-36 scores and higher PTSD scores by Zatzick et al. (2007).

1.3.6 Delirium

Mechanical ventilation is the major reason for admission to an intensive care unit and delirium after mechanical ventilation was found to be a risk factor for PTSD in a prospective follow-up study by Girard et al. (2007). Using the CAM-ICU, Apache II, Charlson Co-Morbidity Index (CCMI) and PTSS-10 in 43 (only 24% of original sample) medical and coronary ICU patients, they found that 14% of patients scored more than 35 on the PTSS-10 at 6-month follow-up. The majority of these patients reported memories of: panic (67%); suffocation (50%); nightmares (20%); and severe pain (20%). Multivariate analysis demonstrated women had higher PTSS-10 scores by 7.36 points (95% CI= 1.62 – 13.11, $p=0.02$), but symptoms declined after 50 years of age ($p=0.04$). Total dose of ICU lorazepam was associated with PTSD (95% CI= 0.17-0.61, $p= 0.04$), but PTSD was not

significantly correlated with duration of mechanical ventilation (Spearman's Rho 0.034, $p=0.83$), or duration of ICU stay ($p=0.51$). The hypothesis that those experiencing increased duration of delirium would be more prone to post-ICU PTSD development was not supported ($p=0.31$). The conclusions were that high levels of PTSD symptomatology were found in 1:7 patients following mechanical ventilation during ICU stay and was more predominant in females and less predominant amongst older people, all of which was associated with ICU Lorazepam dosage. Limitations of the study were that the current levels of data could not determine which components of the ICU experience were instrumental in this.

If delirium is implicated in the development of PTSD, this is significant for the ICU population as the prevalence of delirium was 83.3% in one ICU population. Ely, Inouye and Bernard (2001) used the CAM-ICU, Glasgow Coma Scale (GCS) and Richmond Agitation-Sedation Scale (RASS) and daily paired nursing evaluations on 96 ventilated coronary care and intensive care patients compared with clinician-rated DSM IV assessments. Using the CAM-ICU, delirium was noted to occur in 80 (83.3%) patients during the ICU admission for a mean of 2.4 days (SD= 1.6) median= 2, (IQR = 1-3 days). Even when patients were relatively semi-conscious – conscious, capable of making eye contact and responding to command (as determined by the RASS), they were still delirious in 39.5% of ratings as determined by the DSM reference standard and 42.5% of observations as rated by the CAM-ICU.

Delirium has been linked with sedative administration, for example Jones et al. (2007) found the rate of delirium in their multi-site study ranged from 14-65% ($p>0.0001$, median 41%) the development of which was more prevalent in those patients receiving high daily doses of benzodiazepines (median 24 mg versus 13 mg; Kolmogorov-Smirnov Z $p=0.003$).

Those receiving more opiates were also more likely to develop delirium (88 mg versus 43 mg $p=0.039$). Over 50% of patients recalled delusional memories. Patients receiving high doses of propofol as the main sedative were not more likely to become delirious ($p=0.634$). Patients with withdrawal symptoms from sedation and analgesia were more likely to be delirious (25:32 $p<0.0001$). Patients demonstrating signs of agitation are likely to receive increasing amounts of sedation to help them tolerate life support systems.

One study found that a good predictor of post ICU PTSD related signs is a higher MAS level. Samuelson, Lundberg and Fridlund, (2007) investigated the link between post-ICU emotional distress and memory and traumatic experiences in the ICU, in a prospective cohort of 226 patients at 5 days and 2-months post ICU, using the ICU Memory Tool (ICUM), ICU Stressful Experiences Questionnaire (ICUSEQ), the HADS, and IES-R. Signs of agitation (as seen by higher MAAS scores 4-6) were a significant predictor of high levels of acute PTSD-related signs. High sum HADS scores at 5-days post ICU were found in 19 patients with an IES score of $+30$. These 19 patients were significantly younger, more likely to be female and given midazolam for agitation and reported more ICU experiences as “extremely stressful.” At 2-months post ICU, anxiety (2.0 vs 1.0 $p=0.0001$) and PTSD scores (3.0 v 2.0 $p=0.044$) were elevated in the 121 patients with extremely stressful experiences in ICU compared to those without such experiences, and the sums of HADS scores at this stage significantly correlated with IES-R scores ($r=0.660$, $p<0.0001$). Patients interviewed at 5 days and then lost to follow-up had significantly higher levels of anxiety shortly after ICU discharge than those interviewed at 2 months (median sum scores of 6.0 v 2.0, $p=0.006$). Limitations of the study were that the SEQ and IES need further validation for the ICU setting. High attrition rates and post-discharge telephone interviews may have confounded some of the results.

1.3.7 Delusions, Hallucinations and Nightmares

Another study found that presence of delusions, hallucinations and nightmares were related to increased severity of illness and subsequent length of ICU stay. Samuelson, Lundberg and Fridlund (2006), explored the relationship between memory and sedation in mechanically-ventilated ICU patients and any possible effects of sedation upon recall and delusional ICU memories in their prospective cohort study. Two hundred and six patients reported memories of the ICU. Higher Apache II scores and a higher proportion of MAAS scores 0-2 were noted in those reporting no recall. In patients reporting delusional memories, Apache II scores were higher, they spent longer in ICU (median 6.6 compared to 2.2 p, 0.0001 for those reporting no delusional memories), were ventilated for longer and received more midazolam than patients with recall but without delusional memories. Multivariate analysis of variance demonstrated that longer ICU stay, younger age and increased Apache II scores were associated with delusional memories. Conclusions were that heavy sedation increases the risk of having no recall of ICU and longer length of ICU stay increases the risk of delusional memories. Limitations of the study were the study design and the quality of some of the measures used.

1.3.8 Memory of the ICU Experience

Results of another study suggest that frightening experiences may also play a significant role in the development of post-traumatic stress. Rattray, Johnston and Wildsmith (2005) assessed post-ICU levels and changes in psychological indicators in their prospective longitudinal study, and attempted to relate these to subjective and objective ICU features of the ICU experience, using the HADS, IES and ICUEQ in 80 patients at 0-months, 6-months and 12-months after discharge. The frightening experiences component of the ICUEQ was

associated with higher levels of anxiety ($r=0.44$), avoidance ($r=0.47$) and intrusion ($r=0.41$) at 12-months. Anxiety and depression scores significantly reduced between discharge and 6-months, but there was no further reduction between 6-month and 12-months. Patients experiencing a longer ICU stay demonstrated higher intrusion scores at 12-months ($r=0.26$) and a longer hospital stay was associated with lower intrusion scores at the time of hospital discharge ($r=0.25$). The authors concluded that whilst psychological status is associated with objective and subjective experience in ICU, this is not related to the degree of illness. The limitations are that there is no way of knowing whether those accounted for by attrition had more unpleasant experiences in ICU.

Boer and Van Ruler (2008) investigated the cause of PTSD and depression in 108 abdominal sepsis patients using the IES, PTSS-10, Apache II and Beck Depression Inventory (BDI), at 12-months post-ICU discharge. The authors found the most prominent risk factor in the final multi-variate model for PTSD was patient report of some ($OR = 4.9$, $p < 0.057$) or many memories ($OR = 55.5$, $p < 0.001$), and length of ICU stay ($OR = 1.4$, $p = 0.004$). Increasing age was associated with a lower likelihood of PTSD ($OR = 0.74$ per 10 years increase in age, $p=0.084$). The authors concluded that PTSD could not be totally attributed to severity of illness on admission, but baseline PTSD and previous psychological history was not documented.

Jones, Griffiths, Humphris and Skirrow (2001), suggested that absence of factual recall and presence of delusional memories of ICU may result in anxiety and depression following discharge and PTSD and panic at a later stage. They concluded that PTSD may be related to recall of delusions, with factual memories acting as a protective factor. In a prospective case-series cohort of 30 patients assessed in ICU, at 2-weeks and 8-weeks following ICU discharge, they explored ICU memories and whether there was any link

with post-ICU anxiety and subsequent PTSD development, using the ICUM, HADS, IES, STAI, Fear Index (FI). A Scheffe post-hoc multiple comparison test ($p < 0.05$) showed that patients without factual recall of the ICU but with delusional memories were more likely to be anxious and depressed at 2-week follow-up. Predictors of acute PTSD at 8-weeks were trait anxiety ($p=0.006$) and delusional memories without factual recall of ICU at 2-week follow-up ($p < 0.001$). Those with a previous documented history of panic attacks (eight out of forty-five) were more likely to experience paranoid delusions (Fisher's exact test $p=0.032$), hallucinations ($p=0.017$) and nightmares ($p=0.017$) than those patients without such a documented history. The authors found that recall of factual memories in this study was not related to increasing number of days of sedation ($t=0.8$, $p=0.16$) or opiates ($t=0.88$, $p=0.12$).

1.3.9 Depression

In their retrospective cohort study of 148 ICU patients following cardiac surgery and 6-months post ICU discharge, Schelling et al. (2003) used the SF-36, the American Society of Anaesthesiologists Risk Classification (ASA), the Coronary Artery Bypass Graft Scoring System (CSS), PTSD measures and various illness demographics, and found that evidence of PTSD at one-week post discharge was related to a significant increase in depression scores on the stress symptom questionnaire ($p=0.06$). There was a statistically significant increase in stress scores across the 3 timepoints, from 19 (14.3 – 25, 25th – 75th percentiles) preoperatively, to 22 (16-29 25th – 75th percentiles) at one week after discharge from the ICU. Twenty-seven out of 148 patients (18.2%) had stress scores of more than 35 points at 6 months after cardiac surgery. The most important risk factor for PTSD symptomatology identified in this study was numbers of traumatic memories. Limitations of the study are

that not all patients completed all time-points and pre-morbid psychological and physical health histories may have influenced this, but were not documented, and some of the measures contained similar constructs which could possibly confound.

1.3.10 Predictors

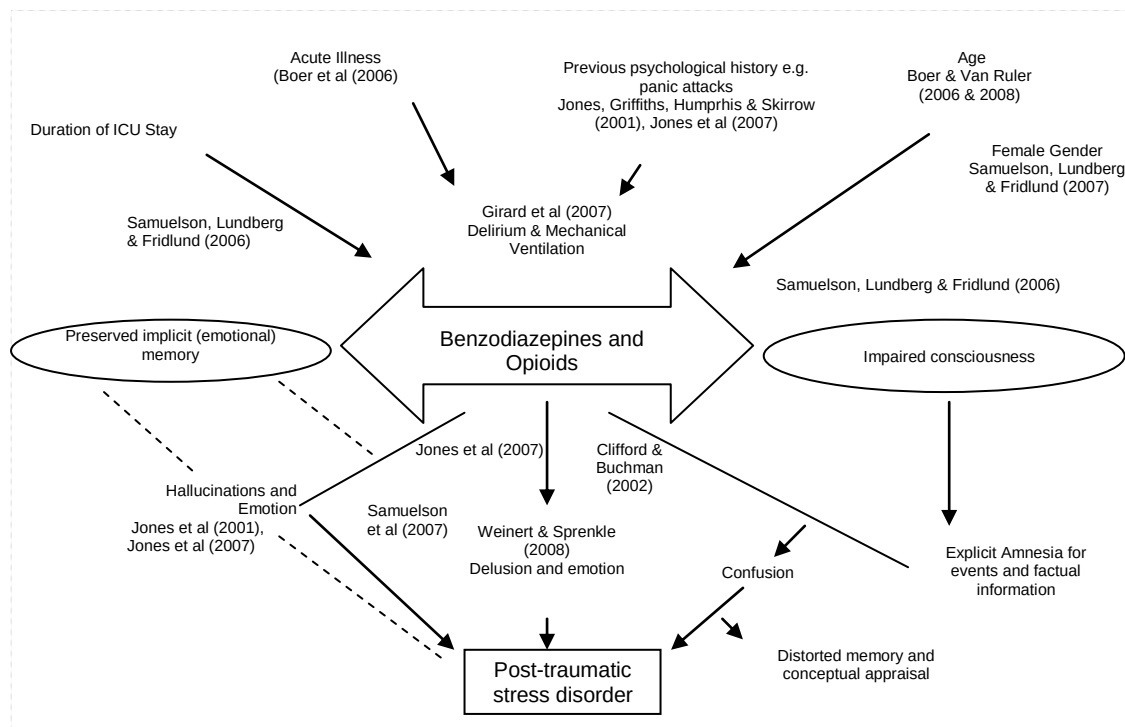
Using multiple regression in their study, Schnyder, Moergeli, Klaghofer and Buddeberg (2001) determined that only 34% of the variance of PTSD symptom profiles one year after the accident could be explained by 10 predictor variables, the most significant of which were psycho-social (biographical, sense of death threat, intrusions and problem-oriented coping). This may have been due to excluding those with previous psychological problems, groups more prone to PTSD and non-german speakers (relating to the avoidance component of PTSD). Intrusion and biographical risk factors were also found to be predictive of PTSD in the study by Hepp et al. (2008).

1.4 Summary

To summarise the most prominent findings, greater levels of PTSD were found to be associated with severity of illness, female gender, and decreasing age by Boer et al (2006), who concluded that the development of PTSD was related to presence of traumatic memories. Traumatic delusional memories and reduced levels of consciousness combined with lack of explicit recall for events but the presence of implicit emotional memory for frightening experiences may be a major factor in the development of PTSD. For example, Jones et al. (2007) and Jones et al. (2001) found that patients with previous psychological histories were more vulnerable to developing PTSD, through increased administration of opiates and sedation. Patients who demonstrated increased agitation received increased amounts of sedation. They concluded that PTSD occurred as the result of an absence of factual memories and the presence of delusional memories, and that factual memories acted as a protective factor against development of PTSD. A later study by Boer et al. (2008) found that increasing age was associated with a lower likelihood of developing PTSD and that a predictive factor was patient report of more memories of ICU and length of ICU stay. Samuelson, Lundberg & Fridlund (2006) found that delusions, hallucinations and nightmares were associated with PTSD development, together with severity of illness, length of ICU stay and age. Sedation was noted to reduce factual memory whilst length of ICU stay was related to the development of delusional memories. Girard et al. (2006), explored PTSD development in relation to delirium following mechanical ventilation and found that PTSD was less predominant in older people and that females demonstrated higher levels of PTSD than males. Samuelson, Lundberg and Fridlund (2007) found that PTSD was related to increased levels of agitation in ICU, younger age, female gender and increased benzodiazepine administration. Clifford and Buchman (2002) found that

propofol affected visual processing whilst fentanyl affected auditory processing and that the effects increased with increasing doses. Weinert and Sprenkle (2008) found a relationship between sedation and delirious memories, wakefulness and PTSD. Patients receiving the largest doses of sedation in their study experienced delusional memories, though they also found that increasing levels of wakefulness were correlated with PTSD. It should be noted however that patients receiving Benzodiazepines may appear awake but explicit memory may be obliterated for this time. Taking these studies into account, Figure 1.3 illustrates a proposed model for the development of PTSD symptomatology in ICU.

Figure 1.3: Proposed Model of PTSD Symptomatology in the ICU



1.5. Discussion

The previous paragraphs have identified how many studies have focussed upon different aspects of psychological distress as a result of intensive care unit admission. Factors found to be associated with subsequent post-discharge psychological distress are: emergency admission, severity of illness, length of stay, ventilatory support, previous psychological history associated with increased sedation requirements, increased pain, delirium, absence of factual memories with presence of delusional memories, subjective accounts of the ICU experience, younger age, increased MAS scores, benzodiazepine administration and effects of sedation upon audio and visual processing. These may result in psychosocial dysfunction in the form of reduced concentration and recall abilities, anxiety, depression, nightmares, negative feelings regarding the ICU stay, panic and other PTSD type problems.

1.6 Methodological Problems

In terms of methodological flaws in these studies, there is an absence of information regarding attrition, incomplete data sets, justification for selection of data-collection time-points and little attention paid to the reporting of negative results. Many fail to justify the sample size with a power calculation or give details regarding the level of data obtained and in one particular case, make conclusions based on information that is gained from information other than that obtained from the data.

Whilst all prevalence studies included in the review used reliable, well-validated measures to detect PTSD-type signs, all three determined relatively differing rates across a variety of timepoints. There is some suggestion that these differences may be partly accounted for by a number of issues, in particular, reason for admission, measures used, methods (such as face to face or telephone interview) and type of healthcare system. For example, Schnyder, Moergeli, Klaghofer, and Buddeberg (2001), whilst using highly reliable, well-validated measures, only researched their group up to one year post-ICU. They found 25% of patients experienced psychological distress at 12 months post-ICU but further exploration reveals that this figure was based upon ratings on the CAPS II and/or a rating of more than seven on the HADS. However a rating of seven on the HADS is just borderline “mild” and clinically would not indicate the need for intervention at that stage. The study was conducted purely in severely-injured accident victims and may therefore contain a higher proportion of people who had ongoing psycho-social issues at the time of admission and therefore may not be immediately generalisable. Whilst Zatzick et al. (2007) used DSM IV criteria for PTSD using the PCL, there is the potential for a study involving participants from any 2-tier medical system to contain distortions and indeed the authors did note significant differences in stress levels between those paying insurance and

those not, and also between White and Hispanic participants. Hepp et al.(2008) found full-blown PTSD in their sample to range between 2-6% at 3 years, with a total of 35% PTSD and PTSD-type signs across the full 3 years of the study. The attrition rate for this type of study was also relatively good at only 25% in a good generic ICU population and they used a well-validated illness-severity rating in addition to other variables measured. The Hepp (2008) study would therefore appear more reliable and generalisable than the other two options.

Illness severity and younger age was found to be related to PTSD (Boer et al. 2006), whose postal study of ICU versus Acute Surgical Unit (ASU) patients concluded that PTSD development was the presence of traumatic memories. Eighteen per-cent (7:39) of the non-ICU group compared to 28% (17:61) of the ICU group experienced PTSD ($p=0.21$), yet 89% of the ICU group required mechanical ventilation compared to none of the ASU patients. The study however contained PTSD, severity of illness, adverse experiences and demographic measures but did not consider other factors known to be relevant to the development of PTSD. Jones et al. (2007) using the PTSS-14, PDS, MAAS and CAM-ICU in their study, found those with previous psychological health histories were more likely to receive increasing amounts of sedation, and their increased recall of delusional memories was likely to account for their increased levels of PTSD. There is however the possibility that those who have only received treatment through a physical healthcare system might be less sensitised to talking about or admitting to delusional experiences and that those with previous experience of talking about psychological distress may volunteer more information. Schelling (2003) and Zatzick et al. (2007) both found that depression was related to the development of post-traumatic stress following intensive care, however Schelling's study was focussed upon cardiac surgical patients, which is a group much more

prone to awareness under anaesthesia, and also increased rates of depression as a result of previously-unanticipated side effects of surgery and therapeutic treatment. This study is therefore likely to be less generalisable to the current review question.

Rattray, Johnston and Wildsmith (2005) and Boer and Van Ruler (2008) both concluded that memories of frightening experiences in the intensive care unit were related to subsequent PTSD-type experiences following discharge from intensive care. It was thought that memory for adverse experiences and lack of any protective factor in the form of absence of memory for real events were responsible for this phenomena. Girard et al (2006) in their study found increased PTSS-10 scores in women but this declined from age 50. This was not correlated with length of stay or sedation. Lorazepam was correlated with PTSD ($p=0.04$), but not mechanical ventilation. These differences may in part be accounted for by the study being conducted in medical and coronary care where the patients may have been on a gradual decline for some time and might have more stoic acceptance to treatment through a desensitisation process, though this does not explain why lorazepam dose was correlated with PTSD yet mechanical ventilation was not. Ely, Inouye and Bernard, 2008 found one in seven medical patients had PTSD and that delirium occurred in over 80% of patients. Opiates and withdrawal of such drugs were implicated in the delirium. It is therefore possible that a combination of frightening experiences under sedation, possibly co-occurring with delirium in some cases, may lead to PTSD type symptoms.

1.7 Conclusion

The information contained above alludes to the possibility that those requiring an increased length of stay with increased amounts of sedation may be more prone to PTSD, if heavy sedation results in no recall and an increased length of stay results in delusional memories. This is however, still ambiguous because length of stay is generally related to severity of illness and also ventilatory support, which is the most common reason for admission. Factual memory of the ICU stay is perceived to be a protective factor against the anxiety caused by retention of unreal memories, and consciousness is frequently altered by delirium. Add to this debate, the findings of Weinert and Sprenkle, (2008) and Clifford and Buchman (2002) who found that different types of sedation can affect visual and auditory processing, and one can begin to see that a very good place to start an investigation might be around the mechanisms occurring in the twilight zone between sedation and consciousness following ventilation, especially those involving delusional and factual memories and implicit recall of events.

Although studies contained in the current review were identified as being in the top-ranking category out of all the data, they were not gold-standard and all had threats even to simple standards such as internal and external validity. They should not be discounted however, as they represent the best of what is currently out there in the intensive care unit clinical research field. Future studies might consider replication of previous ones to randomised controlled-trial standards to ensure assumptions based upon previous research are not flawed.

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2. RESEARCH REPORT: IMPLICIT MEMORY AND PSYCHOLOGICAL
DISTURBANCE IN INTENSIVE CARE UNIT PATIENTS

2.1 Introduction

2.1.1 Post-Traumatic Stress Syndrome as a problem for ICU patients

Post-traumatic stress disorder (PTSD) and psychological disturbance are known to be a problem for a significant proportion of patients who pass through an intensive care unit, but this varies across studies and populations surveyed. For example, whilst Schelling et al. (1998) found a 27.5% prevalence rate in intensive care unit survivors with acute respiratory distress syndrome (ARDS) approximately 6-10 years following discharge, others such as Koshy, Wilkinson, Harmsworth and Waldmann, (1997) have found less at around 15%. Granja et al. (2005) in their multi-site study, found that prevalence rates for a number of variables related to PTSD varied considerably across sites, such as amnesia for hospital admission (between six and forty-two percent) and amnesia for the intensive care unit stay (21-68%). Twigg, Humphris, Jones, Bramwell and Griffiths (2008) found that 16% met the full criteria for PTSD and 27% met at least five of these criteria, leading the authors to suggest that measurement may also contribute to varying prevalence rates.

In their study exploring psychological disturbance in intensive care, Jones et al (2007) found those patients admitted as the result of trauma were no more likely to experience PTSD than patients admitted for other reasons. A considerable amount of evidence exists to support the idea that PTSD type symptoms are only partially accounted for by the illness or injury which resulted in patients' admission to ICU (Skirrow, Jones, Griffiths & Kaney, 2001).

2.1.2 Definition of Post-Traumatic Stress Syndrome

PTSD is a severe anxiety state, experienced as a result of a significant negative life event which threatened serious injury or death to the person concerned, witnessing death or

serious injury to another person or learning of such an event. Responses to the event involve either total helplessness, intense fear or extreme horror. The symptoms of PTSD comprise four separate domains: persistent re-experiencing of the traumatic event; persistent avoidance of things associated with the event; numbing of general responses to the trauma; and increased arousal levels (American Psychiatric Association Diagnostic and Statistical Manual IV, DSM IV, 1984). This seriously impacts upon social, occupational, psychological or other functioning. The full DSM IV diagnosis of PTSD is based upon the presence of three items out of the four domains and should be present for more than one month. Clinically, features of post traumatic stress may occur independently of physical outcome and manifest in the form of dreams (Roberts & Chayboyer, 2004), nightmares and hallucinations (Rundshagen, Schabel, Wegner & Schulte am Esch, 2002), delusions (Jones, Humphris & Griffiths, 2000) flashbacks, emotional buffering, amnesia and cognitive avoidance, anxiety and depression (Skirrow et al., 2001) and heightened startle response and hypervigilance, (Brewin, Dalgleish & Joseph, 1996), all of which can thwart recovery and subsequent quality of life.

2.1.3 Delirium

Several factors are thought to be associated with the development of psychological disturbance including illness severity and treatment, metabolic and systemic dysfunction (Griffiths & Jones, 2007), severe infection (Jones, Humphris & Griffiths, 2000) and sleep disturbance (Jones, Griffiths & Humphris, 2000), all of which can lead to delirium. Delirium was found to be the prime factor in length of hospital stay following intensive care unit admission in a study by Ely et al. (2001) even after adjustment for severity of illness, age, gender, race, benzodiazepines and narcotics.

A study by Roberts, Rickard, Rajbhandaria and Reynolds (2007), found that those with delusional memories had less real recall for factual events at two years post-intensive care, than those without. Jones, Griffiths and Humphris (2000) describe how a combination of illness severity, the effects of therapeutic intervention, and drug withdrawal may combine to create minimisation of memory for external events and magnification of internal events. Delirium increases the risk of amnesia and sleep disturbance increases risk of confusion, which is another feature of delirium, potentially exposing the ICU patient to frightening hallucinations, delusions and nightmares often without the protection of an external reality. Granberg, Engberg and Lundberg (1999), referred to this as “ICU syndrome” and found that good informational care and communication helped reduce the impact of such experiences. Jones et al. (2007) found that the median incidence of delirium in their study was 41% and this was more common in patients who received high daily doses of benzodiazepines as sedatives and those receiving the hypnotic agent propofol (an anaesthetic which does not contain any pain-relieving properties).

2.1.4 Sedation

Sedation is necessary to permit patient tolerance of systemic life support during the ICU stay. The most commonly-used sedatives and pain-killing drugs are known to interfere with memory processes by disrupting the mechanisms involved in encoding information into memory (Jones et al., 2007). In their study of ICU patients, Ely et al. (2001) found benzodiazepines and narcotics to be the biggest risk factor for delirium at 29%. When used for minor procedures, sedation can often result in conscious awareness without explicit recall for the duration of the procedure and under these conditions it is possible that implicit memory, in particular for emotionally-salient stimuli, may arise (Woodruff & Wang, 2004).

It is thought that sedation interferes with the encoding phase of memory so that explicit perceptions are not actually fully encoded (Wang, 2000).

2.1.5 Anxiety and Depression

In their study of emotional disturbance in intensive care unit patients, Skirrow et al. (2001) found that many patients experienced significant amounts of anxiety and depression as well as some features of PTSD. In their qualitative study involving in-depth interviews with six former intensive care unit patients six months following discharge, Adamson et al. (2004) found increased levels of depression were associated with unpleasant memories but that retained memories appeared to be more generalised than specific.

2.1.6 Memories for unreal events

A significant amount of evidence exists to support the suggestion that it is not only the impact of illness, injury or physical care which can affect psychological recovery, but also the effect of the patient's own internal world during the intensive care unit stay. For example Schelling et al. (1998) in their study of 80 former intensive care unit patients found that psychological distress may follow a period in which the patient is not able to make full sense of what is happening during their acute care and may perceive episodes of essential nursing and medical procedures in ICU as traumatic. Alterations in levels of consciousness are common in ICU and whilst some may be due to sedation, other causes of this may include delirium (Griffiths & Jones, 2007). When this occurs during a significant part of the ICU stay, the patient may be left with delusional or hallucinatory memories with no or little factual memory of their admission. This combination can often leave patients feeling traumatised and they may also experience flashbacks, which may in turn leave the

patients more vulnerable to increasing levels of anxiety and features of post-traumatic stress (Griffiths & Jones, 2001).

Roberts, Rickard, Rajbhandari and Reynolds (2006) interviewed 41 patients approximately 18-24 months following an intensive care unit admission. Twenty out of 40 recalled memories of the intensive care unit, 14 recalled their dreams and memories experienced in intensive care, three had no recollection of dreams or their intensive care unit stay and four could only recall the dreams they experienced but nothing else. Thematic analysis of the responses also revealed that six patients experienced unusual auditory phenomena in intensive care and 12 experienced visual phenomena. Granja et al. (2005) reported that 51% of participants experienced dreams and nightmares. Roberts and Chaboyer (2004) found that 74% of patients interviewed 12-18 months post-discharge reported the common occurrence of scary dreams, and that these invoked a mixture of indifference, positive affect, divine experience, persecutory feelings and visual effects. Dreams and unreal experiences are known to be associated with post-traumatic stress disorder (Vick & Roberts, 2002).

In their attempts to describe memories of eight intensive care unit survivors, Minton (2005) used thematic analysis which revealed descriptions falling into several domains, including loss of control, being close to death and memories of dreams and hallucinations. Rundshagen, Schnabel, Wegner and Schulte am Esch (2002) found that whilst 17% recalled the trauma of extubation (removal of breathing tube), 21.1% recalled dreams, 9.3% recalled nightmares and 6.6% recalled hallucinations; 64.7% reported recalling nothing. Those whose stay lasted longer than 24-hours reported increased memory for nightmares and hallucinations. In their validation study of the Intensive Care Unit Memory Tool (ICUM), Jones, Humphris and Griffiths (2000) found that nine patients out of a cohort of

45, interviewed at two- weeks following intensive care, reported having no recall of factual memories of ICU but the presence of delusional memories; these patients also had difficulty in recalling their time around their admission prior to their ICU stay. Lof, Berggren and Ahlstrom (2006) found that patients' memories of hallucinations, dreams and nightmares were generally present at three months and at six months post-hospital discharge. A study exploring the potential relationship between bizarre memory experiences of 238 patients in intensive care and sedation techniques was conducted by Jones et al (2007), who found recall of delusional memories was common (at 44%, 77% and 57% respectively across three time-points).

2.1.7 Lack of Memory for Real Events

Lack of memory for the ICU stay has been implicated as a contributor to PTSD in several studies. Thirty-eight percent of patients surveyed by Granja et al. (2005) reported having no memory for their ICU stay. There is some suggestion that memories for real events may serve as a protective factor against the potential damage of memories for unreal events (Jones, Griffiths & Humphris, 2000; Schelling et al, 1998) and that such false memories are predictive of patients developing post-traumatic stress, with a lack of memory for real events making it difficult for the patient to combat the effects of delusional memories. In their qualitative study into the subject of critical illness and intensive care unit stay, Corrigan, Samuelson, Fridlund and Thorne (2007) found that many patients described the intensive care unit experience as extremely distressing, in particular, aspects involving difficulties in breathing. Some patients were relieved that they had no recall of the ICU but others found this extremely traumatic. Some described post-discharge environmental cues acting as triggers to re-experiencing events, for example, an incident in

a TV programme or the hospital itself, or in an extreme case, the word “intensive care” being said on the radio. Many of these patients described experiencing despair and panic on waking from nightmares, re-experiencing the trauma and excessive avoidance behaviour. Lof et al. (2008), suggested that patients’ memories of both real and unreal experiences in the intensive care unit remain relatively stable over a period of time. A study of one hundred ICU patients by Rotondi et al. (2002) concluded that people are much more likely to remember experiences of the ICU which were particularly bothersome for them. The challenge for ICU professionals is therefore to work towards care and treatment strategies which will help improve patients’ factual memories for the ICU stay.

2.1.8 Impact on General Memory functioning

There is also some evidence to show that a stay in ICU may result in overall reduced cognitive functioning. In their study of thirty patients discharged from intensive care (Jones, Griffiths, Slater, Benjamin & Wilson, 2006), participants demonstrated considerable difficulties in strategic thinking and problem-solving below the twenty-fifth percentile for an age-sex matched population. Impaired memory was correlated with severity of illness scores, but not length of stay or age. Difficulties in problem-solving in the intensive care unit correlated with the length of ICU stay, age and length of hospital stay. These difficulties were retained by 26 out of the 30 patients at one-week follow-up. Those who experienced significant memory problems in the intensive care unit showed a greater tendency to attrition, but avoidance is another feature associated with PTSD (American Psychiatric Association, 1994). These difficulties bear many similarities to symptoms described as post-operative cognitive dysfunction found in elderly cohorts following anaesthesia for operative procedures (Bryson & Wyand, 2006).

2.1.9 General Health & Recovery and Perceived impact on quality of life

There appears to be a complex interplay between effects of emotional distress upon physical outcome and vice versa. Hough (2005) reports how health-related quality of life can be significantly reduced after a period in intensive care. A study into recollections of the intensive care unit experience and subsequent effects was conducted with 464 patients, via questionnaire by Granja et al. (2005) who reported that 14% of these experienced a decreased quality of life with some suggestion that this was associated with amnesia and persistent nightmares. Corrigan et al. (2007) reported how the ICU experience led to ongoing stress and strain in the current life situation, self-transformation, a negative impact upon interactions with others and an inability to move on from the experience. Griffiths and Jones (2001), highlighted how an absence of factual memory, presence of delusional memories and a lack of recall can cause huge problems for patients both in the immediate aftermath of a period in the intensive care unit in the form of confusion, panic and low mood, and also in the longer-term after hospital discharge in terms of difficulty in adjustment and reduced quality of life. Kapfhammer, Rothenhausler, Krauseneck, Stoll, and Schelling (2004) found that patients with a full-blown diagnosis of PTSD experienced the worst level of mental, social and general well-being, and the risk for PTSD was correlated with length of ICU stay. Twenty-three per-cent of these long-term survivors were still experiencing symptoms of PTSD up to eight years after the admission event. This requires further exploration because whilst visible physical injury or illness is often easily-understood by those supporting the individual, emotional variables present much more of a challenge to some therefore placing the patient at greater risk of lack of support and social isolation.

2.1.10 Therapeutic management

Whilst there is some suggestion that neuropsychological symptoms may contribute to this type of distress, good management of such issues can mediate the effects upon the individual. Griffiths, Jones and MacMillan (1996), reported that such difficulties can often go unchecked for a considerable period of time, often with the patient experiencing severe frustration at the lack of physical and emotional progress they are making and similar levels of distress for supporting relatives. Whilst follow-up clinics check that the patient is making satisfactory physical progress, appropriate and timely questions regarding the patient's emotional adjustment are rarely asked and the patient is often discharged to the care of their GP who has had no involvement with the acute admission. Griffiths and Jones (2001) recommended the use of an intensive care unit diary for staff and relatives to complete during the patient's admission and for this to be read and explained to the patient following discharge, together with psychological screening and follow-up. Simultaneous work by Backman and Walther (2001) suggests that a memory diary, with photos may provide a useful narrative account of what the patient is unable to recall themselves. Corrigan, Samuelson, Fridlund and Thorne (2007) concluded that the impact of such an experience might be prevented by reducing stress and fear in the ICU and that follow-up and screening could also avoid unnecessary distress. Magarey and McCutcheon (2005), concluded that constant reassurance and intensive care unit debrief may help patients to process the experience, and friends and relatives may help to provide and build real memories of intensive care. Schweickert and Kress (2008) advocated daily sedative interruption and titration of drugs to facilitate withdrawal. There is therefore considerable potential for investigative trials aimed at evaluating strategies aimed at improving communication, care and treatment.

2.1.11 Relevant Studies into PTSD

Several studies conducted outside the realms of ICU may provide useful insight into areas to investigate in this area. Neurogenic amnesia and post traumatic stress syndrome have often been thought to be incongruous but Krikorian and Layton (1998) proposed it is possible for them to co-exist. They concluded that implicit memory processes play a part in the development of post traumatic stress disorder and suggested that a single traumatic episode can facilitate sensitisation and ensuing conditioned emotional responses in the absence of any declarative memory (factual memory which can be consciously retrieved). They state that the declarative memory system (relating to explicit memory) is mediated by the medial temporal and diencephalic structures, whereas non-declarative memory (relating to implicit or learning memory) is mediated by a vast number of cognitive structures (existing independently of the medial-temporal diencephalic system) and also mediate behaviour change and other psychological functions including learning. This last point would appear to fit with the model proposed by Tulving, Schacter and Stark (1982) who found that priming effects (obtained by subtle exposure to targets and then tasks such as word pairs to obtain a measure of priming) and recognition effects (obtained by purposeful exposure and remembering) differed. This led the authors to conclude that priming effects in word-fragment completion may occur through a different system to that which processes word recognition.

McNally, Kaspi, Riemann and Zeitlin's (1990) experimental study in which Vietnam veterans with and without post-traumatic stress were asked to participate in a stroop test of positive, negative and trauma words in coloured ink, revealed that greater post traumatic stress severity was linked to slower speeds on the naming of trauma words, but that the degree of combat did not correlate with this. They concluded that these participants may

have difficulty in suppressing trauma word meanings once they are activated on such tasks and that posttraumatic stress results from ease of access to semantic memory and ineffective inhibition of such access. Further difficulties in accessing autobiographic but non-traumatic memory may further impede any recovery process by preventing access to what might be seen as protective resources and affecting day-to-day problem solving. A reduced ability to draw upon optimism and a lack of vision that things will improve may further help the development of another potential feature of the post traumatic stress experience – depression. Other authors, such as Ehlers and Clark (2000) placed a slightly different emphasis upon what constitutes post traumatic stress. In their model, post traumatic stress becomes ongoing and problematic when individuals perceive continued serious current threat which arises from people appraising the trauma experience in an overtly negative way and also from the experience of a disturbance of autobiographical memory (poor elaboration/contextualisation, with strong associative memory and perceptual priming).

2.1.12 Studies investigating the presence of implicit memory

The current study draws upon the findings of implicit memory from two separate spheres of psychology: that of traditional experimental studies into PTSD and also that conducted into awareness under anaesthesia and some analogy with the psychoanalytic schools of thought. For example, Schacter (1987) wrote of how traditional studies into memory have made use of explicit memory tests such as those that draw upon recall and recognition. The concept of implicit memory can be seen (though it is termed differently by the various authors) as similar to phenomena described in the case of “Anna O” and “Frau Emmy Von N” by Freud and Bruer (1966), in which previous traumas appear to be

repressed in memory and sporadically are brought into the conscious by cues which occur in the present.

Zeitlin and McNally (1991) used cued recall and word completion tests in Vietnam veterans with and without PTSD. The results of the word completion test suggested that only PTSD subjects show any implicit memory bias for combat words and that this bias may underlie the “re-experiencing” components which characterise part of PTSD. Similar findings were found by MacLeod and McLaughlin (1995) in a non-traumatised highly anxious group tested against a non-anxious control group using explicit and implicit memory tests. McNally and Amir (1996) used trauma, positive and neutral words to test a cohort of Vietnam veterans with PTSD and without PTSD. They were then shown a series of target and distractor words. More old words were identified than new words by both the PTSD and non-PTSD groups, but the priming effect was not enhanced for trauma words in the PTSD group. The authors concluded that tasks specifically aimed at capturing evidence of perceptual implicit memory may not provide enough sensitivity to detect further emotional variables concerned.

2.1.13 Awareness under anaesthesia research

Studies into awareness under anaesthesia have done much to support the idea of two relatively separate parts of memory which at first do not appear to map directly onto traditional cognitive theories of long-term and short-term memory, although there may be some overlap. Levinson (1965), created a mock emergency situation verbalised during operation on ten patients with EEG monitoring for signs of stress. Whilst no patient had explicit recall for the event, hypnosis and regression revealed four out of ten patients repeated almost word-for-word what the anaesthetist had verbalised during the procedure,

and a further four recalled hearing something and indicated that the anaesthetist was the speaker.

Jelicic, Bonke, Wolters and Phaf (1992) wrote of how repetition priming (strengthening of a stimulus through repeated presentation) was possible when information was presented intra-operatively. Bonebakker et al. (1996) undertook a similar study using similar techniques to explore whether patients could hear and assimilate auditory information presented to them during anaesthesia but testing for explicit and implicit memory and concluded that a single presentation of auditory information is sufficient to produce implicit memory and does not require repetition. Significant amounts of priming (implicit memory) were revealed for one of two animal sounds played to a child cohort undergoing anaesthesia who were then post-operatively played degraded versions of these sounds through white noise, whilst post-operative response and recognition times were monitored (Phelan, Sheppard & Davidson, 2009). Wolters and Phaf (1990) presented a paper of evidence of two entirely separate memory mechanisms within the brain and postulated that explicit memory relies upon the formation of new associations, whilst implicit memory relies upon strengthening of already-existing associations. Hugdahl, Mathiesen and Gullestad (1996) played a tape of animal, flower and country words to one group of patients intra-operatively, and pink noise (similar to white noise but less harsh) to the other. When tested post-operatively, despite no statistical significance being reached, the highest hit rate for words was achieved by the group that was “primed” during anaesthesia. Most of these studies assumed that patients are unconscious through adequate sedation, however Russell and Wang (2001) stated that patients are not unconscious although they are sedated; conscious but with post-operative amnesia for the event. In this sense, patients in the

intensive care unit experience the same state – they are sedated and conscious but may have little factual memory of the event.

Other studies have attempted to introduce more ecologically-valid ways of measuring intra-operative memory effects. For example, Russell (1993) used the isolated forearm technique (IFT) – in which a tourniquet is applied to prevent paralysis of the limb from anaesthetic agents and the patient is asked to respond to intra-operative command by moving the isolated (non-paralysed) limb. This demonstrated that whilst the IFT cannot predict which patients will have post-operative recall, lack of post-operative recall does not necessarily indicate unconsciousness during surgery. Odby-Muhrbeck, Jakobsson and Enquist (1995) attempted to assess the effects of therapeutic suggestion to one group of intra-operative patients whilst a blank tape was played to another group. No differences in nausea and vomiting were noted within the 24-hour post-operative period although those patients who received the positive suggestion had less recall for nausea and vomiting compared to the other group. Similar conclusions were reached by Reinsel, Veseli, Duff and Feshchenko (1996) who concluded that measurement of implicit memory is highly sensitive to varying methodological applications. Andrade, Jeevaratnam and Sapsford (1996) concluded that the key factor involved may well be depth of anaesthesia and degree of surgical stimulation. Alkire, Haier, Fallon, Barker and Shah (1996), using positron emission tomography (PET) to map the functional neuroanatomy of implicit memory, found that Wernicke's area, angular gyrus, Broca, parts of prefrontal cortex, occipital cortex, precuneus, basal ganglia, cerebellum, parahippocampal and hippocampal areas may be implicated in verbal implicit memory, but may not account for other forms of implicit memory. Richardson (1989) highlighted how some comparison may be made between the memory impairments found in many amnesic disorders and the knowledge deficits

experienced by patients undergoing sedation or anaesthesia, whilst their skill levels remain intact, linking these with procedural and declarative memory. Wang (2000) illustrated that sedated but conscious patients are able to learn emotional information during this time, without knowing where or when such information was acquired, often resulting in the patient's emotions being triggered by seemingly innocuous environmental cues and stimuli.

2.1.14 Previous implicit memory studies in ICU

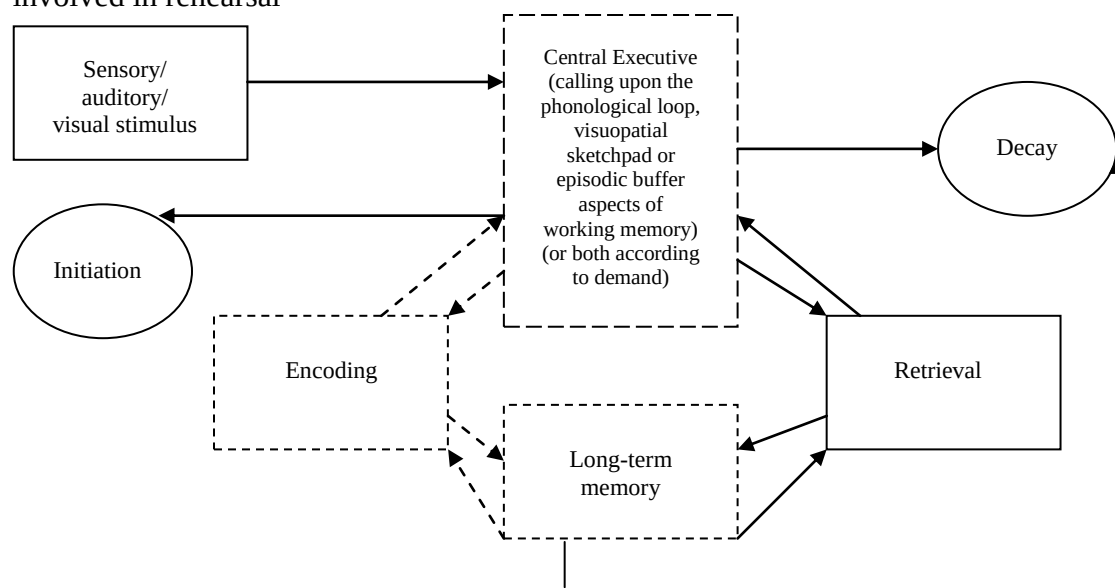
To date there is a gap in the knowledge base regarding whether implicit emotional memory does play a significant role in the development of PTSD in intensive care unit patients. Whilst Clark, Voss, Barnard and Sleight (2003) investigated the possibility of implicit memory occurring in a group of cardiac surgery patients following surgery, they concluded that under moderate to deep propofol sedation there was no evidence of any memory formation (explicit or implicit). This may however, have been due to the lack of emotional salience contained in the word pair and process dissociation word procedures used. A test of implicit memory that taps into the emotional salience of the patient's experience may prove more conclusive.

2.1.15 Cognitive Models of Memory

A useful theoretical framework for psychological exploration of PTSD type problems in the ICU is that of the cognitive model (Atkinson & Shiffrin, 1968; Craik & Lockhart 1972; Baddeley and Hitch 1974; and Shallice, 1982) which breaks down the memory processes into basic component parts, the three main ones being those of acquisition, retention and retrieval. During acquisition, the information being perceived requires processing, using bottom up (perceptual based information received from the senses) and bottom-down

(previously acquired and assimilated knowledge) to identify and encode the information acquired. Memory deficits may occur at any of the processing stages, the central executive may be prevented from calling upon the most appropriate part of working memory due to deficits in initial perception; the encoding mechanisms may be prevented from encoding the perceived information correctly due to either deficits in perception or in working memory. This in turn will affect the storage of such information into long term memory and may also impede its subsequent retrieval. Wang (1998) suggested that sedation (in particular, benzodiazepines and opioids) will affect all of these processes but in particular, a rehearsal stage which (within the cognitive model as detailed in Figure 2.1) is not essential for encoding but increases the likelihood of encoding from short-term into long-term memory. Emotionally-salient stimuli may also be more likely to be encoded without any rehearsal. This may suggest that learning (implicit) memory may require less rehearsal than declarative (explicit) memory which relies on the laying down of memory through rehearsal of short-term into long-term memory.

Figure 2.1: Cognitive Model of Memory. The dashed lines and boxes indicate processes involved in rehearsal



2.1.16 Classical Conditioning & pairing

Classical conditioning involves an initial response to an unconditional stimulus (for example, salivation in response to food being placed in a dog's mouth), as originally described by the Russian physiologist, Pavlov (1849-1936). In this sense, the sedated ICU patient may have had increased anxiety and distress at times during their stay in intensive care as a result of some care procedures, pain, or audio or visual stimuli (unconditional stimulus) they perceived as frightening or torturous to themselves or others (unconditional response), or they may have had nightmares, delusions or hallucinations during this time. When fully recovered they may have no explicit recall, but somehow they may have some implicit memory of their ordeal. Afterwards, an environmental cue may act as the conditional stimulus to them remembering the unconditional stimulus (fearful or painful ICU experience), with the result being flashbacks to the real or unreal experiences in intensive care (conditional response).

2.1.17 Schwender Study and its emotional salience

Schwender et al. (1994), illustrated the significance of implicit emotional learning in their study involving forty-five anaesthetised patients. Patients were played an abbreviated version of the story of Robinson-Crusoe versus another story during anaesthesia. The Robinson Crusoe story was specifically selected for its emotional salience to the predicament of the patient. Three to five days later they were tested for their implicit memory of the story using a free association question - what is the first thing that comes to mind when given the word "Friday?" Whilst many of the cohort responded with reference to days of work, or the weekend and such, seven out of the cohort responded with answers such as Robinson Crusoe and Desert Island, which statistical analysis revealed was

significant. Examination of intra-operative EEG evidence demonstrated that the patients who responded with answers related to the Robinson Crusoe story had a significant level of consciousness at this time, despite having no explicit memory for hearing the story. The authors concluded that the emotional salience of the state of isolation under anaesthesia helped the Robinson Crusoe story to be encoded in implicit memory.

2.1.18 Justification for conducting the current study

It is proposed that the triggering event for PTSD flashbacks and emotional disturbance (conditional response) may be something with emotional salience which sounds or looks like an event or occurrence that took place in the intensive care unit. In many patients, this initial stressful situation (unconditional stimulus) may not be immediately accessible to consciousness and it may be brought to the forefront of their memory only when the conditional stimulus is paired with the conditional response. The current investigator proposed that responses to such triggers are likely to occur at a behavioural/emotional level, occurring faster than the pace at which the patient can process the events which are taking place within their own emotions. The topic is worthy of investigation because, whilst implicit memory has been explored as a potential contributor to PTSD in ICU before (Clark, Voss, Barnard & Sleight, 2003), the emotional component of implicit memory has not been explored, nor have they used experimental implicit emotional memory measures. It was therefore decided to conduct an experimental randomised controlled trial to see whether implicit emotional memory plays a part in the development of PTSD in ICU, by using soundtrack at the end of the study paired with skin conductance to determine any emotional response to ICU stimuli, together with an emotionally salient story and prompted recall question to elicit information presented in ICU.

2.1.19 Aims

The current study was an exploratory investigation in a group of general intensive care unit patients sedated for at least 24 hours. It aimed to test the hypothesis that classical conditioning of ICU environment sounds occurred in ICU patients during admission and that this could be detected by measuring skin conductance responses to a variety of recorded sounds at 4-5 week follow-up.

2.1.20 Hypotheses

The hypotheses for the current study were:

1. That sedative drug regimens facilitate classical conditioning (pairing) of ICU environment sounds to patient distress or anxiety in the ICU which can then be detected after discharge as an emotional conditioned response to the presentation of ICU sounds whilst monitoring skin conductance.
2. That the assimilation of aural information and/or classical conditioning occurs more frequently in patients reporting higher levels of emotional distress following discharge.
3. That critically-ill patients may assimilate verbal information with emotional salience whilst receiving sedative drugs in ICU and that this assimilated verbal information may be retrieved in the absence of explicit recall after ICU discharge by a process of free association.

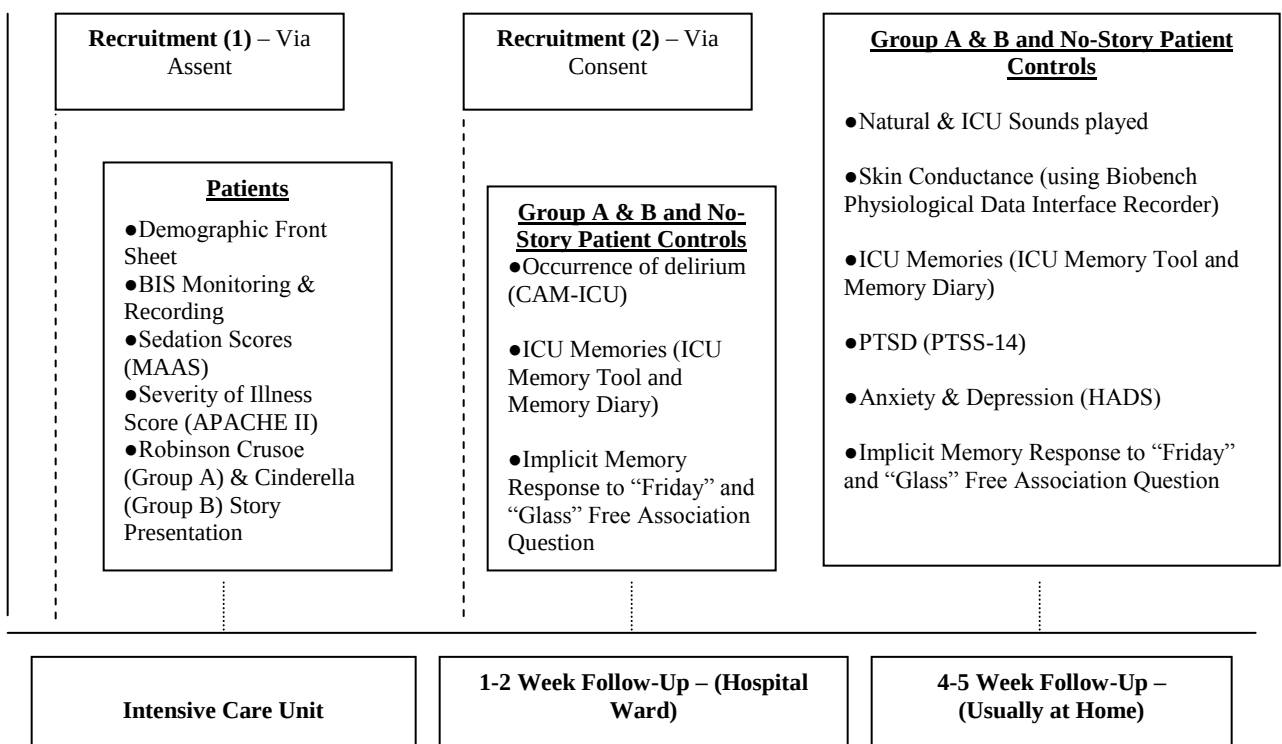
2.2 Method

2.2.1 Design

The current study design was a mixed methodology, prospective and group comparison design, across three separate time-points, for measures of psychological disturbance and repeated measures of ICU memory. It contained a single-measurement, prospective group-comparison design for implicit memory measures in patients who were alive at four-five weeks post-discharge (patients versus controls), using skin conductance responses to a range of pre-recorded sounds. Within-subjects comparisons were made using analysis of variance and regressions. In the ICU sounds paradigm, the independent variable was the sounds (steam train versus rain versus ICU) and the dependent variable was the skin conductance level and spontaneous fluctuation rate. In the free association task the independent variable was the story (Robinson Crusoe versus Cinderella) and the dependent variable was implicit memory free association to the words “Friday” and “glass.”

Figure 2.2.1 presents the schematic summary of design.

Figure 2.2.1: Schematic Summary of Design



2.2.2 Participants

Participants were thirty-three patients admitted to the Intensive Care Unit of Leicester Royal Infirmary who were sedated for at least twenty-four hours, were expected to have the capacity to consent to the rest of the study at one-to-two weeks and expected to survive beyond four-to-five weeks following discharge from Intensive Care.

2.2.2.1 Inclusion criteria

Patients eligible for inclusion into the study were patients admitted to the ICU aged 18 years and over, who would be alive at four weeks post-discharge and whose personal consultee had provided assent in ICU, and who were willing to consent themselves into the rest of the study at one-to-two weeks.

2.2.2.2 Exclusion criteria

Patients excluded from the study were anyone admitted to the ICU who had experienced a traumatic brain injury, significant malignant disease or metastases, significant impairment of intellectual and adaptive functioning (significant learning disability), neurological disease, demonstrating signs of an active major mental illness, significant hearing impairment and bilateral hand or arm amputees. This was in order to avoid placing unnecessary task demand upon the patients, acutely highlighting any cognitive, sensory or physical impairments and risk causing them unnecessary emotional distress.

2.2.2.3 Where participants were recruited from

Participants were recruited from the Intensive Care Unit and associated discharge wards. Patients recruited in ICU were recruited via personal consultee assent whilst the patient was sedated in the ICU, and consent was subsequently obtained directly from the patient themselves one-to-two weeks following discharge from ICU. Patients who could not be

assented in the ICU for medical or logistical reasons were also approached for consent into the study at one-to-two weeks following discharge from ICU.

2.2.2.4 Numbers recruited to the study

A total of thirty-three patients were recruited to the study (twenty-four males and nine females). Eleven were recruited via the assent process in ICU (subsequent consent was obtained from seven of these patients themselves following their ICU discharge). Three of these patients (2 males, one female) recruited via the assent process, died in ICU and another (one male) was eventually transferred to another hospital. Twenty-two patients (nineteen males and eight females) could not be recruited via the assent process in ICU but they were consented into the study one-to-two weeks following ICU discharge.

2.2.2.5 Basic demographics

The total sample comprised thirty three patients, all of whom were born in the UK, (two from Asian groups and thirty-one from white groups). Mean age was 60.51 (SD=14.0). Mean length of stay in ICU was 8.3 days (SD=8.1), mean length of total hospital stay was 28.6 days (SD=21.4). Mean length of sedation was 3.5 days (SD=4.3) and they were mechanically ventilated for a mean duration of 4.8 days (SD=3.8).

2.2.3 Apparatus

2.2.3.1 Sony Walkman B-Series MP3 USB 1 GB digital music players (NWZ-B133)

Walkman music players were used to deliver the pre-recorded Robinson Crusoe and Cinderella stories to patients, via Panasonic digital single-side monitoring control-audio closed headphones. Another Sony MP3 B-Series Walkman was used to present the random one-minute blocks of sounds at the four-five week follow-up data collection stage, delivered via a set of Panasonic RP-HC150 closed, 70% noise-cancelling headphones.

2.2.3.2 Lorus CAL Y704 R23 series stopwatch

A stopwatch was used to help the principal investigator to ensure that accurate timing of the train, rain and ICU sounds and accurate skin conductance recording. It was also used to ensure both MP3 story (Robinson Crusoe and Cinderella) tracks were played for a length of nine minutes, as one story was slightly longer than the other and this ensured study integrity by permitting the stories to be played in full without the researcher being aware of which story was playing.

2.2.3.3 ICU stories

Robinson Crusoe (Defoe, 1719/2007) (8.5 minutes long) and Cinderella (Perrault, 1697/1991) (7.6 minutes long) stories were narrated by the Honorary Consultant/Senior Lecturer in ICU. They were recorded in the professional recording studio of the University of Leicester Audio-Visual Services and audio levels matched to within 3 decibels. They were then copied onto the Walkmans with one story on each Walkman. The Walkmans were labelled “story 1” and “story 2,” blinded to the investigator. The Robinson Crusoe story was selected because of its use in a previous implicit memory study in 1994 by Schwender et al. The story was chosen by Schwender et al and for the current study because of the emotional salience and parallel between Crusoe’s predicament and that of the surgical or ICU patient: isolated, in danger and with uncertainty about the eventual outcome. The Cinderella story was selected as a similarly well-known control story which had no particular intended emotional correspondence. The scripts for these narratives are detailed in Appendices C and D.

2.2.3.4 BioBench physiological data acquisition and analysis, National Instruments Corporation, (1997)

The Biobench skin conductance machine is an electronic data-collection system designed to analyse physiological processes. The Datex 2000 skin conductance monitor, using electrodes attached to the medial phalanges of the first and second fingers of the dominant hand, estimates physiological arousal levels by monitoring palmar sweat gland activity. The results are automatically recorded by the Biobench computer and the results downloaded for analysis. Skin conductance was recorded during train, rain and ICU sound sample presentation at the four-to-five week follow-up point.

2.2.3.5 Stimulus Sounds

Three sounds, (rain, train and ICU) one minute each in duration were selected to play to patients whilst monitoring their skin conductance. The rain and train sounds were carefully sourced using the expertise of the University of Leicester Audio-Visual Department. The specific tracks were selected on the basis of their authenticity from a range of available rain and train sounds. The ICU sound was commissioned by the investigator and created by the Senior Audio-Visual Technician who spent several hours on the ICU, recording everyday activities with which to make up the ICU sound. The three sounds (rain, train and ICU) were arranged together in 6 different orders (tracks one to six) for the purpose of the randomisation procedure and ease of administration. A five-second delay was arranged between one sound and the next. The six tracks were downloaded onto the Walkman to present to patients at four-to-five week follow-up. Patients were presented with only one track containing the three sounds in one of the six random orders during monitoring of skin conductance responses.

2.2.4 Measures

2.2.4.1 Bispectral index monitoring (BIS Vista Monitoring System) Aspect Medical Systems, Netherlands and USA

The Bispectral Index System (BIS) is a processed EEG monitor which provides a numerical index related to the patients' hypnotic state or level of consciousness, obtained via a BIS quarto Semi-reusable Sensor (SRS) electrode which is placed across the patient's forehead. A BIS reading of 55-65 equates with a period of sedation when the patient is in a state between unconsciousness and consciousness which is roughly estimated to be equivalent to a Motor Activity Assessment Scale (MAAS) score of two (responsive to touch or name); this is the stage at which the randomly-allocated story is presented, via headphones to the patient. The monitor produces a ten-minute long processed EEG recording which is downloaded onto a portable USB stick for analysis. This provides a detailed BIS EEG recording coincident with the period of story presentation.

2.2.4.2 Motor Activity Assessment Scale (MAAS) (Devlin, Boleski, Mlynarek, Nerenz, Peterson, Horst and Zarowitz, 1999)

The Motor Activity Assessment Scale (MAAS) (see Appendix E), is a seven-point ordinal scale (ranging from 0 = unresponsive, to 6 = dangerously agitated) designed to measure the level and effects of sedation. It has been tested in ICU settings and has been found to be valid and reliable when analysed against a number of well-established physiological measures. Whilst all measures have been tested for reliability and validity, the decision to use the MAAS was based upon its clinical utility as the standard sedation protocol measure for all patients at the recruitment site, to avoid overloading patients with measures. In its reliability and validity studies, the MAAS ($\kappa = 0.83$, 95% CI= 0.72-0.94, Devlin, Boleski, Mlynarek et al. 1999) was compared with a ten-point subjective

visual analogue scale (VAS) of sedation and was found to be a more reliable measure (ICC 0.32 (95% CI= 0.05-0.55). A linear trend was also noted between the MAAS and the VAS, blood pressure, heart rate and agitation measures (all $p < 0.001$).

2.2.4.3 *Apache II severity of illness scale (Knaus, Draper, Wagner and Zimmerman, 1985)*

The Apache II Severity of Illness Scale measure (see Appendix F) is a severity-of-disease classification system completed by ICU medical staff, using twelve basic physiological measurements combined with age and previous health status (on a fifteen-item, nine-point ordinal scale ranging from +4 = high abnormal range to -4 low abnormal range). This provides the clinician with a general measure of severity of the disease/illness. It has been validated in ICU settings, is noted to be reliable across all disease categories, and has good predictive validity. In an original reliability study an increasing rating on its scale (range 0-71) was noted to be associated with an increased risk of death in 5815 intensive care unit patients recruited from thirteen different hospital sites. The 1.9% death rate for patients scoring 0-4 points was significantly lower (Chi-square= 5.28, $p=0.02$) than the 3.9% death rate for patients rated 5-9 points. The 73% death rate for patients scoring 30-34 points was significantly lower than the 84% death rate for patients scoring 35 or more points (Chi-square= 7.5, $p=0.01$), (Draper, Wagner & Zimmerman, 1985). A five-point increase in Apache II scores also significantly increased death rate in the intermediate ranges of severity ($p < 0.001$). This measure was selected as a well-established measure with demonstrated clinical utility in the recruitment site and was preferable to a simple anecdotal recording of the patient's reason for admission.

2.2.4.4 Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) Ely, Inouye, Bernard, Gordon, Francis, May, Truman, Speroff, Gautam, Margolin, Hart and Dittus (2001)

The Confusion Assessment Method for the ICU (CAM-ICU) (see Appendix G) is a short measure to capture mental status, inattention, disorganised thinking and altered levels of consciousness, using a four-domain, two-point ordinal scale (features present or absent). Inter-rater reliability measures over eighty-four paired datapoints, rated by two qualified nursing staff, demonstrated a Kappa of 0.96 (95% CI= 0.92—0.99, $p < 0.001$) (Ely, Inouye, Gordon et al, 2001). Criterion validity was achieved through four-hundred and seventy-one paired observations by qualified nursing staff then compared with ratings from delirium experts which showed that the CAM-ICU was 98.4% accurate (95% CI= 92-100%, $P < 0.001$).

2.2.4.5 ICU Memory Tool (ICUM) Jones, Humphris and Griffiths (2000)

The ICU Memory Tool (ICUM) (see Appendix H) is a fourteen-item measure, eliciting a combination of nominal, ordinal and qualitative responses (comprising a variety of “yes/no,” qualitative, and fixed choice responses) and is designed as a short assessment of memory function following an admission to intensive care. Construct validity, obtained using factual memories as assessed by the ICUM and patient rates of severe infection in 26 patients (the more severe the infection the higher the likelihood of delirium), showed 38% had no factual memories of ICU, compared to two without infection (Fisher’s exact Chi-square= 4.38, 29 df, $p = 0.04$) (Jones, Humphris & Griffiths, 2000). Test-retest reliability was obtained from 8-week and 6-month data from 30 patients, which showed high levels of test-retest reliability in factual (ICC = 0.81 $p < 0.0001$) and delusional memory (ICC = 0.90 $p < 0.0001$) subscales.

2.2.4.6 UK-Post Traumatic Stress Syndrome-14 Questions Inventory (UK-PTSS-14)

Twigg, Humphris, Jones, Bramwell and Griffiths (2008)

The UK-PTSS-14 Scale (see Appendix I) is a fourteen-item measure, designed to assess the presence of post traumatic stress disorder in ICU patients using an eight-point ordinal scale (always to never). It incorporates all four elements of PTSD as defined by DSM IV (intrusion, re-experiencing, avoidance and hyperarousal). An initial validation study reported internal consistencies of 0.89 at four-fourteen days post-discharge, 0.86 two months post-discharge, and 0.84 at three months post-discharge (Twigg, Humphris, Jones, Bramwell & Griffiths, 2008). Test-retest reliability showed scores were more stable across time-points two and three (ICC= 0.90). Concurrent validity was good at three months post-discharge and showed a Pearson's r of 0.86 with the Post-Traumatic Diagnostic Scale (PDS) and 0.71 with the Impact of Event Scale (IES). It also showed good predictive validity with both the Posttraumatic Diagnostic Scale and Impact of Event Scales. This measure was considered along with a range of other measures. The main criteria for selection concerned the necessity for the chosen measure to have been validated against DSM-IV criteria and that it must contain items relating to re-experiencing, avoidance/numbing and increased arousal. Whilst many of the afore-mentioned measures contained one or more of these elements, few contained all three with the exception of the PTSS-14. The PTSS-14 was selected out of all these measures for its brevity, because it contained items from each category of the DSM-IV criteria, and also for its reliability and validity.

2.2.4.7 Hospital Anxiety & Depression Scale (HADS) (Zigmond and Snaith, 1983)

The HADS (see Appendix J) is a self-rated ordinal instrument that measures levels of anxiety (seven-items) and depression (seven-items) focussed upon ratings for mood over

“the past week” using a four-point scale. Designed to be used in hospital populations, it has a clinical cut-point of eight or nine for moderate anxiety and depression and eleven or twelve for severe. It is reported to have internal consistency alpha levels of 0.80 for anxiety and 0.82 for depression when tested in the general population. Reliability statistics for the measure are reported as 0.84 for anxiety and 0.85 for depression at two weeks, 0.73 for anxiety and 0.76 for depression between two-six weeks and 0.74 for anxiety and 0.63 for depression at two months (Zigmond & Snaith, 1983). Test-retest reliability at two months was 0.89 for anxiety and 0.92 for depression. It is used prolifically within hospital intensive care unit, medical surgical, psychiatry and psychology settings and is particularly useful as a quick screening tool which allows calculation whilst the client is still present. Whilst other measures were reflected upon during the course of the design of the current study (for example the Beck Depression Inventory – BDI) (Beck, Ward and Mendelson, 1961) the HADS remained the dominant contender due to its psychometric properties and general clinical utility, and its concordance with other ICU PTSD studies in the UK in recent years.

2.2.4.8 ICU Memories Diary, Backman and Walther (2001)

The ICU Memories Diary (see Appendix K) is a qualitative data collection tool with two columns in notepad form and a front sheet which simply asks patients, staff and relatives to briefly record any dreams, nightmares, flashbacks, delusional material, unreal and real events reported during the patient’s hospital stay, and the contents analysed using thematic analysis.

2.2.5 Procedure

The current study was sponsored by Leicestershire Partnership NHS Trust Research & Development Unit. It was approved following Ethical Review by Nottingham 1 Regional

Ethics (Mental Capacity) Committee, University Hospitals Leicester Research & Development Committee, University of Leicester School of Psychology Ethics Committee and scrutinised by the Doctorate in Clinical Psychology Peer Review Panel and Service User Reference Group (SURG). The relevant approval letters can be found in Appendices L – N.

2.2.5.1 Screening and Participants

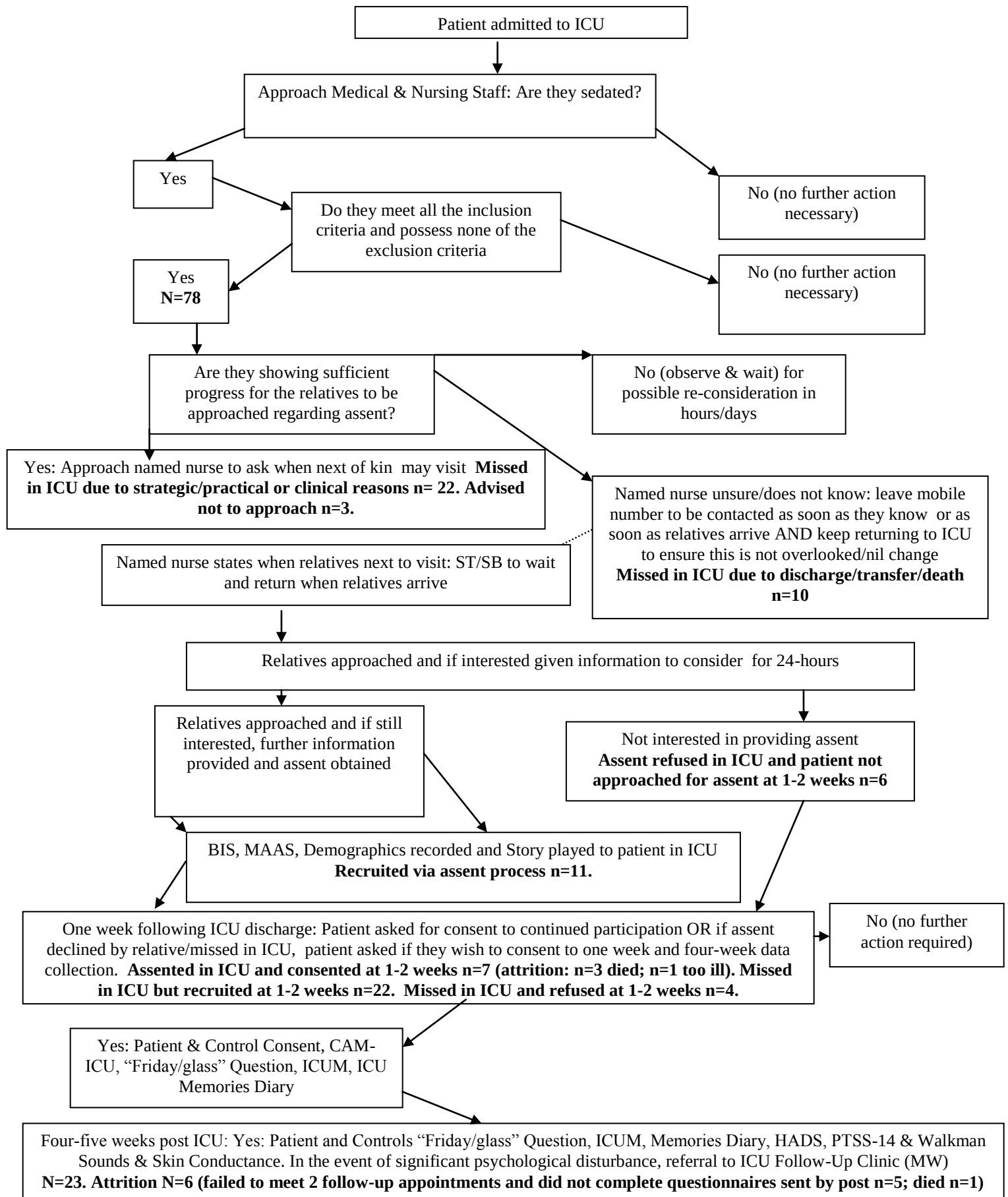
Patients were screened for eligibility, using the inclusion and exclusion criteria during their ICU stay. Due to time constraints, random selection of admissions to the intensive care unit was not feasible. Therefore an opportunistic sample was used, based upon consecutive admissions to the ICU who fulfilled the inclusion criteria, fell outside of the exclusion criteria and whose personal/nominated consultee was willing to provide assent; the patients were then approached again for their consent to continue at one-to-two weeks following discharge from ICU. For those who could not be recruited via the assent process in ICU, the investigator approached the patients for consent at one-to-two weeks following discharge from ICU.

2.2.5.2 Recruitment

A3 Posters (see Appendix T) and A4 leaflets (see Appendix U) were displayed in the ICU and Relative's Room with a request to indicate to the named nurse if interested in assenting relatives into the current study or participating as a control group member. Since patients admitted to ICU as emergencies who are placed on the sedation protocol in the Intensive Care Unit do not have capacity to consent, personal/nominated consultee (nearest relative/friend or clinician in charge of patient's care) assent was required initially for most participants. The principal investigator and the research nurse paid a number of visits to the ICU each day to look for newly-admitted patients and to keep a check on the status of

those already identified/screened as “potentials.” A patient was classified as a potential if they had been admitted for care to ICU requiring at least overnight sedation, met all of the inclusion criteria and none of the exclusion criteria. Once identified, the relevant named nurse was approached, the project was outlined and they were asked if it would be feasible to approach the relatives about the research. The assent and recruitment process is illustrated in Figure 2.2.2.

Figure 2.2.2.: Assent and Recruitment Process Flow Chart



If the relatives had not yet visited the ICU, the named nurse was asked to contact the principal investigator on learning when the relatives were due to visit or when they arrived on the ICU. Initial contact with relatives was made by the investigator (ST) and on several occasions by the Research Nurse (SB), who provided information verbally and in writing to the potential consultee (nearest relative or friend) on the ICU. Personal or nominated consultees were provided with brief verbal information and full written information for consideration for twenty-four hours. If, after twenty-four hours, they were still interested in assenting on behalf of the patient, the principal investigator provided full verbal information regarding the current study. The assent was taken by the honorary consultant/senior lecturer and consent for patients at one-to-two weeks taken by the principal investigator.

A considerable degree of flexibility in strategies was required to steer through each aspect of this process, particularly because the principal investigator was not present on site from 9.00 am – 5.00 pm, due to clinical commitments on another hospital site within the City and the honorary consultant/senior lecturer also had full-time theatre commitments when not on call for the Intensive Care Unit. On three occasions when the principal investigator was unable to be present due to clinical commitments, the research nurse took assent for three patients, however the principal investigator was responsible for the recruitment of the remaining thirty patients and for obtaining all data from all thirty-three recruits. This often required significant hour-to-hour co-ordination. Because of the patient's condition, and often due to the sudden and unexpected disruption caused to everyday life routines created by the acute admission, many relatives did not visit at fixed times.

The principal investigator and sometimes the research nurse often made several trips to the ICU each day and liaised with ICU on the telephone to keep a check on the status of patients (whether relatives were present or expected, whether the patient was likely to be placed on sedation, whether they were going to be taken back to theatre, or whether their condition had deteriorated which reduced the likelihood of participation). Patients had their sedation turned off for several hours each morning from 6.00 am to avoid the effects of sedative build-up, known as “sedation hold.” If screening identified a patient but the principal investigator was unable to obtain assent prior to “sedation hold,” and therefore unable to present the ICU story track, the principal investigator endeavoured to meet with the patient at the one-to-two week stage to ask for their consent and retrospectively gathered the relevant ICU data, as well as completing the four-to-five-week follow-up.

Written and verbal information provided to personal or nominated consultees focussed around three major issues. The first was that in accordance with the Mental Capacity Act (2005) the personal/nominated consultee must consider the known wishes and attitudes of the patient towards issues such as NHS research and not base their decision to assent or decline assent upon their own wishes and beliefs. They were also informed that the current study aimed to explore the issue of post-traumatic stress and psychological disturbance experienced by some patients following an ICU stay. It was then stressed that assent was voluntary and that they could withdraw this assent or consent at any time and the patient would also have the opportunity to consider their consent to continued participation at the one-two week follow-up stage. An opportunity was given to ask any questions. After twenty-four hours personal or nominated consultees or patients were approached again and asked if they still wished to participate. Patients who were pre-planned surgical admissions were able to provide consent themselves and all investigators were able to consent patients

into the current study. Those who declined were thanked for their time. The principal investigator provided the consultee with all relevant information and supporting written information regarding the assent process (Appendices U-Z) and the hon. consultant/senior lecturer in ICU took the signature for assent from those consultees willing to provide it. The investigator provided all information and took signature for consent from those patients able to provide it for themselves.

2.2.5.3 Data collection

Data collection took place across three time-points over a period of four-to-five weeks (timepoint 1 = immediately prior to discharge from the ICU; timepoint 2 = one-to-two weeks post-ICU discharge whilst still on a hospital discharge ward and timepoint 3 = four-to-five weeks post ICU discharge at the patient's home). The decision to commence study procedures for each patient in the intensive care unit was based upon the most appropriate time at which to play the MP3 story (just as the patient was beginning to wake from sedation - between levels 1 & 2 on the Motor Activity Assessment Scale, approximating to a reading of 55-65 on the Bispectral Index Monitor). The one-to-two week post ICU discharge follow-up was designed to minimise any decay of implicit memory that may occur, provide a short-term measurement of progress from ICU, identify any early signs of delirium which would exclude the patient from participating in the current study, and capture any troublesome memories of the ICU at the earliest possible stage the patient could be expected to participate in such questioning. It was also determined that whilst it was an early measure, it would be conducted whilst the patient was still in hospital thus not overburdening the patient with more than one return visit. The four-to-five week follow up was determined as the most optimum time to capture levels of PTSD, anxiety and depression. It was also judged to be a time when the patient might feasibly be expected to

possess enough clarity of thought and good health in order to cope with the demands of the tasks.

2.2.5.4 Story delivery and data collection (time-point 1 – conducted in the Intensive Care Unit)

The Walkman track was played to the recruited patient just as they were being taken off the sedation protocol in order to be weaned off the ventilator, and this was normally between 6.00 am – 8.00 am on the day prior to discharge or on the day of discharge. It was hypothesised that this would be the optimum time to play the Walkman story as it was a time when patients would begin to emerge from a state of unconsciousness and into gradual consciousness (a time when implicit memory/explicit memory dissociation may occur). Patients who were taken off ventilatory support and placed on a “sedation hold,” but who were then found to be medically unstable, were re-ventilated and sedated. If this occurred, the story presentation phase was repeated once the patient was deemed ready to be placed on “sedation-hold” again. Assented patients were randomly allocated to one of two story groups, (Robinson-Crusoe or Cinderella) which were played to patients using one of four Walkmans (two marked “story 1” and two marked “story 2” with the principal investigator blinded to the identity of the story), when the patient’s consciousness levels reached a score of 60 on the BIS monitor and a rating of “2” on the Motor Activity Assessment Scale (MAAS). Some patients (for example, those with metabolic, haemodynamic & renal dysfunction) often took longer to wake, and a considerable amount of time was spent observing such patients. The randomization code was created by one of the clinical collaborating investigators (MW) and the principal investigator (ST) was blind to this; this was to avoid unnecessary bias. Unless they demonstrated significant explicit memory of the story at a later stage patients were inherently blind to the story group.

On the morning prior to discharge from ICU, whilst under “sedation hold” the principal investigator spoke with the named nurse and then approached the patient, introduced herself and informed him or her that they were to have an electrode placed on their forehead to monitor their level of consciousness and that they would then have headphones placed over their ears for ten minutes to allow them to hear a short story. The patient’s brow was cleaned with a cliniwipe sterilizing cloth to prepare for the adhesive electrode. The electrode was then placed across the patient’s forehead and connected to a Bispectral Index Monitor (BIS). Whilst the MAAS indicated the point at which the story should be played, the BIS was used to provide a quantitative estimate of the patient’s consciousness level. The target BIS reading of 55-65 indicated when the story might be presented and when it might reasonably be expected that dissociation between implicit and explicit memory might occur. The principal investigator then formally assessed the patient for consciousness level using the Motor Activity Assessment Scale (MAAS). The BIS was used as a secondary measurement of consciousness levels for data analysis purposes. The principal investigator checked to ensure the patient’s MAAS level was at the optimum stage at which to play the MP3 story (MAAS Level 2 “responsive to touch or name – opens eyes or raises eyebrows or turns head towards stimulus or moves limbs when touched or name is loudly spoken).” At this stage the closed headphones were then placed over the patient’s ears and attached to a Sony MP3 Walkman containing the randomised story. The MP3 Player contained only one track (Story 1 or 2), and was played for nine minutes, timed with a stopwatch. At the end of the nine minutes the patient was told that the player was being stopped and that their headphones would be removed. This was done immediately, and the patient thanked, regardless of their response level. The BIS recording for the immediately preceding 10-minute epoch was then downloaded onto a USB memory

stick. The headphones were then cleaned with cliniwipe to comply with the hospital's control of infection policy. The patient's demographic front sheet, sedation type and level, and MAAS scores, were also completed at this stage and the patient's BIS identifier and storytape allocation was recorded; the APACHE II data were collected from the ICU upon discharge. The patient's named nurse was then provided with an ICU memories diary for the staff and relatives to record any occurrence of dreams, nightmares, flashbacks or delusional material mentioned by the patient or observed; this would be collected by the investigator at the one-to-two week stage. This deductive approach (asking whether ICU patients experience unreal memory phenomena) would permit coding at semantic level and would also allow the investigator to link the themes directly with the actual contents of the data corpus through a recursive process. It was intended that the diaries would accompany the patients on transfer to the general wards. A record of the research event was recorded and a copy of the assent and patient information placed in the hospital notes. Provision of the ICU memories diary aimed to facilitate immediate recording of any such material rather than reliance upon retrospective accounts. A letter was then sent to the patient's GP informing them of the patient's involvement in the current study and that the patient would receive a summarised version of the results at the end of the study.

2.2.5.5 One-to-two week follow-up

One-to-two weeks following discharge from the ICU, the patient was approached on their discharge ward and it was explained to them that their relatives had assented them into the current study, the procedure which had taken place, and asked if they would consider continued participation. Full verbal information was given to them at this stage and they were left to consider this, and written back-up information for a full twenty-four hours. After twenty-four hours they were re-visited by the investigator and if they were willing,

consented into the rest of the current study. At this stage, the CAM-ICU was administered, and data from the ICU memories diary were collected. The patient was asked if they could remember anything from the ICU, and whether or not they recalled hearing a story being played to them on the ICU and if so what the story was. In the event of the patient demonstrating explicit memory of the story, the free association task was discounted. For those patients who failed to demonstrate explicit memory of the story, they were then asked “what is the first thing that comes into your mind when I mention the word “Friday?” and then “what is the first thing that comes into your mind when I mention the word “glass?” The ICU Memory Tool (ICUM) was then administered and the patient was asked about any ICU Memories. If patients reported any ICU memory phenomena but these had not been recorded in their ICU memories diary by staff or relatives, the investigator recorded them at this stage. Patients were then given a new diary in which to record any memories, to be collected by the investigator at the four-to-five week appointment. At this stage the control group (no-story consented patients) underwent the same data collection procedure (CAM-ICU, ICU Memories Diary, Friday question, glass question, and ICUM). Both parties were given appointments for four-five week follow-up.

2.2.5.6 Four-to-five week follow-up

At the four-to-five week follow-up appointment, patients were visited at home (by the principal investigator) and asked if they could remember anything from the ICU. Patients were asked whether or not they recalled hearing a story being played to them on the ICU and if so what the story was. For those demonstrating any explicit memory of the ICU story, the free association task was discounted. For all others, patients (and no-story controls) were then asked the two free association questions again. They were then asked by the investigator, about any ICU memories using the ICU memories diary, the ICUM, the

UKPTSS-14, and the HADS. If patients reported any ICU memory phenomena but had then failed to record these in their diary themselves, the investigator recorded them at this stage. The three recorded sounds were then presented whilst undergoing skin conductance recording. At the end of the sessions they were offered opportunity to ask any questions, thanked for their time and effort, and told that we would inform them of the outcome of the current study in due course. Any participant demonstrating scores above the recommended clinical cut-points were referred to the ICU Follow-Up Clinic lead by one of the clinical collaborating investigators (MW).

2.2.5.7 Data Analysis

Data were entered into a database using SPSS Version 16.0. Frequencies, percentages and distributions were checked initially, prior to statistical analysis to determine the appropriateness of statistical testing and to check for any outliers that might confound the results and for distributions for normality. Log-normal transformations were conducted upon the data, with the exception of the skin conductance data. Following this, non-parametric Friedman's ANOVA, and post-hoc tests using Wilcoxon's signed ranks test were conducted upon the skin conductance data to determine any significant differences. Multiple regression was conducted on the data to determine any possible predictions between the independent variables of measures of ICU memories, psychological distress and skin conductance data. Data from the responses to the free association question were checked for any "hits."

Finally, the contents of the ICU Memories diaries were analysed using thematic analysis to pull out core themes and relationships with other data.

2.3 Results

2.3.1 Introduction

The following paragraphs comprise details of basic descriptives and demographics presented in table, figure and text form, prior to providing information regarding process and content of analysis in relation to each separate hypothesis. The results of the thematic analysis of diaries are also presented in this section.

2.3.2 Basic Descriptives

Data collection ran from 13th February, 2009 to 28th September, 2009. During this time 491 patients were admitted to the Intensive Care Unit, of whom 78 were screened as eligible, a full breakdown for which is set out in Table 2.3.1.

Table 2.3.1: General demographic breakdown – Numbers and gender

Group	Number
Total number of patients screened as eligible	(N=78)
Gender Breakdown of screened sample	(n=57 males; n=21 females).
Gender Breakdown of recruited sample	(n=24 males; n=9 females)
Gender Breakdown of screened patients not recruited	(n=33 males; n=12 females)

Forty-five of these patients were not recruited to the study, the reasons for which are set out in Table 2.3.2.

Table 2.3.2: Reasons for non-recruitment

Reason	Number
Refusal for assent by next of kin	12
Missed due to ICU Consultant being away	4
Deterioration/diagnostic changes	2
Patient woken before investigator aware of eligibility	9
Further investigation revealed not expected to survive	2
Died	5
Logistical issues involving contacting next of kin in time	9
Transferred to another hospital	1
Unable to arrange interpreter at short notice at weekend	1

A breakdown of the screened sample, in terms of ethnicity is presented in Table 2.3.3

Table 2.3.3.: General demographic breakdown - ethnicity

Ethnic Group	Number
Screened sample:	(N=78)
Afro-Caribbean	2
Asian (African)	1
Asian (UK)	12
White (Eastern European)	1
White (UK)	62
Recruited Sample: (N=33)	
Asian (UK)	2
White (UK)	31

A breakdown of the study sample in terms of age is provided in Table 2.3.4.

Table 2.3.4: General demographic breakdown of wider study sample - Age

Breakdown	Mean	Standard Deviation (SD)
Age of screened sample (N=78)	57.3	16.05
Age of recruited sample	60.51	14.0
Age of screened patients not recruited	53.75	17.27

A breakdown of the study sample using other demographics collected can be seen in Table 2.3.5.

Table 2.3.5: General demographic breakdown of study sample – other characteristics

Characteristic	N	Sample Mean(days)
Length of stay in ICU	20	6.6
Length of total hospital stay	17	29.7
Length of sedation	17	3.4
Duration of mechanical ventilation	17	3.9

Note: This table contains only data in relation to the skin conductance sample. Data was not available for 3 patients. A breakdown for the full dataset can be found in Appendix P

Full recruitment and attrition breakdown is provided in Figure 2.3.1. Six of the patients were elective admissions and the remaining 27 were all admitted as emergencies. A breakdown of other characteristics for the whole study sample can be found in Appendix P.

Figure 2.3.1: Recruitment, data collection and attrition

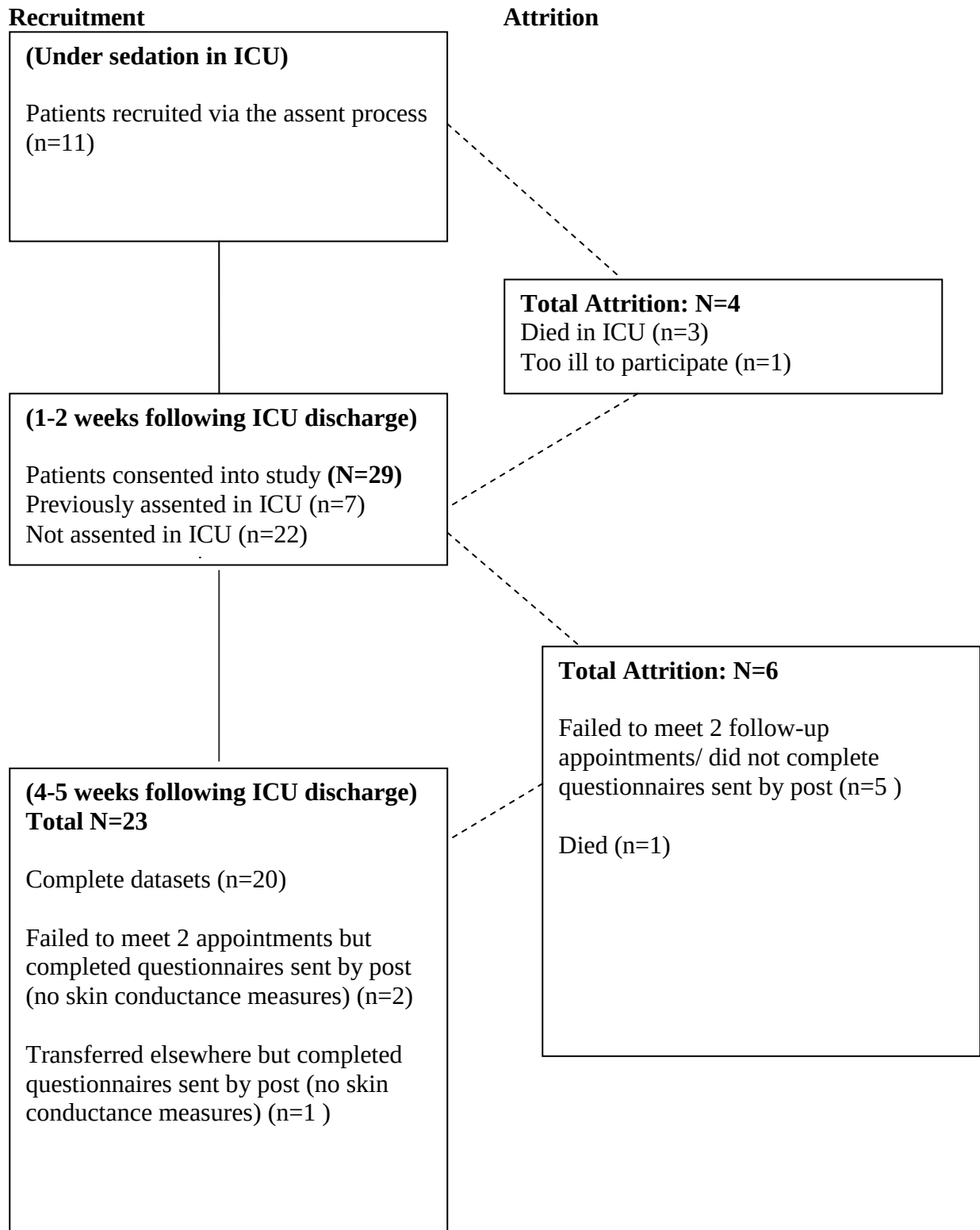


Table 2.3.6 presents details of reason for admission to ICU for the skin conductance study sample; a similar table relating to the larger sample can be found in Appendix Q.

Table 2.3.6: Reason for admission to ICU

Reason for admission	N	Admission Type
Abdominal aortic aneurysm	2	Elective
Ivor-Lewis Procedure for Ca.Oesophagus	3	Elective
Whipples Procedure (Gall Bladder)	1	Elective
Abdominal Aortic aneurysm	3	Emergency
Abdominal sepsis	1	Emergency
Pneumonia	2	Emergency
Cardiac arrest	1	Emergency
Laparotomy	2	Emergency
Pancreatic tumour	1	Emergency
Road traffic accident	1	Emergency
Sub-mandibular abscess	1	Emergency
Generalised sepsis	1	Emergency
Spinal fixation/decompression	1	Emergency

Table 2.3.7 shows other nominal/ordinal variables from the dataset – a similar table relating to the wider sample can be found in Appendix R .

Table 2.3.7: Other variables from the dataset

Variable	N
Sleep deprivation reported	6
Additional complications	12
Previous history of mental health issues	2

Note: Data relating to sedation for five patients in this skin conductance study sample were unobtainable. As can be seen from the table, although over half of the sample experienced additional complications in ICU, only a small number reported sleep deprivation or any history of mental health issues.

Table 2.3.8: Description of sample variables

Variable	N	Mean	SD	Median	Range
T2 ICUM (Factual)	19	6.473	3.115	7.0	10.0
T2 ICUM (Feelings)	20	2.450	1.637	2.0	7.0
T2 ICUM (Delusional)	20	2.0	1.450	2.0	5.0
T3 ICUM (Factual)	19	5.263	3.649	5.0	11.0
T3 ICUM (Feelings)	19	1.315	1.376	1.0	4.0
T3 ICUM (Delusional)	19	1.473	1.711	1.0	5.0
Morphine & Midazolam(mg)	5	4.0	1.414	4.0	4.0
Propofol (mg)	6	10.1	6.8	11.0	18.0
Morphine & Propofol(mg)	4	13.25	11.47	9.5	26

Table 2.3.9: Summary means and standard deviations relating to main variables

Variable	N	ICU(T1)	1-2 weeks(T2)	4-5 weeks(T3)
Apache II	20	15.9 (4.7)	---	---
BIS Reading	5	55.4 (7.4)	---	--
ICUM Factual Memories	19	---	6.4 (3.1)	5.2 (3.6)*
ICUM Feelings Memories	20	---	2.4 (1.6)	1.31 (1.37)*
ICUM Delusional Memories	20	---	2.0 (1.4)	1.4 (1.7)*
PTSS-14	20	---	---	13.9 (16.4)
HADS anxiety	20	---	---	5.2 (4.5)
HADS depression	20	---	---	4.7 (2.9)
Mean SR (Train)	20	---	---	0.2740 (1.7950)
Mean SR (Rain)	20	---	---	0.1980 (1.7034)
Mean SR (ICU)	20	---	---	0.1255 (1.6496)
Minimum SR (Train)	20	---	---	0.0455 (1.7249)
Minimum SR (Rain)	20	---	---	-0.0740 (1.6408)
Minimum SR (ICU)	20	---	---	-0.1600 (1.5102)
Maximum SR (Train)	20	---	---	.5275 (1.8901)
Maximum SR (Rain)	20	---	---	.4615 (1.7618)
Maximum SR (ICU)	20	---	---	.3695 (1.7375)

Note: *N=19. A correlational analysis of all the main variables is provided in Appendix 0 as Field (2005) recommends that variables with extremely high correlations should not be entered into any analysis of variance. A similar table detailing summary means and standard deviations for the whole wider sample can be found in Appendix S.

2.3.3 Data Analysis

All data were input into SPSS and frequency and distribution histograms were plotted. This demonstrated that most of the data collected from standardized measures were not normally distributed which distorted the standard deviations. In an effort to further determine the normality of the data, Kolmogorov-Smirnov tests were conducted upon all variables, as detailed in Tables 2.3.8. and 2.3.9. This demonstrated that most of the variables related to the main research questions had significantly abnormal distributions. This therefore violated two out of four main assumptions for using parametric statistics.

2.3.3.1 Efforts to combat dataset anomalies

Boxplots and bivariate scatterplots revealed the presence of several outliers across different measures and the decision was taken to remove them. Tests of homogeneity of variance were conducted on the data. Levene's Test was significant for many of these and in an attempt to avoid whole data-set transformation, an adjustment was made to the data using the standard correction mean plus two standard deviations (Field, 2005). These piecemeal corrections however then led to further irregularities being highlighted in the Levene's and Kolmogorov-Smirnov tests and at this point it became obvious that these errors could not be resolved without extensive whole data-set transformation. A Log-normal transformation was therefore carried out upon the main variables (listed in Table 2.3.8), which was successful and produced much more normally-distributed histograms. Log-normal transformation could not be conducted upon the skin conductance data due to risk of losing all negative data.

Analysis in relation to Hypothesis 1: That sedative drug regimens facilitate classical conditioning (pairing) of ICU environment sounds to patient distress or anxiety in the ICU which can then be detected after discharge as an emotional conditioned response to the presentation of ICU sounds whilst monitoring skin conductance.

Skin Conductance Data

In order to produce skin conductance readings from the skin resistance data, each data entry point for minimum, mean and maximum skin resistance readings in response to the rest minute and train, rain and ICU sounds were divided into 1 in accordance with Rose's range correction as recommended by Lykken and Venables (1971) for standardization of skin conductance:

$$\phi_{ix} = \frac{SCL_{ix} - SCL_{min}}{SCL_{max} - SCL_{min}}$$

Each data entry point was divided into 1. To obtain the range for each participant, the highest and lowest readings for each participant were selected out across the four conditions, and the lowest value was then subtracted from the highest value. The mean value for all the data for each participant was then subtracted from the mean reading obtained for each one-minute epoch (train, rain or ICU). All subsequent analysis of skin conductance readings used these three final measures.

Histograms, descriptives and frequencies were performed on the skin conductance data which revealed that whilst the data for skin conductance in response to the train and rain sounds were normally distributed, the data in response to the ICU sound was markedly abnormal, contained several outliers and one case in particular was set apart from the rest. Removal of this one case did not make the distribution any more normal. Kolmogorov-

Smirnov tests showed that these distributions were significantly abnormal at the $p < 0.05$ level. Table 2.3.10 provides details of the sample in relation to Hypothesis 1.

Table 2.3.10: Description of sample in relation to hypothesis one

Variable	N	Mean	SD	Median	Range
SC (Train)	20	-0.941	10.162	0.017	44.375
SC (Rain)	20	0.28	9.059	0.095	46.525
SC (ICU)	20	4.793	21.829	0.151	112.858

Since the transformation of the skin conductance did not normalize the data obtained in response to the ICU sound, the decision was taken to use non-parametric analysis to compare the sounds data. Thus Friedman's ANOVA was conducted upon the skin conductance readings in response to train, rain and ICU sounds. Whilst this revealed that the skin conductance level did not differ significantly across the three sound presentations ($X^2 = 2.795$, $df = 2$, $p = .247$), the mean rank of the ICU sound (2.30) was greater than those produced for the train (1.88) and rain (1.82), and the difference between the response to ICU sound and rain or train was much greater than the difference between the level in response to the train and rain sound (as reflected in the group means in Table 2.3.9).

In view of the trend towards ICU sound producing an increased skin conductance response (although this was not statistically significant), multiple regression was conducted using the "enter" method, due to the relatively small sample size (Brace, Kemp & Snelgar, 2000). Taking the skin conductance data in response to the ICU sounds, and the transformed data for ICU Factual, Feelings and Delusional Memories, regression was

conducted using skin conductance data as the dependent variable and ICU memories as the independent variables. Using this method no significant model emerged ($F_{3,11}=1.464$, $p=.278$, adjusted R square = .090).

This means that analysis of the skin conductance readings revealed that stress responses to the presentation of ICU sounds were greater than those produced in response to the rain or train sound, although these differences were not great enough to be able to definitely state that this increase was more than could be expected to occur by chance. The investigator was unable to find any relationship between the number of different types of memory phenomena experienced by patients in the ICU and increased skin conductance response to the presentation of ICU sounds. The analysis could not confirm that whilst patients are still under the influence of sedation in ICU, they are able to link sounds they hear in the ICU to any emotional distress or anxiety they experience at that time. Support could not be obtained for the hypothesis that whilst patients are not aware of this pairing or learning, this link is retained in the (subconscious) learning memory and is then re-activated by similar emotional stimuli at some time in the future when they are fully conscious.

Analysis in relation to Hypothesis 2: That the assimilation of aural information and/or classical conditioning occurs more frequently in patients reporting higher levels of emotional distress following discharge.

Table 2.3.11 provides frequencies and descriptives in relation to Hypothesis 2 and Table 2.3.12 provides a further breakdown of scores on measures of psychological distress.

Table 2.3.11: Frequencies and descriptives in relation to the sample

Variable	N	Mean	SD	Median	Range
PTSS-14	20	13.9	16.472	7.0	61.0
HADS Anxiety	20	5.25	4.563	3.0	17.0
HADS Depression	20	4.7	2.939	3.5	10.0

Note: Only one person met the DSMIV criteria for PTSD . Two people achieved a score indicating severe anxiety on the HADS, one of whom also met the DSMIV criteria for PTSD. One person achieved a score indicating severe depression on the HADS.

Table 2.3.12: Breakdown of scores from measures of psychological distress.

Measure	PTSS-14	HADS Anxiety	HADS Depression
N	20	20	20
Sub-threshold levels	19	16	16
Mild-moderate	---*	2	3
Moderate-severe	---*	2	1
DSMIV	1	---*	---*

Note: * indicates that the classification does not apply to the measure

Taking the skin conductance data response to the ICU sounds, and the transformed data for PTSD, HADS anxiety and depression, a regression was conducted using ICU skin conductance as the dependent variable and measures of psychological distress as the independent variables. Using this method, no significant model emerged ($F_{3,16}=2.616$, $p=.087$, adjusted R square = .203).

This means that no relationship was found between increased stress responses to presentation of ICU sounds and reported symptoms of anxiety, depression and post-traumatic stress. There was therefore no evidence to suggest that implicit emotional memory (emotional learning) occurs more frequently in those patients who report increased levels of anxiety, depression and post-traumatic stress following discharge from ICU.

Analysis in relation to Hypothesis 3: That critically ill patients may assimilate verbal information with emotional salience whilst receiving sedative drugs in ICU and that this assimilated verbal information may be retrieved in the absence of explicit recall after ICU discharge by a process of free association.

Table 2.3.13 provides frequencies and descriptives for the sample in relation to hypothesis three.

Table 2.3.13: Frequencies and descriptives

Variable	N(ICU)	N(T2)	Hits(T2)		N(T3)	Hits(T3)	
			Story 1	Story 2		Story 1	Story 2
Story 1	8	6 (2)**	0	0	4 (2)**	0	0
Story 2	3	1 (2)**	0	0	1 (0)**	0	0
Controls*	---	17	0	0	16(1)**	0	0

*Patients who did not have the story presented in the ICU but were asked a prompt question at follow-up. ** Attrition.

Eleven patients were played the stories in the ICU. Twenty-four patients provided responses to the free association questions (FAQ) at time two (one-to-two weeks following discharge from ICU - pertaining to the randomized Robinson Crusoe (Story 1) and Cinderella stories (Story 2). Seven of these respondents were patients who had been played the story in ICU (three having died and one being transferred over 160 miles away). There

were 21 respondents to the free association questions at time point three (four-to-five weeks following discharge from ICU). There were no “hits” scored by any participant (patients or controls) at any time for words even remotely relating to any content of either the Robinson Crusoe or Cinderella stories (Group A and Group B) or Group C. No further analysis was conducted on these data and no further distinctions were made in subsequent analyses between the ICU patient group (those who had been played the story in ICU) and controls (those who had not been played the story).

This means that because there were too few patients recruited into this part of the study, a full and detailed analysis of responses could not be made. General perusal of responses obtained from the free association question suggested that there was no evidence that any patients had any implicit memory of the stories played to them when they were under sedation in the ICU. There was therefore no evidence to support the hypothesis that critically-ill patients in ICU are able to learn auditory information which is emotionally-relevant to their isolated, sedated state. There was also no evidence that such information can be spontaneously retrieved from learning memory by presenting them with a simple question related to the previously-presented auditory information, following discharge from ICU.

2.3.3.2 Additional analyses

In order to determine evidence of any link between the presence of post-traumatic stress and types of ICU memory, separate regressions were conducted upon the measures of psychological distress (HADS and PTSS-14) and ICU memories reported at 1-2 weeks and 3-4 weeks respectively. In the first regression, HADS anxiety scores were entered as the dependent variable and Time 2 ICUM Factual, Feelings and Delusional memories measures were once again used as the independent variables. Using the enter method, a model

approaching significance emerged ($F_{3,14} = 4.423$, $p=.022$, adjusted R square $=.377$) for a relationship between number of feelings memories and HADS anxiety. A conservative approach, using a p.value of 0.01 was deliberately chosen in view of the small sample size.

Another regression used HADS depression scores as the dependent variable with the same independent variables. This demonstrated no significant findings ($F_{3,14}=.304$, $p=.822$). The procedure was repeated in a further 3 regressions, using the same dependent variables of PTSS-14, HADS anxiety and HADS depression and replacing the independent variables with Time 3 (4-5 weeks following discharge from ICU) ICUM Factual, Feeling and Delusional Memories. In the first, with PTSS-14 scores as the dependent variable and T3 ICUM memories as the independent variables, no significant model emerged ($F_{3,9} = 2.244$, $p=.152$, adjusted R square $=.237$). In the second, with HADS anxiety scores as the dependent variable and T3 ICUM memories as the independent variables, no significant model emerged ($F_{3,12} = 2.635$ $p=.098$, adjusted R square $=.246$). Similar non-significant findings were found in the final regression using HADS depression as the dependent variable and the T3 ICUM memories as the independent variables ($F_{3,12} = 1.547$, $p=.253$, adjusted R square $=.099$). When exploring the relationship between ICUM T2 Total factual, feelings and delusional memories upon UKPTSS-14 total score, using the 'enter' method, a partial model, accounting for just over 28% of the variance within the model emerged ($F_{3,20} = 4.032$, $p<.02$, adjusted R square $=.283$). Significant variables are shown in Table 2.3.14.

This means that analysis was conducted in order to determine whether symptoms of anxiety, depression and post-traumatic stress were related to patient reports of memories of the ICU. When anxiety scores were examined to look for any relationship between anxiety and memories of the ICU reported by patients at one-to-two weeks following ICU

discharge, this showed there was some evidence of a relationship between anxiety and memories of feelings but this relationship was not strong enough for the investigator to report this as a relationship that was bigger than could occur by chance. When a calculation was made to explore any relationship between symptoms of depression and memories of the ICU reported at two weeks, this suggested that there was no bigger relationship between the two than could occur by chance. A calculation exploring any relationship between reports of memories of the ICU reported at four-to-five weeks and symptoms of anxiety or depression again found no relationship than that which could occur by chance. When exploring any relationship between symptoms of post-traumatic stress and memories of ICU the total number of memories of feelings reported at one-to-two weeks following discharge from the ICU appeared to account for 28% of the symptoms of post-traumatic stress.

Table 2.3.14: Model explaining variance in PTSS-14 Scores

Predictor variable	Beta	p-value
T2 ICUM Total Feelings Memories	.552	.006

Note: Whilst T2 ICUM total Feelings memories were significant (at 28%), total Factual and Delusional memories were not.

When exploring the relationship between T3 ICUM Factual, feelings and delusional memories upon HADS depression scores, using the enter method, no significant model emerged ($F_{3,12} = 1.547$, $p = .253$, adjusted R square = .099). Finally, a regression was conducted using the skin conductance responses to ICU sounds as the dependent variable and the Apache II Severity of Illness, type of sedation and total length of hospital stay as

independent variables. No significant model emerged ($F_{3,16} = 2.717$, $p = .079$, adjusted R square = .213).

This means that no relationship other than that which could occur by chance was found between memories of the ICU reported at four-to-five weeks following ICU discharge and symptoms of depression. When exploration was made of any relationship between skin conductance responses to ICU sounds and severity of illness scores, the type of sedation patients received and the total length of time patients spent in hospital, no relationship was found.

Overall the analysis revealed some suggestion that patients exhibited an increased stress response as measured by skin conductance readings in response to ICU sounds, as opposed to the train and rain sounds although statistically it was impossible to state that this was bigger than any relationship which could occur by chance. Analysis suggested that there was a relationship between number of feelings of memories reported at one-to-two weeks following ICU discharge and reported levels of anxiety, though again it was impossible to state that this could not have occurred by chance. A relationship was also noted between the number of feelings memories and symptoms of post-traumatic stress and the analysis revealed that this relationship was larger than that which could occur by chance. This means that although the hypothesis was not supported, there was some support for the assertion that sedatives given to patients in ICU can increase opportunities for patients to learn auditory information, and that evidence of this can be obtained at a later stage by presenting the patient with sounds of the ICU and monitoring their stress response. It also means that whilst there was no support for the hypothesis that this type of unconscious emotional learning occurs more frequently in patients who demonstrate increased emotional distress following ICU discharge, those patients experiencing higher levels of

PTSD symptomatology did report more memories of feelings occurring whilst in the ICU. The investigator was unable to make any direct links between increased stress responses to ICU sounds and levels of PTSD symptoms, although those who reported higher levels of PTSD did report increased impact of unusual memory phenomena upon their emotions, as measured by the ICUM total feelings. A small sample size may partly explain why it was not possible to rule out that some of these results (with the exception of the relationship between ICU memories reported at 1-2 weeks and increased PTSD symptomatology as measured by the PTSS-14) may have occurred by chance.

2.3.4 Thematic Analysis of ICU Memory Diaries

Although inset within a largely quantitative study, it was thought expedient to conduct thematic analysis of the diaries that were collected from patients at the one-to-two weeks and the four-to-five week stages, using the methods and procedures advocated by Braun and Clarke (2006). Thematic analysis was selected for its relative theoretical freedom to compliment this qualitative element of what was predominantly a quantitative project. The epistemological stance taken was largely realist in approach because the investigator held the position that the patient may present an account for their own thoughts and perceptions whilst under sedation and that these are not accessible to others during this time. Coding was data-driven. Whilst the data corpus was the whole collection of diary comments, the data set comprised any comments regarding unreal memory phenomena (delusions, hallucinations, dreams, nightmares and flashbacks). Whilst the investigator acknowledges the inclusion or exclusion of information as her decision, the stating of this decision clearly and explicitly, should allow the reader to decide how much emphasis to place upon any interpretation. Any strong themes emerging from the data set in the form of dominance of any particular section of the data corpus or similar pieces of information relayed across the

data set are set out below with additional emphasis being illustrated by the inclusion of a particular data extract which encapsulates the theme. A theme was deemed prevalent if it were mentioned in several individual diaries. Themes fell across five main dimensions: life versus death; illusion versus reality; care versus torture; sensory distortions; and disorientation. Considerations were made for future research, care and planning.

The majority of the analysed transcripts contained material volunteered at one-to-two weeks, and most of the content of diaries collected at four-to-five weeks appeared to be condensed repetitions of the information volunteered at one-to-two weeks. There were some exceptions however; at four-to-five weeks, one patient reported having a new factual-type of memory of their transfer from ICU to the ward which appeared to contain some visual distortion regarding the finer details of the mode of transfer. Three patients recalled nightmares, one of whom reported that they had noted the influence a recurring nightmare appeared to have upon their waking emotional state. One patient reported experiencing dreams more often than they did prior to their ICU stay, some of which were of being abandoned by a close relative. Another patient reported a recurring dream where they were faced with unsolvable mathematical problems. One patient who, at one-to-two weeks reported experiencing a re-traumatisation from previous decades whilst in ICU suggested that these memories had subsided at the four-to-five week stage. The following paragraphs provide examples which illustrate the five major themes emerging from the transcripts.

2.3.4.1 Life versus death

When examining the transcripts it appeared even whilst under sedation in the ICU, that many patients experienced a sense of being very seriously ill, even when their sensory

abilities prevented them from understanding what was taking place regarding their basic physical care or their actual location and surroundings.

“I felt as if I had died and had been brought back.....” (1-2 week report)

“Just everything they seemed to be doing felt as if it was wrong, as if it shouldn’t be happening. Obviously it wasn’t but, it was a hospital, but the base of it was not run as a hospital, it was an experimental kind of place. They kept everybody alive.” (1-2 week report):

“I thought I heard staff phoning my wife to tell her I was dead, and on another night I heard the nurses on the ward say that I was being sectioned, but that might have been because of your visit.” (4-5 week report)

2.3.4.2 Illusion versus reality

Some patients reported thinking that their thoughts were in order following waking from sedation and on discharge from ICU, but when given opportunity to reflect at a later stage (for example, on the general wards and at home), they reported realising that their perceptions and emotions may have contained many distortions, as the following sections of transcript illustrate:

“It felt as if I was watching a play...” (1-2 week report)

“In the middle of the night, I suddenly thought, “this isn’t real,” (it was just like Big Brother), and that the patients were asked to be patients for two weeks and I wanted to say, I just want to finish the game and get home – I don’t want anymore” (1-2 week report)

“It’s only in the last few days that I have realized what’s been happening. I have been having nightmares. It happens when I go to sleep and it wakes me up and stays with me. I

sometimes feel that you can't differentiate dreaming from waking early on, and the dream stays with you, the emotion from the dream stays with you." (4-5 week report)

2.3.4.3 Care versus Torture

This theme arose from two major sources, the first involved interpretation of sensations endured as the result of painful but often life-saving techniques. For many patients under sedation, due to a lack of awareness regarding surroundings or situation, such painful procedures might be interpreted as torture by staff. Even when patients have woken from sedation, some care tasks might be experienced as not only very painful and unpleasant but also as deliberate acts of harm. The second source may arise from visual misinterpretations. For some patients who woke from sedation unaware of where they were, or what had led to their admission, attempts to make sense of their surroundings may have led to some interesting but traumatic assumptions. The following text aims to illustrate both types.

"Sometimes, when treatment and care were being carried out (which were painful and uncomfortable), I did think at times, people were trying to cause me harm. I remember the staff on the ICU telling me – "it's OK, we're not going to hurt you" but the fact was that they were hurting me" (1-2 week report)

"I know that wherever I went to, it was not ICU – to me it was like hell. I thought I'd died and been brought back." (1-2 week report)

A four-to-five week diary report from a patient illustrates vicarious traumatising: *"I saw visual horrors, patients opposite me being tortured."*

2.3.4.4 *Sensory distortions and disorientation*

Some patients, even those who reported no other memory phenomena, mentioned having experienced some strange physical-type sensations around sleep times (either when waking or going to sleep). For example, from one-to-two week diary reports: Feeling as if they were dropping things when drifting off to sleep, and waking with a start or feeling that people were present when they were not; feeling as if they were struggling for breath/being smothered.

Feelings of being restrained or restricted, as illustrated by the following four-to-five week diary report: *“I went fishing on a big ship but could not get to the deck because something was holding me back. On a boat from Rotterdam to England I could not get off but did eventually and went on a train but could not get off that either because I was restricted.”*

2.3.4.5 *Considerations for future research, care and planning*

Many patients took an interest in the project and appeared to recognize that the information they provided about their ICU memory phenomena could be fed back to improve care around the issues of memory and sedative effects and also to direct future research. Some who had experienced strange phenomena were relieved to find that this was something that could happen to patients during an ICU stay. Several patients emphasized the need for the research information to be fed back to staff in order to help staff learn more about what takes place in patients' minds during the time between sedation and becoming fully conscious. At one-to-two weeks, many patients reported that the presence of family and friends was very grounding, and represented their only link with reality whilst in intensive care.

2.3.4.6 Comments

The transcripts collected at four-to-five weeks post-ICU contain only 55% of the amount of data contained in the transcripts collected at one-to-two weeks, so this would appear to suggest that for most patients, memories of the ICU experience regardless of whether positive or negative, diminish over time. It may also indicate that early intervention, beginning in the intensive care unit, might help alleviate much psychological distress experienced by patients following discharge from intensive care, and that the sedation practices in this particular unit, are effective in helping reducing traumatic memories for the time spent in ICU, since only one patient out of 25 actually met criteria for PTSD.

2.4 Discussion

This discussion section begins with a summary of the findings from Section 2.3, then proceeds to review each of the three hypotheses in light of the results. Following on from this is a discussion of the strengths and weaknesses of the current study. The section ends with discussions on clinical implications, directions for future research and conclusions.

2.4.1 Summary of the findings

Non-parametric analysis of variance on skin conductance data in relation to the three sounds (train, rain and intensive care unit) did not produce any statistically significant findings. A trend however, was observed which may support the idea that skin conductance did increase in response to the presentation of intensive care unit sounds. Analysis conducted upon measures of psychological distress and the skin conductance data did not suggest any relationship between higher skin conductance levels in response to the presentation of intensive care unit sounds and levels of psychological distress, nor were any trends observed. A relationship was observed between the number of memories of feelings reported at one-to-two weeks following intensive care unit and higher levels of psychological distress at four-to-five weeks, as measured by the Post Traumatic Stress Scale-14. A similar relationship was suggested between levels of anxiety as recorded by the Hospital Anxiety and Depression Scale and the number of memories of feelings recorded by the Intensive Care Unit Memory Tool at time-point two, however the regression appeared to just fail to reach significance. The free association question did not reveal any implicit memory for the intensive care unit story presentation. To summarise, a trend was observed in support of the hypothesis that sedative drugs facilitate pairing of immediate environmental sounds to patient distress in the intensive care unit (which may be

detected following discharge as an emotional conditioned response to the presentation of intensive care unit sounds, using skin conductance). No evidence was found to suggest any support for the hypothesis that classical conditioning of aural information occurs more frequently in patients reporting higher levels of emotional distress following discharge, nor was there any support for the hypothesis that these critically ill patients may assimilate emotionally-salient verbal information whilst sedated in intensive care and that this information may be retrieved (without explicit recall) after discharge when prompted with a free association question. Exploration and analysis of the intensive care unit memory diaries revealed that the majority of patients had experienced strange phenomena during sedation in the intensive care unit and the distress it caused to them at the time was sufficient for them to mention it at the first interview (one-to-two weeks following discharge from the intensive care unit). However the prevalence rate for caseness on the Hospital Anxiety and Depression Scale and Post-Traumatic Stress Scale-14 was relatively low by comparison. Recruitment via personal consultee assent in the intensive care unit was low and as a result, only eleven participants were recruited to the intensive care unit Story presentation Groups (Robinson Crusoe and Cinderella), three of whom died in the intensive care unit and one of whom was transferred. The free association questions elicited no “hits” in either the Robinson Crusoe Story Group, the Cinderella Story Group or the No-Story Control Group.

2.4.2 Review of the three Hypotheses in light of the results

Discussion in relation to Hypothesis 1: That sedative drug regimens facilitate classical conditioning (pairing) of ICU environment sounds to patient distress or anxiety in the ICU

which can then be detected after discharge as an emotional conditioned response to the presentation of ICU sounds whilst monitoring skin conductance.

Non-parametric ANOVAs conducted on the transformed skin conductance data failed to identify any statistically significant differences between sound conditions but the skin conductance group mean and mean rank were higher in response to the ICU sounds than to the train or rain sounds. This may be viewed as a trend in the direction of supporting Hypothesis 1 and it is possible that the lack of significance may be due to the small sample size. No significant relationship was found between skin conductance score and measures of psychological distress (PTSS-14 AND HADS) or ICU memories, nor were trends observed. Exploration of the impact of type and length of sedation did not reveal any significant findings nor did they suggest any trends. It is worth noting that the current study only sought to collect information on the last dose of sedation, rather than the total amounts of sedation given to a patient throughout their ICU stay or any mean level of sedation and it may be that an opportunity to monitor and analyse the effects of sedation in more detail was missed.

Discussion in relation to Hypothesis 2: That the assimilation of aural information and/or classical conditioning occurs more frequently in patients reporting higher levels of emotional distress following discharge.

The analysis revealed that there were no statistically significant relationships between the skin conductance scores and measures of post-traumatic stress, anxiety and depression. There was however, a suggestion of a trend that may be stronger in a larger sample size. Unlike the study by Hepp et al (2008), patients in the current study who scored higher on the PTSD measure were not more likely to score higher on measures of anxiety and depression, but this may be related to the study sample whose prolonged illness trajectory,

in many cases, led them to be far more concerned about their physical progress and outcome than any emotional issues.

Discussion in relation to Hypotheses 3: That critically ill patients may assimilate verbal information with emotional salience whilst receiving sedative drugs in ICU and that this assimilated verbal information may be retrieved in the absence of explicit recall after ICU discharge by a process of free association.

With only eleven participants recruited to the ICU Story Groups A and B, three of whom died in ICU and one who was transferred to another acute hospital, and no “hits” in either Group A, B, or C, there was no evidence that critically-ill patients can assimilate verbal information whilst receiving sedative drugs in ICU and that this information could be retrieved by means of a free association question, despite the absence of explicit recall for the learning event. One patient remarked on a time in the intensive care unit when he had not yet woken and recalled dreaming twice of being on a boat and attempting to alight the boat but being unable to because he felt they were restricted. Further investigation however revealed that this person had received the Cinderella and not the Robinson Crusoe story.

2.4.3 Anecdotal comments

Whilst no statistically significant whole models emerged to support any of the main hypotheses, there was some evidence to suggest that ICU sounds resulted in increased skin conductance scores and there was also some evidence to suggest a relationship between the presence of ICUM feelings memories at time-point two to HADS anxiety and PTSS-14 scores. This emphasis upon memories of feelings is different to the findings obtained by Stoll et al (1999), who found that the number of “traumatic” memories was associated with PTSD symptomatology, and Jones, Griffiths, Humphris and Skirrow (2001) who found that

an increase in delusional memories and absence of factual memories were associated with increased PTSD symptomatology. Presence of factual memories were also thought to provide a protective factor against PTSD. No significant findings in relation to either factual or delusional memories were found in the current study. There was no evidence to support any relationship between either ICU memories or measures of psychological distress (HADS and PTSS-14) to the increased skin conductance response to ICU sounds.

The current sample was a general ICU population but because of the specialties involved in work on the hospital site, a particularly sick, elderly frail client group formed the basis of the upper and lower gastro-intestinal surgical admissions, with emergency and elective aneurysms forming another bulk of admissions. Despite many of the patients being frail, many had also experienced serious illness for a considerable length of time and may have been sensitized to the acute treatment environment through exposure to repeated hospital admissions and procedures. This is different to more generic ICUs whose population comprise a large proportion of trauma/emergency single-episode admissions who are generally fit and well prior to admission. The population in the current study contained many patients who had experienced significant systemic illness for a number of years previously and who continued to experience ill-health for a considerable period of time after discharge.

Exploration and analysis of the ICU memory diaries revealed that the majority of patients had experienced strange phenomena during sedation in the intensive care unit and the distress it caused to them at the time was sufficient for them to mention it at the first interview (one-to-two weeks following discharge from ICU). However the prevalence rate for caseness on the HADS and PTSS-14 was relatively low by comparison. In view of the findings arising from the critical literature review, as highlighted by Figure 1.3, the

investigator suspects that the use of propofol over and above morphine and midazolam may be the reason, as Jones et al (2007) found that patients receiving high doses of propofol were not more likely to become delirious. Spearman's correlations however, conducted upon the variables of propofol and delusional memories at one-to-two weeks and four-to-five weeks were not significant, but this may be as a result of the small sample size. The relatively low levels of psychological distress may also be due to several things including adequate sedation and pain relief practices in the ICU, age, desensitization to unusual experiences as a result of repeated hospital procedures and admissions and general stoicism in a predominantly older patient population.

No statistically significant relationships were demonstrated related to main variables from the main hypotheses. The additional regression analyses did however demonstrate a statistically significant correlation between a number of variables which suggest a relationship between the total number of memories of feelings present one-to-two weeks after discharge from intensive care and higher scores on the PTSS-14 and a non significant relationship between T2 feelings memories and anxiety as measured by the HADS.

2.4.4 Lack of participation from minority ethnic groups

An interesting anecdotal finding was that despite Leicester's local population comprising approximately 50% minority ethnic groups, this was not reflected in the composition of the screened sample, with the sample comprising overwhelmingly white patients with all but two of the patients in the recruited sample being of white British origin. This highlights areas for researchers to explore in future, the first being exploratory examination of the pathways which lead to people from minority ethnic groups not being able to or choosing not to take up health services, how these groups perceive and manage

illness and critical illness in the face of a health crisis, what the alternatives are for them and what their perceptions are of acute services which lead to them refusing to participate in research of this nature. This is highly relevant as Schnyder, Moergeli, Trentz, Klaghofer and Buddeberg (2001) reported reduced participation from minority groups may be an issue if part of the reluctance is around language barriers, as this can lead to poorer social integration which is linked to greater-than-average difficulties in dealing with the aftermath of trauma.

2.4.5 Limitations of the study and implications for results

Data analysis was compromised by insufficient power due to an unanticipated low recruitment rate and further compromised by a high attrition rate of almost one-third of participants. Attrition is something of a challenge in this type of study because avoidance is a significant feature of post-traumatic stress disorder and one might well be researching a subject in which the most pertinent data are missed. The logistics associated with a protracted and complex assent process may account for the low recruitment rate. Some studies that involve recruitment and data collection during ICU admission appear to have much lower attrition rates, although further examination reveals that such studies have been conducted by the main clinicians involved in the patient's care, as for example, in the study by Hepp et al (2008) which had a fairly low attrition rate. ICU studies using postal questionnaires also appear to have fairly low attrition rates (for example, Boer et al. 2007). As can be seen by the demographic data there are a number of issues around the sample. It was a predominantly male sample, and predominantly older client group. This may also account for the relatively low rates of psychological distress detected in this sample (one patient scoring past the cut-point for DSMIV on the PTSS-14 and two others scoring in the

moderate-to-severe range for anxiety on the HADS out of a total of 28 patients) though many others reported several symptoms and the data were negatively skewed. Being older (Boer et al, 2007) and being male (Breslau et al, 1997) are thought to be protective factors in PTSD. The trend observed in the results of the skin conductance response to presentation of ICU sounds was limited in view of the lack of significance and this part of the current study could have been strengthened by the inclusion of a control group.

2.4.6 Clinical Implications

2.4.6.1 Memories of feelings at one-to-two weeks

Results of analysis between ICU memories and psychological distress suggest a relationship between the number of memories of feelings present at one-to-two weeks following discharge from ICU and signs of post-traumatic stress as measured by the PTSS-14 at four-to-five weeks and also possibly, anxiety as measured by the HADS. Consideration should be given to the screening of all ICU patients at one-to-two weeks following discharge, and staff should remain vigilant for anyone demonstrating increased memories of feelings, for signs of psychological distress at four-to-five weeks.

2.4.6.2 The need to encourage discussion and normalization of ICU memory phenomena

Many patients were relieved to discover they were not alone in experiencing strange memory phenomena whilst in ICU. In the case of the one patient who experienced psychological distress which met DSMIV criteria for PTSD, simply discovering that a research project was ongoing to explore such memory phenomena helped them begin to process their experiences at one-to-two weeks after discharge to a point at which by four-to-five weeks their distressing symptoms began to subside. This suggests that staff

working in ICUs should be supported to inform patients and their relatives of the risk of such phenomena and help normalize such experiences in the event of these occurring.

2.4.6.3 Active encouragement of expression of such feelings and experiences

Given that avoidance is one of the major signs of PTSD, rather than asking very general questions regarding patients' emotions, staff should ask very specific active, rather than passive questions, such as "has your sedation made you feel as if we were deliberately hurting you?" or "when you have been going to sleep, have you ever woken up thinking you were falling, or you were about to drop something, or that you had forgotten to turn something off?" Such questions may also encourage a general opening up to discussing some things which patients do not mention for fear of being thought of as mentally-ill.

2.4.6.4 Supplementary written information to support good informational care

Rather than patients being given small general booklets regarding their ICU stay, importance should be placed upon unusual memory phenomena by production of a dedicated booklet on the occurrence of this in ICU. Each type of memory phenomenon should have several clear examples and clearly written, simplified neuropsychological explanations to help patients make sense of their experiences.

2.4.6.5 Psychological involvement in ICU follow-up clinics

All ICU follow-ups should have support and involvement from health or clinical psychology departments. This may require high intensity involvement initially, in order to provide effective screening systems, tools, informational care and appropriate intervention and signposting where need be. Such intervention may be scaled down once systems are in place and may even require only supervision, consultation and possibly one-to-one intervention for patients whose signs indicate higher-level work. Currently in the UK very few ICUs follow patients up as routine, unless there are very specific reasons for doing so.

There is therefore great potential for clinical and health psychology departments based in acute centres to become pro-active in the development of services providing methods of screening, follow-up and if necessary, treatment for patients who experience an intensive care unit admission.

2.4.6.6 Things to help orientate the patients

Whilst control of infection policies mean that many personal items may not be left at bedsides, given that many patients reported that a main source of orientation during their period in ICU came from contact with their families, consideration should be given to ways in which patients may be continually orientated when their families cannot be around (for example, outside of visiting hours). Perhaps something similar to an orientation board used for people with cognitive problems, which could be kept clean to control-of-infection policy standards, might help patients somewhat.

2.4.7 Future Research Recommendations

2.4.7.1 ICU sounds

Future research could focus upon attempting to develop the ICU sounds paradigm further by attempting to replicate the findings in a larger sample. This would also permit a more comprehensive exploration of any potential relationship between scores on psychological disturbance and PTSD mechanisms.

2.4.7.2 Exploration of relationships between type, length and levels of sedation and PTSD

Further research is recommended to explore this across a more longitudinal study. The four-to-five week stage is the earliest the investigator could assess for PTSD but she was not able to explore any possible development of PTSD at a later stage due to time

constraints. Researchers attempting to explore this in the future would do well to obtain recordings of all sedation administered to patients across the whole of the ICU stay. Only the last dose of sedation was documented in the current study but many patients were administered one type of sedation and then another in a relay over a number of days.

2.4.7.3 The need for intensified focus and importance being placed on memories

Any future research into ICU memory phenomena would benefit from an intensified focus upon such issues and staff should be trained to be vigilant to any reported or observed memory and for accurate and detailed recordings to be made. Alongside such memory recordings, any notable care tasks, procedural or medication changes, visitors, admissions, discharges, incidents should all be recorded to enable a full and detailed research exploration to be made.

2.4.7.4 Further exploration regarding the ICU story paradigm

Any attempt to replicate the ICU story paradigm from the current study should involve a sample from a more general ICU with high turnover rates, involving patients with lower levels of chronic illness and disease, lower age and predictable illness trajectories, for example as in cardiac surgery or trauma and orthopaedics. Given the input required for this type of hypothesis, researchers may find it best to make this the sole focus of the study to allow relevant and detailed exploration whilst avoiding overloading patients with questions and measures. In the current study the hypothesis was based upon patients being discharged from ICU on the same day or day after they were weaned from sedation. In reality, many patients remained in the ICU for days or even weeks after sedation was stopped. The patients in the current study experienced abnormal perceptions in intensive care as demonstrated in the ICU memories diaries and ICUM but these did not appear to lead to PTSD. This may be related to the relatively high age levels in the sample. Older

people have been found to demonstrate lower levels of psychological distress in response to trauma but this varies from culture to culture and may well have an economic basis (Acierno, Ruggiero, Kilpatrick, Resnick & Galea, 2006).

2.4.8 Conclusion/Summary

The current study demonstrated that many patients who pass through an intensive care unit as part of their acute hospital admission, experience real and unreal memory phenomena which can leave them distressed. Over half of these memories appeared to subside by four-to-five weeks. The presentation of sounds demonstrated a non-significant trend between ICU sounds and stress responses as measured by skin conductance. This may suggest a mechanism involving implicit memory/classical conditioning but no further relationship could be demonstrated between this and measures of psychological distress, or implicit memory retention as implied by the hypothesis that critically ill patients may assimilate emotionally-salient verbal information whilst sedated in intensive care and that this information may be retrieved (without explicit recall) after discharge when prompted with a free association question, which was rejected in the current study. The trend towards increased skin conductance in response to ICU sound presentation is an interesting one despite the lack of significance, and the extent of variation in skin conductance in response to presentation of ICU sounds suggests that some patients were conditioned to the sounds and some were not.

Though patients emphasized the excellent care they received on ICU, the transcripts indicated that patients were still very much alone with their strange memory phenomena which means that some patients continued to experience psychological distress on discharge from the ICU and home, with no direct access to psychological support around

such issues. The literature review provided a model for the development of PTSD in ICU and implicates morphine and the benzodiazepine midazolam as the main source of PTSD development. Many patients in the current study received propofol (an anaesthetic drug without pain-relieving properties) which may explain this, but it should be noted that the study only sought to document the last dose of sedation. Many patients in the ICU received alternating regimens of both (morphine and midazolam or propofol) sedation types so future research should document type, length and dose of sedation across the whole of the ICU stay in order to clarify this further.

There were insufficient sample numbers (eleven patients were played the story but only seven remained in the study at one-to-two weeks post-discharge from ICU) obtained with which to explore whether patients were able to demonstrate implicit emotional memory by assimilating an emotionally-salient story whilst sedated in ICU. There were no “hits” (answers to the free association questions which implied implicit emotional memory of the story played in ICU) found amongst the responses of the recruited sample. This could in part be due to the vagaries of this particular sample. Further research in a more mainstream general ICU population is therefore recommended. The literature on implicit memory suggests that when implicit memory does occur, it is not robust and the best opportunities of detecting this arise within 24 hours of acquisition (Daneman & Merikle, 1996). Future research in this area should aim to test for implicit memory within 24 hours of acquisition and only when evidence of this is obtained should research extend detection to a longer time period.

Because of the complex nature of the phenomena and client group under study, it is very important for future research to be well-funded and conducted as much as possible, by those already working into the particular unit. Future investigators should consider funding

staff who can work a percentage of their time focusing upon clinical commitments and the rest focusing upon the research in the same unit.

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3. Critical Reflection

The following paragraphs discuss the investigator's own reflections upon what she believes to be the strengths and weaknesses of the current study. This begins with a focus on the strengths of the current study, for example, the hypotheses, the compromises made, the particulars of the sample, the ethics process and the fine line between research and clinical work. The weaknesses are then discussed, for example, recruitment, data collection issues, attrition and administrative issues. The investigator then reflects upon process issues from a psychodynamic perspective and then takes a macro view of the research in general. The section ends with a summary and a reflection upon the demands of doctorate research.

3.1. *Strengths*

3.1.1. *The hypotheses*

The current study drew upon research conducted in other areas of psychology - experimental civilian and non-civilian research into PTSD, awareness under anaesthesia and also knowledge gained through clinical psychology training. It investigated a phenomenon which occurs in a setting in which to date (apart from work undertaken by the Liverpool Group, for example Skirrow, Jones, Griffiths & Kaney 2001), there has been little clinical psychology input, but where opportunities for such input are vast. The literature review introduced a tentative model for PTSD in ICU using novel techniques to investigate a serious problem which occurs in ICU patients and the investigative study required familiarization and communication of minute details of the Mental Capacity Act, as well as knowledge and skill acquisition with regard to ICU and acute ward practices.

Much of the organizational, pre-data collection groundwork was both complex and time-consuming and the investigator believes that she managed such demands well.

3.1.2. Compromises

The investigator thoroughly researched well-validated and reliable measures for use in the project, some of which were withdrawn following recommendation by the ICU Consultant and substituted for others with which she was not familiar. Whilst initially disappointed, the researcher acknowledged early on that whilst it is good to have the practice of drawing upon theoretically sound measures, that in real world research, realism, compromise and collaboration are key to a successful outcome.

3.1.3. The sample

The study investigated post-traumatic stress in a severely ill client group. Whilst the process has highlighted much which might be improved upon, this relatively complex study was set up well given the constraints of time and resources.

3.1.4. Curious benefits emerging from a stringent ethics process

Initial rejection of the project by Leeds West Mental Capacity Ethics panel resulted in the proposal being re-submitted to the Nottingham Mental Capacity Ethics panel for a second hearing - a process which set the project timetable back by five months. This protracted process meant that some things which the researcher had set up in good time when first planning their research, were due for their annual renewal before data collection commenced (for example, SPSS licence codes and honorary research contract for acute settings within University Hospitals Leicester - UHL). The ethics process was far less

stringent than the UHL Research and Development (R&D) process. The initial proposal was rejected because the Leeds Ethics panel did not think that the investigator had sufficient experience to assent people into the study and instead recommended that the Consultant in ICU should be responsible for assenting patients, as he had previous experience of conducting research in which assent was required. During this time, the investigator reflected upon how our profession is viewed by many other healthcare professions, whilst being aware that this was to become a familiar challenge upon qualification. Having completed the current project, the investigator may be in a much stronger position when making ethics applications for similar projects in future.

3.1.5. Stark contrasts between clinical and research remits

Never before has the very fine line between clinical and research been so apparent to the investigator, with many more similarities than there were differences. The challenge not to intervene was forever present, and there was a need to flag up to other professionals when a patient was experiencing emotional distress, in order to avoid changing the nature of the phenomena under scrutiny. This proved to be very good practice for the researcher for thinking on one's feet in an acute healthcare setting.

3.2. Weaknesses

3.2.1. Recruitment

Despite a tremendous amount of ground-work prior to submission to Ethics and R&D (meetings with various professionals, observing theatre procedures, attending ICU ward rounds and discussions with patients) and positive predictions regarding potential participants, the data collection phase yielded disappointingly low recruitment numbers. If

planning a study of a similar nature in the future, in a setting where there is no direct clinical psychology input into patient care, the investigator would conduct an audit and pilot prior to forming a full proposal. This may be something which clinical psychology courses could consider in the future, perhaps by encouraging trainees to conduct a small scale project comprising an audit and pilot of the problem they wish to investigate in their major research project. Reflecting back on the difficulties encountered during attempts to recruit, the investigator believes that the main difficulty was due to the investigator not being part of the ICU care team and that had recruitment been conducted by a professional directly involved with the patient's care, this would have been much easier. The stipulation from ethics that the ICU Consultant must take the assent and the 24-hour rule also made the project virtually unworkable at times. Locating the Consultant within the hospital could be time-consuming and did not always fit with the relatives' availability; he was also away a great deal of the time. Most assented patients were recruited when the particular Consultant was on call for ICU. If more ICU consultants had been involved with the project from the start it is possible that the numbers may have been higher because they too would have identified potential recruits.

Remaining vigilant for potential recruits was extremely time-consuming and quite difficult at times due to the investigator being on placement at another hospital several miles away. The investigator had chosen a final year specialist placement in neuropsychology to compliment the study but with hindsight, it may have been better to have chosen Health Psychology which was based on the research site. The investigator perceived that one of her greatest strengths was her ability to work hard but she had mistakenly thought that this alone would be sufficient to carry her through. She now acknowledges that there were many things they have had around them in previous research

projects which they took for granted. The current project was conducted in relatively alien territory working alongside people who were struggling to understand the investigator's professional role and status let alone her novel project. The investigator learnt that a tremendous amount of hard work and what one perceives as a theoretically sound project do not necessarily ensure success.

3.2.2. Potential biases in the study sample

It was notable that although minority ethnic groups comprise fifty-per-cent of the population in the City of Leicester, only fifteen patients out of the seventy-seven screened as eligible were from minority ethnic groupings compared to sixty-three patients from white ethnic groups. This trend was even more pronounced in the actual study sample; all participants were born in the UK; only two participants were from Asian ethnic groups and the remaining thirty-one were from white ethnic groups. This means that despite relatives and patients from minority ethnic groups being approached for assent and consent with regard to the study, the majority of those approached declined the opportunity to participate. In this particular ICU the numbers of minority ethnic groups residing in the city are not reflected in the proportions of patients admitted to the ICU from such backgrounds. Ultimately this also means that the results of the study may be limited in applicability to those under-represented groups. Any attempts to explain such issues in terms of language barriers do not apply to this particular study as all patients from a minority ethnic background (apart from one patient eligible for the study but not recruited) spoke fluent English. Further research is therefore essential to discover referral and treatment pathways for such groups, not only in ICU but in terms of access to, or take up of surgical and medical interventions which may require an ICU admission. From a wider

perspective this may also mean that it may be useful for research to be conducted around the same issues but in ICU populations which comprise predominantly minority ethnic groups. In relation to the current study, the discussion around minority ethnic groups arose from reflections upon the content and process of conducting the research and not from active and planned observation of such issues during the course of research. Future studies should pay particular attention to recruitment biases in terms of ethnicity in order to contribute more to this debate and stimulate future research questions.

3.2.2. Data collection

It would have been interesting to study the recruited cohort longitudinally (for example six months, one year and two years post-ICU) in order to help determine the long-term effects upon psychological well-being. The memories diaries did reveal very interesting information but most accounts from diaries collected at the 1-2 week stage were actually retrospective accounts. Future investigators might wish to ensure more ownership of the diaries perhaps by co-opting a member of the nursing team. For any future study following on from the current one, it might be useful to consider the purchase of a tape recorder to collect the diary reports. This may also help place more importance on the volunteering of such information. After the first few clients were recruited it became obvious that to avoid attrition, the investigator would have to visit people at home in order to successfully collect the 4-5 week data. The skin conductance recording equipment was quite cumbersome to manage at times and if conducting research of this nature in future involving similar equipment, the researcher would apply for funding in order to reassure patients that they would be collected and returned home by taxi at the 4-5 week follow-up.

3.2.3. Attrition

The current project also suffered from a relatively high attrition rate. A reason for attrition and low take up might also be due to the heterogeneity of this particular client group, who are not necessarily psychologically-minded, having arrived at the ICU through a physical health care system. With hindsight, within the context of a doctorate project the investigator perhaps put in too many stages of data collection. Whilst ethically sound, the investigator acknowledges that she was perhaps too ambitious given the limitations of a clinical psychology doctorate. Patients recruited to the current study by assent in ICU could easily turn around at 1-2 weeks and say they did not wish to participate in the study, and likewise at 4-5 weeks. ICU Consultants managed patient care in the ICU, when the patients were sedated for most of this time; this resulted in patients having more allegiance to their admitting surgeon or physician and the discharge ward than they did to the ICU Staff and Unit and the investigator perceives this to be a significant factor in recruitment and attrition.

3.2.4. Administrative Issues

The study had to adhere to the standard of a randomized control trial in an acute hospital setting, with required administrative processes that took up a considerable amount of time for no additional benefit to the actual project. This was very apparent when arranging follow up visits at home and was time-consuming due to a variety of reasons, including being on a different site on placement, not having direct access to the patient files in order to contact a research colleague to check on patient status on computer and not being able to quote any one particular telephone number where patients could leave a message or contact the project.

3.3. Parallel Processes

This research was conducted with a very difficult to access, physically and emotionally frail client group who were surrounded by many different professionals due to their intensive needs, which often changed not only day by day but often hour-by hour. Because of this, it often took several ward visits prior to obtaining consent and 1-2 week measures. Only rarely did the investigator manage to see a patient at first attempt and this, coupled with the low recruitment rate, despite supportive supervision, meant that at times the investigator felt quite uncertain about whether all the hard work would result in completion of her doctorate. Reflection around this helped her think of the parallel processes taking place, not just within the patient group but also within the staff groups involved and within her own research processes. Given the ever changing nature of NHS structures and directives and the adaptation required to deal with such uncertainties, this was an experience which will be invaluable when working in various contexts as a clinical psychologist.

3.4. Expectations of Health Care Research

It seemed that the current study was in some way, outside the boundaries of the general public's expectations of what type of research they might assent their relatives into whilst in an intensive care unit. The investigator thinks recruitment might have been easier if the nursing staff had been able to give the initial information to patients' relatives or if the researcher had been part of the clinical team on the Unit, or if the investigator had been a qualified clinical psychologist.

3.5. *Summary*

The lack of a psychological context within the acute setting was quite unnerving at times. It did permit the researcher to witness at first hand, how the adoption of a paradigm by professionals working in this area has a functionality which enables them to continue to carry out their vital role, without succumbing to burnout. The investigator has learned much about the value of structure, support and integration when investigating potentially new areas within which clinical psychologists may work. She has learned much about her own limitations and time-management considerations when planning future research. As a newly-qualified clinical psychologist who is keen to bear in mind the Core Purpose and Philosophies of the profession, and continuously look for new ways in which clinical psychology can contribute to patient care within the NHS system, reflection upon these processes will be invaluable. The research content and process have allowed the investigator to demonstrate most competencies required of the clinical psychologist (with the exception of teaching, training and supervision) and there are many parallels between the research stages of literature review, introduction, methods, results, discussion and stages of clinical work involving assessment, formulation, intervention, monitoring and evaluation. Whilst the journey at times has not been straightforward, there is enough in the current study to provide a contribution to knowledge to others in the field of ICU and to feed back to the particular unit and the professionals who manage it. The investigator has also gained much in the way of transferrable skills and knowledge when conducting other research in the future.

3.6. Constraints of Doctorate Research

There is a dichotomy which exists between the demands of producing a reasonable piece of research suitable for a doctorate in clinical psychology; time constraints mean that one has to try and create a proposal which can be completed in the set amount of time whilst producing a piece of work that contributes to knowledge in the field. However real-world research cannot be predicted, because if it could be predicted it suggests there is no justification to conduct it. In areas of research where studies are research grant-funded and do not have the academic time-limit and constraints attached, this invariably means that deadlines are extended to within reasonable limits so that the research can come to a natural end. In this sense the investigator does not think that the research hypotheses, nor the design was necessarily an incorrect one, but the nature of this particular client group, which was older than the average ICU population, and in this ICU which serves an upper and lower gastro-intestinal client group with longer illness trajectories and poorer prognosis, meant that she ran out of time.

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Appendices

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Appendix AA Guidelines for submission from British Journal of Clinical Psychology

Appendix E: Motor Activity Assessment Scale

Motor Activity Assessment Scale

0	Unresponsive	Does not move with noxious stimulus ^a
1	Responsive only to noxious stimuli	Opens eyes OR raises eyebrows OR turns head toward stimulus OR moves limbs with noxious stimulus ^a
2	Responsive to touch or name	Opens eyes OR raises eyebrows OR turns head toward stimulus OR moves limbs when touched or name is loudly spoken
3	Calm and co-operative	No external stimulus is required to elicit movement AND patient is adjusting sheets or clothes purposefully and follows commands
4	Restless and co-operative	No external stimulus is required to elicit movement AND patient is picking at sheets or tubes OR uncovering self and follows commands
5	Agitated	No external stimulus is required to elicit movement AND attempting to sit up OR moves limbs out of bed AND does not consistently follow commands (e.g. will lie down when asked but soon reverts back to attempts to sit up or move limbs out of bed)
6	Dangerously agitated, unco-operative	No external stimulus is required to elicit movement AND patient is pulling at tubes or catheters OR thrashing side to side OR striking at staff OR trying to climb out of bed AND does not calm down when asked

^aNoxious stimulus, suctioning OR 5 secs of vigorous orbital, sternal, or nail bed pressure

Appendix F – Apache II Severity of Illness Scale

THE APACHE II SEVERITY OF DISEASE CLASSIFICATION SYSTEM									
PHYSIOLOGIC VARIABLE	High Abnormal Range					Low Abnormal Range			
	+4	+3	+2	+1	0	+1	+2	+3	+4
TEMPERATURE – rectal (° c)	○ ≥41°	○ 39°-40.9°		○ 38.5°-38.9°	○ 36°-38.4°	○ 34°-35.9°	○ 32°-33.9°	○ 30°-31.9°	○ ≤29.9
MEAN ARTERIAL PRESSURE – mm Hg	○ ≥160	○ 130-159	○ 110-129		○ 70-109		○ 50-69		○ ≤49
HEART RATE (ventricular response)	○ ≥180	○ 140-179	○ 110-139		○ 70-109		○ 55-69	○ 40-54	○ ≤39
RESPIRATORY RATE – (non-ventilated or ventilated)	○ ≥50	○ 35-49		○ 25-34	○ 12-24	○ 10-11	○ 6.9		○ ≤5
OXYGENATION:A-aDO ₂ or PaO ₂ (mm Hg) a. FIO ₂ ≥0.5 record A-aDO ₂	○ ≥500	○ 350-499	○ 200-349		○ <200				
b. FIO ₂ <0.5 record only PaO ₂					○PO ₂ >70	○PO ₂ 61-70		○ PO ₂ 55-60	○ PO ₂ <55
ARTERIAL Ph	○ ≥7.7	○ 7.6-7.69		○ 7.5-7.59	○ 7.33-7.49		○ 7.25-7.32	○ 7.15-7.24	○ <7.15
SERUM SODIUM (Mmol/L)	○ ≥180	○ 160-179	○ 155-159	○ 150-154	○ 130-149		○ 120-129	○ 111-119	○ ≤110
SERUM POTASSIUM (Mmol/L)	○ ≥7	○ 6-6.9		○ 5.5-5.9	○ 3.5-5.4	○ 3-3.4	○ 2.5-2.9		○ <2.5
SERUM CREATININE (mg/100ml) (Double-point score for acute renal failure)	○ ≥3.5	○ 2-3.4	○ 1.5-1.9		○ 0.6-1.4		○ <0.6		
HEMATOCRIT(%)	○ ≥60		○ 50-59.9	○ 46-49.9	○ 30-45.9		○ 20-29.9		○ <20
WHITE BLOOD COUNT (total/mm3)	○ ≥40		○ 20-39.9	○ 15-19.9	○ 3-14.9		○ 1-2.9		○ <1
GLASGOW COMA SCORE (GCS) Score = 15 minus actual GCS									
A Total ACUTE PHYSIOLOGY SCORE (APS): Sum of the 12 individual variable points									
Serum HCO ₂ (venous-mMol/L) (Not preferred, use if no ABGs)	○ ≥52	○ 41-51.9		○ 32-40.9	○ 22-31.9		○ 18-21.9	○ 15-17.9	○ <15

Appendix I: UK Post-traumatic Stress Scale (UKPTSS-14)

UK-PTSS-14

Presently (this means in the past few days) I suffer from:

	(never)							(always)
	0	1	2	3	4	5	6	7
1. Sleep problems	0	1	2	3	4	5	6	7
2. Nightmares	0	1	2	3	4	5	6	7
3. Depression, I feel dejected/downtrodden	0	1	2	3	4	5	6	7
4. Jumpiness, I am easily frightened by sudden sounds or sudden movements	0	1	2	3	4	5	6	7
5. The need to withdraw from others	0	1	2	3	4	5	6	7
6. Irritability, that is, I am easily agitated/annoyed and angry	0	1	2	3	4	5	6	7
7. Frequent mood swings	0	1	2	3	4	5	6	7
8. A bad conscience, blame myself, have guilt feelings	0	1	2	3	4	5	6	7
9. Fear of places and situations which remind me of the intensive care unit	0	1	2	3	4	5	6	7
10. Muscular tension	0	1	2	3	4	5	6	7
11. Upsetting, unwanted thoughts or images of my time on the intensive care unit	0	1	2	3	4	5	6	7
12. Feeling numb (e.g. cannot cry, unable to have loving feelings)	0	1	2	3	4	5	6	7
13. Avoid places, people, or situations that remind me of the intensive care unit	0	1	2	3	4	5	6	7
14. Feeling as if my plans or dreams for the future will not come true	0	1	2	3	4	5	6	7

Appendix O: Correlational Table of Main Variables

Correlational Table of Independent/dependent variables used in analyses pertaining to the main hypotheses (using Spearman's Rho)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Length of sedation	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2. Type of sedation	.043	---	---	---	---	---	---	---	---	---	---	---	---	---
3. ICUM (Factual) (T2)	-.116	-.014	---	---	---	---	---	---	---	---	---	---	---	---
4. ICUM (Feelings) (T2)	.145	.128	.309	---	---	---	---	---	---	---	---	---	---	---
5. ICUM (Delusional) (T2)	.271	-.188	.108	.534	---	---	---	---	---	---	---	---	---	---
6. ICUM (Factual) (T3)	-.143	-.214	.656**	.423*	.278	---	---	---	---	---	---	---	---	---
7. ICUM (Feelings) (T3)	-.118	.000	.185	.672**	.344	.615**	---	---	---	---	---	---	---	---
8. ICUM (Delusional) (T3)	.022	-.010	-.022	.480*	.516*	.419*	.713	---	---	---	---	---	---	---
9. PTSS-14	.050	-.077	-.063	.567**	.372	.213	.473*	.513*	---	---	---	---	---	---
10. HADS (Anxiety)	-.141	-.109	.082	.577**	.294	.119	.283	.332	.716**	---	---	---	---	---
11. HADS (Depression)	.218	-.141	-.060	.099	.227	-.142	.094	.250	.503*	.208	---	---	---	---
12. Mean SC (Train)	.368	-.278	.242	.039	.185	-.293	-.325	-.236	-.041	.134	.060	---	---	---
13. Mean SC (Rain)	.118	-.247	.252	-.049	.126	-.019	.025	-.006	.090	.094	.244	.657**	---	---
14. Mean SC (ICU)	-.092	-.340	.269	-.111	-.013	.049	-.064	-.361	-.355	-.245	-.448*	.498*	.374	---

Correlational Table of Independent/dependent variables (continued)

Variables(other)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
15. Age	-.189	.185	-.051	-.182	-.194	-.361	-.370	-.400	-.216	-.112	-.393	.235	.126	.202
16. Length of stay (ICU)	.783**	.194	-.140	-.044	.057	-.173	-.170	.044	.035	-.217	.503*	.014	.034	-.423
17. Length of hospital stay	.541*	-.086	-.145	.247	.277	.009	.348	.309	.567**	.144	.589*	.287	.474	-.255
18. Apache II	.202	.252	-.137	-.098	-.232	-.128	-.068	-.109	.257	.094	.497*	.240	.410	-.002

Correlational Table of Independent/dependent variables (continued)

Variables	15	16	17	18
15. Age	---	-.236	-.312	.067
16. Length of stay (ICU)	---	---	.578**	.331
17. Length of hospital stay	---	---	---	.383
18. Apache II	---	---	---	---

* p<.05 **p<.02

Appendix A: Initial Data Extraction Tool

1.Date of Study	2.Subject Matter	3.Population Surveyed
4. Location of Study	5. Country of origin	6.Type of Study (e.g validation/exploratory etc)
7.Citation Score Ranking	8.Journal Quality Ranking	9.Quality of study Ranking
TOTAL SCORE: (Sum of 7, 8, & 9):		
Final Decision: ●Discard abstract OR ●Retrieve Article		

Appendix B: Literature Review Rating Tool

SECTION 1: INFORMATION ON METHODS AND OTHER FACTORS AFFECTING QUALITY:

Citation Score

JIF Rating

Quality Ranking of study

TOTAL RATING

Are major variables and terms defined:

Psychometric evidence (e.g. reliability stats) to demonstrate that the instruments/measures used are pertinent to that population:

face validity

content v

predictive v

construct v

convergent v

divergent v

sensitivity

specificity

Are the study data collected prospectively:

The sample is obtained randomly from a specifically-defined population or the entire eligible population is chosen (describe age, male/female, ethnicity etc)

Is the choice of sample size is explained?

Are reasons given for incomplete/no data on eligible participants (and what they are):

Adequacy of response rate is discussed:

Information is offered that is specifically pertinent to the research question:

Researchers provide psychometric evidence for the validity of the data sources used for the main variables:

SECTION 2: DATA ON CONTENT

For each study, describe or give:

Study objectives: the hoped-for specific outcomes or expectations of the study:

Definitions of the main variables such as health status and quality of life):

Settings: the locales in which the study was conducted e.g. trauma unit, icu, private hospital etc:

Intervention or programme under study: main objectives, activities and structural or organisational characteristics of programme or intervention:

Research design: Experimental or observational. If experimental, controlled or not.

Sample size and composition: how many participants are in each setting: group or experiemntal and control, male & female.

Measures for main variables: how each variable (e.g. satisfaction, is measured) e.g. the ABC satisfaction survey – online version):
RESULTS:

Conclusions: in author's own words: what do the study's findings suggest about:

1. **implicit memory**

2. **PTSD**

3. **anxiety**

4. **depression**

5. **other factors**

year of publication

source of financial support.

ELIGIBILITY AND ACTUALITY:

Contains relevant information?

Is accessible?

Meets pre-set standards for methodological quality?

Does not have any features justifying exclusion?

METHODOLOGICAL QUALITY:

Prospective non randomised controlled trial

Retrospective study with clearly defined sources of info

Retrospective study with unspecified/unclear data sources

Essays/editorials/reviews/book chapters

Screened for methods/content/eligibility & actuality (state database and scoring etc)

Print database out: To highlight strengths & weaknesses of each study when writing review:

Review screen

Type of study:

***Reliability: (not possible to obtain within context of a D.Clin.Psy thesis – supervision by expert in field as next best thing):**

Appendix C: Robinson Crusoe Transcript

Robinson Crusoe was born in the city of York, in England, in the year 1632. His father was a man of some wealth, able to give him a good home and send him to school. It was his wish that he should be a lawyer but his head began to be filled very early with thoughts of travelling, and he could dream of nothing but going to sea. Against his father's wishes, one day he went to Hull and met an old schoolfriend and set sail for London with him in his father's ship. From there he sailed on a trading vessel bound for Africa. Out in the ocean a great storm came up, the ship lost its way, struck a bank of sand, and broke into pieces. In their distress they launched a boat but the boat capsized before they reached land and he was forced to swim to safety. Once on dry land he began to realize that he was the only crew member to make it to safety.

He sought safety in a tree for the night, to avoid fierce animals. The next day he swam out to the wreck of the ship and was able to salvage many of the provisions on board using a makeshift raft from some of the wreckage on shore. He also managed to salvage other things including a carpenter's chest, some guns and gunpowder. That afternoon he set off to explore the terrain. To his astonishment he discovered he was on a desert island, which at the time he believed to be uninhabited by anyone other than himself. Over the next twelve days he worked hard at salvaging anything he could from the shipwreck, however on the twelfth night there was another violent storm and when he awoke in the morning the ship was nowhere to be seen. With the ship now gone, he put all his effort into building himself a safe shelter to live in. He found a shallow cave on the side of a hill, and made a tent from one of the sails of the boat. He then created a high fence around this with a ladder to climb over it. This he called his "castle." He had found aboard a dog and two cats. He carried the cats ashore on the raft, but as for the dog he swam ashore himself, and was a trusty servant to Crusoe for many years. Besides the company of these pets, Crusoe had a parrot which he caught, and which he taught to speak; and he too often gave him much amusement. Initially he lived on the meat from goats running wild on the island, but then began to breed them to ensure a steady supply of goat meat for a long time to come. He saved the skins for clothes and also made an umbrella to shelter him from both sun and rain.

For a long time he brooded over the idea of making a canoe of the trunk of a tree, as the Indians do, and at last set to work at the task. He cut a large tree, and spent over three months shaping it into the form of a boat. Then he found it too large to move to the water. After this, Crusoe made a smaller one, and succeeded in launching it, and set out to make a tour around the island in it. But when he had been out three days, such a storm arose that he was near being lost. At last he was able to bring his boat to the shore, in a little cove; and there he left it, and went across the island, on foot, to his castle, not caring to go to sea again in such an unsafe vessel.

Years and years passed. Although he had, to some extent, become contented with his lonely existence on the island, at times a terrible sense of loneliness and desolation would come over him. Sometimes he would go to the top of a hill where he could look out to sea in hopes of catching sight of a ship. Often when doing this Crusoe's imagination would run away with him and he would believe that he had sighted a ship. He would spend a long time looking at the horizon for it, and then bring himself back to reality that the ship existed only in his imagination, at which point he would sit down and weep like a child, thus making himself feel worse not better. But one day he saw a sight which turned his thoughts in a new channel. It was the print of a naked foot upon the sand near the shore. It filled Crusoe with fear, for it showed that the island must sometimes be visited by savages.

One morning, going out quite early, he could see the light of a fire about two miles away. He went to the top of the hill and looked in the direction of the fire. He saw that five canoes were drawn up on the shore, while a swarm of naked savages were dancing about the fire. Presently they dragged two poor chaps from the boats and one of them, who was left standing for a moment, saw a chance to escape, and started to run towards Robinson Crusoe. He made up his mind to help him. When they were near enough, Crusoe took a short cut down the hill, and placed himself between pursuers and pursued, shooting the pursuers. Then he made signs to the poor runaway to come to him, and he did so in fear

and trembling, kneeling at Crusoe's feet and setting his foot upon his head, as a sign that he was now Crusoe's slave. He now had a companion, and in a short time he began to teach him to speak English. First Crusoe let him know that his name was to be Friday, for that was the day he had saved his life. Then he taught him everything that he thought would make him useful, handy, and helpful. He clothed him in a suit made of goatskins, and the runaway seemed to be greatly pleased to be dressed like Crusoe.

After some time had passed over, Friday came running to Robinson Crusoe one morning to say that there was a ship in sight. Welcome as this news was, he thought he would not show himself until he could learn what had brought the ship there, and it was well that he did not. Crusoe watched in concealment and saw a boat leave the ship and make for the shore. Eleven men landed, and he saw that three of them were bound as captives. They were laid upon the ground while the rest dispersed about the island. He approached the captives and questioned them, and found they were English, that one was the captain, and the others were the mate and a passenger, and that there had been a mutiny on the ship, and that the men, as a favor, instead of killing them, were going to leave them on the island. Crusoe offered to aid them to recover the ship, and going back to his castle, he brought guns and gave them to them. When the men returned to the boat they ambushed them and then they rowed out to the ship. Those on board were equally surprised at what had happened, and when one of the worst was killed, were glad to return to their duty. Then the captain came back to the island, and told Crusoe that the ship and all that he had was at his service, in return for what he had done for him. Crusoe told him that all he asked for was a free passage for Friday and himself back to England. To this he gladly assented. He provided him with clothing from his own wardrobe, and after he had arranged all his belongings, Friday and Crusoe went aboard. Thus, Robinson Crusoe left the island, twenty-eight years, two months, and nineteen days after he had landed upon it, landing safely in England, glad to be back in his old home once more, desiring nothing but to spend the rest of his days in peace and happiness, but feeling blessed that in Friday, he had encountered someone on that Island whose friendship, despite the barrier of language, was one of the best he had ever known.

Appendix D: Cinderella Transcript

There once was a beautiful girl named Cinderella, who lived with her two ugly sisters. “Cinderella, scrub the floor.” “Cinderella, make the beds.” “Cinderella, why is my dinner not ready yet?” This sort of thing was all that poor Cinderella heard from her step sisters from morning to night. Cinderella was very beautiful and good natured but her step sisters, who were very ugly, were uncontrollably jealous of her so they made her life miserable. One day a messenger called at the house with an invitation to a Grand Ball which the Prince was holding at the Palace. At once the step sisters were in a dither about what to wear and how they should look.; “All the most handsome young men in the kingdom will be there,” they cried. “We must be sure to look our best!” “Oh please can I come to the ball?” begged Cinderella. The ugly sisters howled with laughter. “You go to the ball . . . don’t be so ridiculous. Just look how tattered your clothes are. You can’t go looking like that, and besides, we will need you to help us get ready.”

Anyone but Cinderella would have refused to help, but she was so kind hearted that she could not,. On the night of the ball the ugly sisters had Cinderella running around in circles after them. “Powder my wig . . . Press my gown . . . Do this up . . . Fetch me a mirror and do hurry up you lazy creature.” Cinderella felt quite dizzy by the time they were finished and she didn’t even get so much as a “thank you.” Her step sisters swept out to their carriage and left poor Cinderella crying quietly by the fireside.

Suddenly there was a flash of light and, to Cinderella’s astonishment, a little old lady appeared. “I am your fairy godmother,” she said. “Dry your eyes. You shall go to the ball. Just do as I say.” First she sent Cinderella to the garden to find a pumpkin. She touched it with her magic wand and in an instant it became the most splendid coach you ever saw. Then Cinderella was told to bring the mouse trap from the kitchen. Inside it were six white mice. The fairy godmother gave each of them a tap with her wand and turned them into snow white horses. Next, Cinderella brought six little lizards which she found in a watering can. These were turned into six footmen with silver-buttoned coats. Finally a large black rat was transformed into a jolly coachman. “Well now, child – you can go to the ball after all,” chuckled the fairy godmother. “Aren’t you pleased?” “Oh

yes,” exclaimed Cinderella, “But how can I go in these old rags?” At once the godmother waved her wand and the dirty old clothes were changed into a beautiful ball gown and around Cinderella’s neck was a string of pearls. Then, to complete the picture, she found a pair of dainty glass slippers on her feet. “Now, off you go and enjoy yourself,” said the fairy godmother. “But remember, you must not stay a second after midnight or all your fine clothes will turn back into rags and the coach and horses, coachman and footmen will return to what they were before I worked my magic.

Cinderella arrived at the palace just as the ball was about to begin. As she entered the ballroom a murmur ran around the crowd. “Who is that beautiful girl?” The Prince could not take his eyes off her. He insisted that she dance with him for the entire evening. Cinderella had never been so happy before in her entire life. She was so happy that she didn’t notice the time flying by until, suddenly, the clock began to strike twelve. “Good heavens!” she cried, remembering her fairy godmother’s warning. “I must go.” She ran out into the darkness. At the twelfth stroke her fine clothes became rags and the coach turned back into a pumpkin. The Prince ran after Cinderella but she had vanished into the night. All that remained was one of her glass slippers. It had fallen from her foot as she ran down the palace steps. “I will find the girl who wore this slipper,” vowed the Prince, “And I will make her my bride.”

The next morning a proclamation was read out in the square to the sound of a trumpet. Every girl in the kingdom was to try on the glass slipper and whoever it fitted would marry the Prince. From North and South, East and West, people came flocking to the City. Young and old, short and tall, thin and fat; one by one they tried on the glass slipper, but it fitted none of them.

Eventually, the slipper was brought to Cinderella’s house. The ugly sisters were so excited. They snatched the glass slipper from the messenger before he could say a word. “Look! It fits me!” cried the elder sister. “Nonsense,” said the younger sister. “Your heel is sticking out. Let me try it on. There it fits me like a glove.” “Well, it certainly doesn’t fit like a slipper!” sneered the elder one. “Your toes are bent double.” “Does

anyone else live here?” asked the messenger. “Everyone must try on the slipper.” “Only Cinderella,” replied the sisters. “But she’s only a servant girl. The slipper can’t possibly fit her.” But the messenger insisted that even Cinderella must try on the slipper, and so she was brought from the kitchen where she had been cooking dinner. Slowly, she took the slipper and put it on. The ugly sisters gasped in amazement. “It fits,” they wailed.

Then Cinderella’s fairy godmother appeared and tapped her with the magic wand. Once more she was dressed in fine clothes, even more beautiful than her ball gown. “Your carriage is waiting to take you to the palace,” said the fairy godmother. The Prince was overjoyed to see Cinderella again. Soon the couple were married. Everyone went to the wedding, even the ugly sisters whom Cinderella had completely forgiven for their previous unkindness.

Appendix G: Confusion Assessment Method for the Intensive Care Unit (CAM-ICU)

Delirium is diagnosed when both Features 1 & 2 are positive, along with either Feature 3 or Feature 4

Features and Descriptions	Absent	Present
1. Acute onset or fluctuating course		
A. Is there evidence of an acute change in mental status from the baseline? B. Or, did the (abnormal) behaviour fluctuate during the past 24 hours, that is, tend to come and go or increase and decrease in Severity ? Sources of information: Serial Glasgow Coma Scale or sedation score ratings over 24-hours as well as readily-available input from the patient's bedside critical care nurse or family.		
II. Inattention		
Did the patient have difficulty focusing attention ? Is there a reduced ability to maintain and shift attention? Sources of information: Attention Screening Examination by using either picture recognition or Vigilance A random letter test. Neither of these tests requires verbal response, and thus they are ideally-suited for mechanically-ventilated patients.		
III. Disorganised thinking		
Was the patient's thinking disorganized or incoherent, such as rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable switching from subject to subject? Was the patient able to follow questions and commands throughout the assessment? 1. "Are you having any unclear thinking?" 2. "Hold up this many fingers." (examiner holds two fingers in front of the patient) 3. "Now do the same with the other hand." (not repeating the number of fingers)		
IV. Altered level of consciousness		
Any level of consciousness other than "alert." Alert – normal, spontaneously fully aware of environment and interacts appropriately Vigilant – hyperalert Lethargic – drowsy but easily aroused, unaware of some elements in the environment, or not spontaneously interacting appropriately with the interviewer; becomes fully aware and appropriately interactive when prodded minimally. Stupor – difficult to arouse, unaware of some or all elements in the environment, or not spontaneously interacting with the interviewer; becomes incompletely aware and inappropriately interactive when prodded strongly Coma – unarousable, unaware of all elements in the environment, with no spontaneous interaction or awareness of the interviewer, so that the interview is difficult or impossible even with maximal prodding		
Overall CAM-ICU Assessment (Features 1 and 2 and either Feature 3 or 4): Yes..... No.....		

Appendix H: ICU Memory Tool (ICUM)

(Please circle the appropriate answer)

1. **Do you remember being admitted to hospital?**
Clearly/Hazily/Not at all
2. **Can you remember the time in hospital before you were admitted to Intensive care?**
All of it/Some of it/Nothing
3. **Do you remember being in intensive care?**
Yes/No
- 4.a) **Do you remember all the stay clearly?**
Yes/No
- 4.b) **What do you remember?** (*circle those things you remember*)

Family Alarms* Voices* Lights* Faces* Breathing Tube**
Suctioning Being uncomfortable[†] Darkness* Clock**
Tube in your nose Ward round* Feeling confused[†] Feeling down[†]*
Feeling anxious/frightened[†] Feeling that people were trying to hurt you[‡]
Hallucinations[‡] Nightmares[‡] Dreams[‡] Panic[‡] Pain[‡]
- 4.c) **If you had any feelings that someone was trying to hurt or harm you While you were in intensive care can you please describe these Feelings below:**

.....

.....

.....

Score for subscales:

*score of 0, 1 added to give number of factual memories

†score of 0,1 totalled to give number of memories of feelings

‡score of 0.1 totalled to give number of delusional memories + score of 1 for mention of nurse or doctor trying to kill the patient in description 4c.

(please circle the appropriate answer)

- 4d. If you had nightmares or hallucinations while you were in intensive care could you please describe these:**

.....

.....

.....

- 5. Do you remember being transferred from intensive care to the general wards?**

Clearly/ Hazily/ Not at all

- 6. Have you had any unexplained feelings of panic or apprehension?**

Yes/ No

- 6a. If yes: What were you doing when these feelings happened?**

.....

- 7. Have you had any intrusive memories from your time in hospital or of the event that lead up to your admission?**

Yes/ No

7a. *If yes:* What were you doing when these intrusive memories happened?

.....

7b. What did these memories consist of (e.g. tube in nose, or frightening Nightmares)?

.....

8. Have you talked about what happened to you in intensive care with:

A member of your family/ A nurse on the ward/ A friend/

A doctor on the ward/ Your family doctor

Appendix J: Hospital Anxiety & Depression Scale (HADS)

University Hospitals of Leicester 
NHS Trust

Directorate of Anaesthesia, Critical Care & Pain Management,
Leicester Royal Infirmary,
Leicester,
LE1 5WW.
Tel 0116 258 5291
Fax 0116 247 0141



Senior Lecturer: Dr Jonathan Thompson

HAD Scale

ID Code:

Date:

Doctors are aware that emotions play an important part in most illnesses. If your doctor knows about these feelings he will be able to help you more. This questionnaire is designed to help your doctor to know how you feel. Read each item and place a firm tick in the box opposite the reply which comes closest to how you have been feeling in the past week. Don't take too long over your replies: your immediate reaction to each item will probably be more accurate than a long thought-out response.

Tick only one box in each section

I feel tense or "wound up":

Most of the time	☐
A lot of the time	☐
Time to time, occasionally	☐
Not at all	☐

I feel as if I am slowed down:

Nearly all of the time	☐
Very often	☐
Sometimes	☐
Not at all	☐

I still enjoy the things I used to enjoy:

Definitely as much	☐
Not quite as much	☐
Only a little	☐
Hardly at all	☐

I get a sort of frightened feeling like "butterflies" in the stomach:

Not at all	☐
Occasionally	☐
Quite often	☐
Very often	☐

I get a sort of frightened feeling as if something awful is about to happen:

- Very definitely and quite badly ☐
- Yes, but not too badly ☐
- A little but it doesn't worry me ☐
- Not at all ☐

I can laugh and see the funny side of things:

- As much as I always could ☐
- Not quite so much now ☐
- Definitely not so much now ☐
- Not at all ☐

Worrying thoughts go through my mind:

- A great deal of the time ☐
- A lot of the time ☐
- From time to time but not too often ☐
- Only occasionally ☐

I feel cheerful:

- Not at all ☐
- Not often ☐
- Sometimes ☐
- Most of the time ☐

I have lost interest in my appearance:

- Definitely ☐
- I don't take so much care as I should ☐
- I may not take quite as much care ☐
- I take just as much care as ever ☐

I feel restless as if I have to be on the move:

- Very much indeed ☐
- Quite a lot ☐
- Not very much ☐
- Not at all ☐

I look forward with enjoyment to things:

- As much as I ever did ☐
- Rather less than I used to ☐
- Definitely less than I used to ☐
- Hardly at all ☐

I get sudden feelings of panic:

- Very often indeed ☐
- Quite often ☐
- Not very often ☐
- Not at all ☐

I can sit at ease and feel relaxed:

Definitely ☐

Usually ☐

Not often ☐

Not at all ☐

**I can enjoy a good book or
radio or TV programme:**

Often ☐

Sometimes ☐

Not often ☐

Very seldom ☐

**Implicit Memory and Psychological Disturbance in ICU
Study**

Memory Diary

Please record each day any dreams,
nightmares, flashbacks or other memory
events you experience

Date	Time	What your dream, nightmare, flashback or other memory event was (in your own words)

Date	Time	What your dream, nightmare, flashback or other memory event was (in your own words)

Date	Time	What your dream, nightmare, flashback or other memory event was (in your own words)

Appendix L: LPT Sponsorship Approval Form



A
Research & Development Office
Daisy Peake Building
Gipsy Lane
Leicester
LE5 0TD
Tel: 0116 225 3743
david.clarke@leicspart.nhs.uk

Sherley M. Tordoff
Clinical Psychology
University of Leicester
104 Regent Road
Leicester LE1 7LT

22nd January 2009

Dear Sherley

Re: Implicit memory and psychological disturbance in ICU
UHL: 10649, Ethic Ref: 08/H0403/148, LPT Trust Ref: ADMH0471

Thank you for applying for NHS Permission to Conduct Research for the above-named project and supplying comprehensive information on the amendments required by the REC. This study has now been validated and reviewed according to the Standard Operating Procedure for research appraisal. The study therefore has been granted the following level of approval:

Full Approval	☒	Approval in Principle	☐	Approval refused	☐
Sponsor:	Leicestershire Partnership NHS Trust				

Under the research governance policy of the Trust, confirmation of appropriate ethical approval is a necessary prerequisite for Trust Approval. This office is now in receipt of confirmation of a favourable ethical opinion following extensive correspondence and amendments with Nottingham Research Ethics Committee 1 and their meeting of 9th December 2008. LPT confirms it will be the research sponsor, although you must comply with the terms of your placement contract with University Hospitals of Leicester NHS Trust. No further agreement should be necessary. Please read and sign the principles stated overleaf.

Yours sincerely

A handwritten signature in blue ink, appearing to read "D. Clarke", with a horizontal line underneath.

Dr. Dave Clarke (Associate Director, R&D)

Leicestershire Partnership NHS Trust will act as a sponsor for the project named below provided the Investigator adheres to the following conditions:

1. The Investigator and all members of the research team shall comply with all the regulations applicable to the performance of the project, including, but not limited to, the NHS Research Governance Framework for Health and Social Care (April 2005), the World Medical Association Declaration of Helsinki (2000), the UK Medicines for Human Use (Clinical Trials) Regulations (2004), ICH Good Clinical Practice Guidelines (1997), the Human Tissue Act (2004) and the Data Protection Act (1998), Mental Capacity Act (2005).
2. **The project must not start until:**
 - Favourable ethical opinion from an appropriately constituted LREC or MREC and MHRA approval (if applicable) has been obtained, or evidence has been provided that such approval is not necessary.
 - Final indemnity has been confirmed from either the R&D Office of funder.
 - Non-LPT employees having direct contact with patients and/or direct bearing of the quality of their care should ensure they have honorary contracts (see Trust policy).
 - If the project is externally funded, financial arrangements must be covered by a suitable agreement approved and signed by the R&D Office. For any project which uses Trust resources, the R&D Office must have assessed the associated costs and made arrangements for their recovery.
3. **The Investigator must ensure:**
 - Participants are consented to the project, using the version of the consent form and patient information sheet which has received a favourable opinion by the ethics committee.
 - Amendments to the protocol or project documents are approved by the ethics committee/ MHRA where applicable (see NRES website for guidance on substantial and minor amendments). The R&D Office needs to be notified of any changes to the project and copies of the updated documentation forwarded to the R&D Office.
 - The R&D Office is notified of the actual start and end date of the project and any extension or early termination of the project.
 - The R&D Office is notified of any major staff changes to the research team.
 - All near misses and incidents stemming from the research are notified to the Trust Clinic Risk Department using the Trust incident form. Serious Averse Event (SAE's) and Suspected Unexpected Serious Adverse Reactions (SUSAR's) relating to clinical trials of drugs or devices must be reported to the R&D Office and the local ethics committee within 24 hours of learning of the event.
 - All project documentation, medical notes and staff involved in the research project are available for audit if requested by regulatory bodies or by the R&D Office.
 - At the end of the project, documents relating to the project are appropriately archived within the Trust's and/or the University's archiving facilities.
 - Any potential intellectual property stemming from the research must be disclosed to the East Midlands Innovations Hub.
 - The R&D Office is notified of any outputs of the research such as guidelines, publications, changes in service delivery etc.
 - For research governance purposes, any requests from the R&D Office for further information on the project are responded to at the earliest convenience.

I have read the above and agree to adhere to these responsibilities for the project stated below.

Project title: Implicit memory and psychological disturbance in recovering intensive care unit patients

Chief/ Principal Investigator: Mrs Sherley M. Tordoff

Signature: _____ Date: _____		
For the Sponsor Organisation: Dr. David Clarke (Associate Director (R&D))		Date: 22 nd January 2009

Annex

Responsibilities of Principle Investigators where Leicestershire Partnership NHS Trust has agreed to be Sponsor:

To ensure that:

- The research proposal respects the dignity, rights, safety and well-being of participants and the relationship with care professionals.
- The research proposal is worthwhile, of high scientific quality and represents good value for money.
- An appropriate research ethics committee has approved the research proposal.
- Appropriate arrangements are in place for the registration of trials.
- The principal investigator and other key researchers have the necessary expertise and experience and have access to the resources needed to conduct the proposed research successfully
- The arrangements and resources proposed will allow the collection of high quality, accurate data and the systems and resources being proposed are those required to allow appropriate data analysis and data protection.
- Intellectual property rights and their management are appropriately addressed in research contracts or terms of grant awards.
- Arrangements proposed for the work are consistent with the Department of Health Research Governance Framework and the Medicines for Human Use (Clinical Trials) Regulations 2004.
- Organisations and Individuals involved in the research all agree the division of responsibilities between them.
- Arrangements are in place for the sponsor and other stakeholder organisations to be alerted if significant developments occur as the study progresses, whether in relation to the safety of individuals or to scientific direction.
- An agreement has been reached about the provision of compensation in the event of non-negligent harm.
- Arrangements are proposed for disseminating the findings.
- All scientific judgements in relation to responsibilities set out here are based on independent and expert advice.
- Assistance is provided to any enquiry, audit or investigation related to the funded work.

Responsibilities of Leicester University and Leicestershire Partnership NHS Trust

To ensure:

- Compliance with all current employment and health and safety legislation.
- Promotion of clear codes of practice and mechanisms to monitor and assess compliance.
- To ensure that principal investigators and/or other research staff are aware of, understand and comply with this framework.
- Discharging their agreed role in the management and monitoring of work undertaken by their organisation.
- Demonstrating systems for continuous professional development of staff at all levels.
- Having agreements and systems in place to identify, protect and exploit intellectual property.
- Ensuring they are able to compensate anyone harmed as a result of negligence on the part of their staff and, if they have agreed to do so, for non-negligent harm arising from the research.
- Having in place systems to detect and address fraud and other scientific or professional misconduct by their staff.
- Having in place systems to process, address and learn lessons from any complaints brought against their employees.
- Permitting and assisting in any investigation arising from complaints received in respect of actions.

Appendix M: Notts 1 MCA Ethical Approval

Nottingham Research Ethics Committee 1

1 Standard Court
Park Row
Nottingham
NG1 6GN

Telephone: 0115 8839368
Facsimile: 0115 9123300

09 January 2009

Dr Jonathan Paul Thompson
Senior Lecturer/Honorary Consultant in Anaesthesia and Critical Care
University of Leicester
Department of Cardiovascular Sciences
Clinical Division of Anaesthesia & Critical Care
Victoria Building
Leicester Royal Infirmary
LE1 5WW

Dear Dr. Thompson,

Full title of study: **Implicit memory and psychological disturbance in recovering intensive care unit patients**
REC reference number: **08/H0403/148**

Thank you for your letter of 18 December 2008, responding to the Committee's request for further information on the above research [and submitting revised documentation](#).

The further information has been considered on behalf of the Committee by the [Vice-Chair](#).

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation [as revised](#), subject to the conditions specified below.

Mental Capacity Act 2005

I confirm that the committee has approved this research project for the purposes of the Mental Capacity Act 2005. The committee is satisfied that the requirements of section 31 of the Act will be met in relation to research carried out as part of this project on, or in relation to, a person who lacks capacity to consent to taking part in the project.

Ethical review of research sites

The favourable opinion applies to the research sites listed on the attached form.

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission at NHS sites (“R&D approval”) should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Protocol	2	05 November 2008
Investigator CV		05 November 2008
Application	11505/14603/1/600	13 November 2008
Unfavourable Opinion letter from Leeds (West) REC		21 October 2008
Covering Letter: addressing issues from Unfavourable Opinion letter		13 November 2008
Investigator CV: Key Investigator		05 November 2008
Summary/Synopsis: Flowchart	2	05 November 2008
Sample Diary/Patient Card: Memory Diary	2	05 November 2008
Questionnaire: EQ-5D (UK English Version)	2	05 November 2008
Questionnaire: HAD Scale	2	05 November 2008
Questionnaire: SF-36 Questions	2	05 November 2008
Questionnaire: ICU Memory Tool (ICUM)	2	05 November 2008
Questionnaire: UK-PTSS-14	2	05 November 2008
Cinderella Script	2	05 November 2008
Robinson Crusoe Script	2	05 November 2008
Word Association Task	2	05 November 2008
Skin Conductance Responses Recording Form	2	05 November 2008
Peer Review		13 August 2008
Letter from Sponsor		12 August 2008
The Confusion Assessment Method for the Intensive Care Unit (CAM-ICU)	2	05 November 2008
Motor Activity Assessment Scale	2	05 November 2008
The Apache II Severity of Disease Classification System	2	05 November 2008
Pre-Discharge Front Sheet/Demographics	2	05 November 2008
Response to Request for Further Information		18 December 2008
Participant Consent Form: Assent - personal consultee	3	18 December 2008
Participant Consent Form: Assent - nominated consultee	3	18 December 2008
Participant Consent Form: Patients following ICU	3	18 December 2008

Participant Consent Form: Controls	3	18 December 2008
GP/Consultant Information Sheets	3	18 December 2008
Letter to nominated consultee	3	18 December 2008
Letter to patient & personal consultee with report	3	18 December 2008
Letter to patient with report	3	18 December 2008
Letter to patient	3	18 December 2008
GP/Consultant Information Sheets - pt withdrawn assent	3	18 December 2008
Participant Information Sheet: Patient (whose nearest relative/friend gave assent in ICU who can now choose to consent themselves)	3	18 December 2008
Participant Information Sheet: Controls	3	18 December 2008
Participant Information Sheet: Assenting Personal Consultee	3	18 December 2008
Participant Information Sheet: Assenting Nominated Consultee	3	18 December 2008
Letter of invitation to participant: to Nominated Consultee	3	18 December 2008
Letter of invitation to participant: Personal consultee	3	18 December 2008
Letter of invitation to participant: to Patient (previously assented)	3	18 December 2008
Letter of invitation to participant: Controls	3	18 December 2008
Advertisement: Poster	3	18 December 2008

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document “After ethical review –guidance for researchers” gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

08/H0403/148

Please quote this number on all correspondence

With the Committee's best wishes for the success of this project

Yours sincerely,

Mr Robert Johnson / Miss Rinat Jibli
Vice-Chair / Committee Coordinator

Email: rinat.jibli@nottspct.nhs.uk

Enclosures: "After ethical review – guidance for researchers"

Copy to: Dr David Clarke - LPT
R&D office for NHS care organisation at lead site - UHL
Mrs Sherley Tordoff - Trainee Clinical Psychologist (via email)

Appendix N: UHL R&D Approval Letter

University Hospitals of Leicester 
NHS Trust

DIRECTORATE OF RESEARCH & DEVELOPMENT

Research & Development Office
Leicester General Hospital
Gwendolen Road
Leicester
LE5 4PW

Director: Professor D Rowbotham

Assistant Director: John Hampton

R&D Manager: Carolyn Burden

Direct Dial: (0116) 258 8351

Fax No: (0116) 258 4226

22/01/2009

Dr Johnathon Thompson
Directorate of Anaesthesia Critical Care & Pain
Management Level 3 Victoria Building
LRI
LE5 4PW

Dear Dr Johnathon Thompson

Ref: UHL 10649

Title: Implicit memory and psychological disturbance in recovering intensive care unit patients

Project Status: PROJECT APPROVED

End Date: 30/03/2010

I am pleased to confirm that with effect from the date of this letter, the above study now has Trust Research & Development permission to commence at University Hospitals of Leicester NHS Trust.

All documents received by this office have been reviewed and form part of the approval. The documents received and approved are as follows:

Document Name	Version Number	Date
Protocol	2	05.11.08
Investigator CV		05.11.08
Application	11505/14603/1/600	13.11.08
Unfavourable Opinion letter from Leeds (West) REC		21.10.08
Covering Letter: addressing issues from Unfavourable Opinion letter		13.11.08
Investigator CV: Key Investigator		05.11.08
Summary/Synopsis: Flowchart	2	05.11.08

Appendix P: General demographic breakdown of study sample – other characteristics

Characteristic	N	Sample Mean(days)
Length of stay in ICU	30	8.366
Length of total hospital stay	26	28.65
Length of sedation	22	3.56
Duration of mechanical ventilation	25	4.08

Appendix Q: Reason for admission to ICU – wider sample

Reason for admission	N	Admission Type
Abdominal aortic aneurysm	2	Elective
Ivor-Lewis Procedure for Ca.Oesophagus	3	Elective
Whipples Procedure (Gall Bladder)	1	Elective
Abdominal Aortic aneurysm	4	Emergency
Abdominal sepsis	2	Emergency
Acute pancreatitis	1	Emergency
Biliary sepsis	1	Emergency
Bleeding ulcer	1	Emergency
Pneumonia	5	Emergency
Cardiac arrest	1	Emergency
Cholecystitis	1	Emergency
Laparotomy	4	Emergency
Pancreatic tumour	1	Emergency
Road traffic accident	2	Emergency
Sub-mandibular abscess	1	Emergency
Generalised sepsis	1	Emergency
Spinal fixation/decompression	2	Emergency

Appendix R: Other variables from the dataset (nominal/ordinal) – wider study sample

Variable	N
Propofol sedation	9
Propofol & Morphine	6
Morphine & Midazolam sedation	11
No sleep deprivation reported	21
Disrupted/intermittent sleep reported	9
Severe sleep deprivation reported	1
Additional complications	17
Previous history of mental health issues	3

Appendix S: Summary means and standard deviations relating to main variables

Variable	N	ICU(T1)	1-2 weeks(T2)	4-5 weeks(T3)
Apache II	33	16.5 (4.6)	---	---
BIS Reading	10	56.4 (22.0)	---	--
ICUM Factual Memories	28	---	6.0 (3.1)	4.5 (3.6)
ICUM Feelings Memories	29	---	2.4 (1.6)	1.2 (1.3)
ICUM Delusional Memories	29	---	2.1 (1.8)	1.4 (1.6)
PTSS-14	25	---	---	12.1 (15.2)
HADS anxiety	24	---	---	4.6 (4.4)
HADS depression	24	---	---	4.91 (3.0)

Implicit Memory and psychological disturbance in ICU



An investigation into whether patients have implicit memory of the Intensive Care Unit (ICU) experience and how this might impact upon their subsequent psychological well-being following discharge from the ICU

Can you help us?

Some patients who have passed through intensive care may go on to develop psychological disturbance such as anxiety or stress reactions. Our study is currently being carried out in the Intensive Care Unit and looks at the role of different types of memory that may or may not contribute to the development of such problems. We are looking for both patients and relatives to participate. If you are interested in participating/giving assent for your relative/friend to participate, and wish to find out more, please take a leaflet and/or ask the patient's named nurse for more details

Appendix U: Invitation Letter (Personal Consultee)

University Hospitals of Leicester **NHS**
NHS Trust

Directorate of Anaesthesia, Critical Care & Pain Management,
Leicester Royal Infirmary,
Leicester,
LE1 5WW.
Tel 0116 258 5291
Fax 0116 247 0141



Senior Lecturer: Dr Jonathan Thompson

**Letter of Invitation to Assent Patient in a Research Project
(Personal Consultee)**



Study Title: **Implicit Memory and Psychological Disturbance in ICU**

NHS REC Number 08/H0403/148

R&D Number 10649

Patient Identifier.....

Study Number

Chief Investigator:

Dr. Jonathan Thompson
0116-2585291

Clinical/Collaborating
Investigators:

Sherley Tordoff
Tel: 0116-2231639

& Professor Michael Wang
0116-2231639

Research Nurse

Sarah Bowrey
Tel: 0116-2585291

We are undertaking a study aimed at finding out more about the factors which we think may contribute to some patients developing some features of psychological disturbances such as anxiety or stress reactions following a period in the Intensive Care Unit (ICU), and the role of different types of memory that may or may not contribute to the development of these. Your relative/friend may be able to help us by participating in a research study.

If you think that your relative/friend would be interested in taking part, we will give you an information sheet to read and will be available to explain any details. We may then ask you to act on your relative/friend's behalf in agreeing to their participation in the study. This agreement would only cover the period during which your relative/friend is unable to give/refuse consent whilst they are sedated in ICU. If you provide assent for them to be included in the study when your relative/friend regains their capacity to consent, we will approach them with the same information and ask them if they would be willing to continue. At that stage, should they indicate they do not wish to participate, we would withdraw the information collected on them up to that point in the study.

Thank you in advance for considering your relative/friend's participation in this study. If you have any questions about this research, the investigators will be more than happy to answer them. Their contact details are given on the front sheet:

Jonathan Thompson
Chief Investigator

Sherley Tordoff
Trainee Clinical Psychologist & Clinical Collaborating Investigator

Michael Wang
Professor of Clinical Psychology, Honorary Consultant Clinical Psychologist & Clinical Collaborating Investigator

Sarah Bowrey
Research Nurse

Appendix V: Invitation Letter (Assented Patient)

University Hospitals of Leicester **NHS**
NHS Trust

Directorate of Anaesthesia, Critical Care & Pain Management,
Leicester Royal Infirmary,
Leicester,
LE1 5WW.
Tel 0116 258 5291
Fax 0116 247 0141



Senior Lecturer: Dr Jonathan Thompson

Letter of Invitation to Patient (previously assented) to Participate in a Research Project



Study Title: **Implicit Memory and Psychological Disturbance in
ICU**

NHS REC Number...08/H0403/148

R&D Number 10649

Patient Identifier.....

Study Number

Chief Investigator:

Dr. Jonathan Thompson
0116-2585291

Clinical/Collaborating
Investigators:

Sherley Tordoff
Tel: 0116-2231639

& Professor Michael Wang
0116-2231639

Research Nurse

Sarah Bowrey
Tel: 0116-2585291

Dear Patient,

We are undertaking a study aimed at finding out more about the factors which we think may contribute to some patients developing psychological disturbances such as anxiety or stress reactions following a period in the intensive care unit (ICU) and the role of different types of memory that may or may not contribute to these. At the time of your ICU stay we thought that you might be able to help us by participating in our study.

Because you were too ill to be able to make the decision to participate, your personal/nominated consultee was asked for permission to include you in our study; this was done by asking them to provide their assent for your participation. Now that you are well enough to be able to make decisions for yourself again, we would like to ask you to consider participating further in the study.

We attach an information sheet for your perusal. The principal investigator will contact you in one day's time (at least 24 hours) to ask if you are interested in continuing to take part, and to answer any questions you may have about the study. If you indicate to us that you do wish to participate further, the principal investigator will meet with you to go through the patient information again. This is to check you fully understand all aspects of your participation in the study and to ask you to sign a consent form. Thank you in advance for considering the information contained in this letter, and the information sheet, should you decide to read it. If you have any questions about this research, we (the investigators) will be more than happy to answer them. Our contact details are listed below. If we are not available at the time, a message will be taken and we will contact you when we are available:

Jonathan Thompson
Chief Investigator

Sherley Tordoff
Trainee Clinical Psychologist & Clinical Collaborating Investigator

Michael Wang
Professor of Clinical Psychology, Honorary Consultant Clinical Psychologist & Clinical Collaborating Investigator

Sarah Bowrey
Research Nurse

Appendix W: Information Sheet (Personal Consultee)

University Hospitals of Leicester **NHS**
NHS Trust



Directorate of Anaesthesia, Critical Care & Pain Management,
Leicester Royal Infirmary,
Leicester,
LE1 5WW.
Tel 0116 258 5291
Fax 0116 247 0141

Senior Lecturer: Dr Jonathan Thompson

ASSENTING PERSONAL CONSULTEE INFORMATION SHEET



Study Title: **Implicit Memory and Psychological Disturbance in ICU**

NHS REC Number 08/H0403/148

R&D Number 10649

Patient Identifier.....

Study Number

Chief Investigator:

Dr. Jonathan Thompson
0116-2585291

Clinical/Collaborating
Investigators:

Sherley Tordoff
Tel: 0116-2231639

& Professor Michael Wang
0116-2231639

Research Nurse

Sarah Bowrey
Tel: 0116-2585291

1. Study background and purpose

We are undertaking a study aimed at finding out more about the factors which we think may contribute to some patients developing psychological disturbances such as anxiety or stress reactions following a period in the intensive care unit (ICU), and the role of different types of memory that may or may not contribute to these. You are being asked to agree to the patient participating in this research study because they are being sedated to facilitate organ system support.

2. Why has the patient been invited to take part?

The patient has been invited to take part in this research study because they have been admitted for organ system support and require sedation to facilitate this. Before you decide whether you want to give your assent for the patient to be included in this study, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Please ask us if there is anything that is not clear to you, or if you would like further information before making any decision. Please take time to decide whether or not you wish the patient to take part. Thank you very much for taking the time to read about our study so far.

3. What will happen to the patient if you agree to their participation in the study?

The research would involve you reading this leaflet, considering the information, and then if you still wish to proceed, to sign an assent form for the patient to be included in the study. Following this, it would involve the patient's sedation and consciousness levels being checked, and a story being played to them occasionally whilst they are still being sedated and ventilated during their stay in ICU. Demographic information would also be collected at this stage. The patient would also have allocated to them an "ICU Memories Diary" and will be asked each day if they have had any recurring dreams or experienced anything unpleasant or unusual in the form of memories. When considering whether you wish to provide assent for the patient to participate it is important that you base this decision upon what you think the patient's wishes would be, rather than basing it upon your own wishes. You should consider the person's past and present wishes, feelings, beliefs and values that would be likely to influence such a decision.

4. What happens next?

One to two weeks following discharge from ICU we would then like to ask the patient if they would consider continuing to participate in the rest of the study. Should they indicate they wish to continue, they will then be asked some questions about their memory of ICU using a structured questionnaire and their ICU memories diary. Their memory will also be assessed at this stage to ensure that they are well enough to continue in the study. We will also ask them a question in relation to the tape they heard in the ICU.

At four-five weeks after discharge from the ICU the patient will be sent an appointment to return to the hospital to meet with us. At this appointment they will then be asked to complete a number of short questionnaires looking memory, general physical and psychological well-being, anxiety, depression and post-traumatic stress. We will also play another tape of sounds and record their responses to this using a stress monitor. They will also be asked about any unusual dreams, nightmares, flashbacks or daydreams they may have experienced during and following the period in ICU, in addition to the ICU memories diary which record any of these things during their hospital stay. We hope that they will find this an interesting experience.

We understand that some people may find it quite upsetting to return to the same part of the hospital as the ICU, so we ask them to return to a different part of the hospital to meet with us and complete this series of tasks. We would expect that this would take no longer than an hour. We would then like to examine all of this data to see if there are any links between them for those patients who go on to develop post-traumatic stress disorder or experience reduced emotional well-being. Travel expenses will be reimbursed for this return visit.

5. What will you do with the patient's results from the study?

We will anonymise all the data collected from the patient and then analyse this along with the rest of the study data. Whilst patients will not be provided with their individual study results, the final analysis of data will be written up and the patient will receive a summary of these results. If however, the data from the patient indicates anything of concern, we would report this initially to the ICU consultant and if appropriate, to the ICU Follow-up clinic.

6. What will you do with the patient's data?

Any data that is collected (e.g. test forms etc) will be anonymised immediately and will be given an identifier so that only Dr. Thomson, Professor Wang, Sherley Tordoff and Sarah Bowrey will know who the data belongs to. Once it has been collected, analysed and, if necessary, used clinically to help anyone experiencing post-traumatic stress symptoms, it will be stored safely in a locked cabinet, in a locked room for 5 years in accordance with EC directives and professional guidelines. At the end of five years it will be destroyed by incineration.

7. Are there any risks?

Occasionally it may be that patients might find some of the sounds or the questions we might ask lead them to become upset at the time but should this occur, it may be due to their experiences that lead to their admission to hospital. If this does happen it is highly unlikely that hearing either the tape or us asking you questions is going to be the only situation in which this occurs. Should this occur during our research, the patient will either be reassured that such an occurrence is a normal event or in the case of extreme distress as demonstrated by scores well above the cut-points for the psychological tests, they will be referred to the ICU Follow-up Clinic.

Implicit Memory and Psychological Disturbance in ICU Version 2 (Patient Information Sheet Version 3) December 18th, 2008

8. What are the benefits to the patient?

Although there will be no direct individual benefit to the patient (as with most other kinds of research), what we do learn from these tests may help us to better identify and treat patients who experience PTSD-type symptoms in the future. The patient will not benefit financially from participation in the study. By agreeing to take part in this study you agree that the researchers, the Leicester Royal Infirmary and the University of Leicester may report on the results of the research and disseminate these by writing articles to submit to academic journals and by presentations and posters at meetings, conferences and symposiums. The patient's name or any other personal identifiers will not appear on this information.

9. Will personal information about the patient be kept confidential?

The study has been designed in such a way that personal details such as name and address will be kept separate from the patient's medical notes and the results of the tests and questionnaires. All data they provide to us will be coded using a unique code number before they are analysed. Only the above-named investigators involved in the study will have access to these codes. The research results will not be recorded in the patient's medical records. All information collected about them during the process of the research will be kept strictly confidential. No information about the patient which leaves the hospital will contain any identifiers (for example, name, date of birth and address) so that they are not identifiable. Individuals will not be informed of their results although a summary sheet highlighting the overall findings of all of the research will be sent out to the patient on completion of the study.

As a safety precaution, the patient's general practitioner will be informed in writing that they are taking part in our study, although we will not pass on any information gathered from the study to their GP. If, however, it became obvious to any of the researchers that the patient was in urgent need of medical intervention or had symptoms causing concern, we would contact their consultant and GP, but we would always try to discuss this with the patient before we did this.

10. What if new information becomes available?

If new information becomes available which has significant implications for the continuation of the study, the investigators will seek advice of the Regional Ethics Committees and Trust R&D Departments regarding further action.

11. What happens when the research study stops?

When the research study stops all patients and nearest relative/friends who have contributed to the study will receive communication relating to the summarised results but there will be no further contact with the investigators after this point and the study will cease to function.

12. Can I refuse assent for the patient to participate?

Yes, absolutely, it is your fundamental right to do so. It is up to you to consider the information we have provided to you and then decide whether or not you wish the patient to be included in the study. If you do decide to give assent for the patient to take part you will be given this information sheet to keep and be asked to sign an assent form. If you do decide to provide assent you are free to withdraw at any time and without providing us with a reason (the patient is also free to withdraw from the study as soon as they are able to indicate this).

Whether you decide to provide assent for the patient to be included, decide to provide assent and then withdraw, or decide you do not wish to provide assent from the outset, whatever decision you make will not affect the standard of care the patient receives.

If you do decide to withdraw assent, you may ask for all the information collected on the patient up to that point, to be removed from the dataset. It will be the responsibility of the researchers to do this. In addition, the patient's GP or hospital consultant can also choose to remove them from the study at any time.

13. What if something goes wrong?

Our study does not involve any drug or treatment and is therefore very low risk. The patient will continue to receive the required amounts of care they need whether or not you provide assent for their inclusion in this study. If the patient is harmed by taking part in this research project, there are no special compensation arrangements. If the patient is harmed due to someone's negligence, you may have grounds for a legal action but you may have to pay for it. If you are not happy with any aspect of the study or the way the study is being conducted then feel free to make a complaint.

14. Can the patient be excluded from the study?

The patient may be excluded from the study if their study doctor feels it would be in their best interests.

15. Who is organising and funding the research?

The research is being jointly funded by Leicester Partnership NHS Trust, University of Leicester and Leicester Royal Infirmary.

16. Who has reviewed the study?

The study has been reviewed by two peer review panels at the School of Psychology, Clinical Section, University of Leicester, and the Patient Reference Group. The study has been reviewed and approved by the Local Research and Ethics Committee (LREC) and the R&D Department for Leicester Royal Infirmary.

17. What does giving informed Consent mean?

If you provide assent for the patient to take part, you will be asked to sign the "Personal Consultee Assent" form. By signing the "Personal Consultee Assent" form you will not in any way waive your relative/friend/client's legal rights.

18. How can I let you know that I wish to provide assent for my relative/friend/client to be included in the study?

You can do this by either informing your relative/friend/client's named nurse when you speak with them next, or inform one of the Investigators/Research nurse.

18. Additional information

If you do decide to give assent to the patient participating in the study, the patient's GP will be informed of this in writing. Other than this, the patient's participation in the study is kept confidential. The only time the investigators would break this confidentiality will be in the case where it is indicated to them that the patient is at risk from themselves or others, or that others are at risk from the patient. In cases such as this, we would be required to inform relevant authorities. The only time when we might be forced to abandon participation in the research will be if the patient is to become seriously ill and/or the research is likely to seriously jeopardise their treatment, or if the participant is demonstrating physical and verbal aggression within the sessions.

Results from the study will be written up in:

- Academic Report form
- Poster Presentation
- Conference Presentation
- Academic Journal Submission

Participants will not be identified from any of the data presented in any of the above. Some quotations may be extracted from the ICU Memories interview, but these will be presented in a way which does not identify anyone.

Thank you in advance for considering providing assent for the patient to participate in this study. If you have any questions about this research, the study staff will be more than happy to answer them. Their contact details are given below:

Yours sincerely,

Jonathan Thompson
Chief Investigator

Sherley Tordoff
Trainee Clinical Psychologist & Clinical Collaborating Investigator

Michael Wang
Professor of Clinical Psychology, Honorary Consultant Clinical Psychologist & Clinical Collaborating Investigator

Sarah Bowrey
Research Nurse

Appendix X: Information Sheet (Assented Patient)

University Hospitals of Leicester **NHS**
NHS Trust

Directorate of Anaesthesia, Critical Care & Pain Management,
Leicester Royal Infirmary,
Leicester,
LE1 5WW.
Tel 0116 258 5291
Fax 0116 247 0141



Senior Lecturer: Dr Jonathan Thompson

**PATIENT INFORMATION SHEET (for patients whose nearest
relative/friend gave assent in ICU) but who can now choose to
consent themselves**



Study Title: **Implicit Memory and Psychological Disturbance in
ICU**

NHS REC Number...08/H0403/148

R&D Number 10649

Patient Identifier.....

Study Number

Chief Investigator:

Dr. Jonathan Thompson
0116-2585291

Clinical/Collaborating
Investigators:

Sherley Tordoff
Tel: 0116-2231639

& Professor Michael Wang
0116-2231639

Research Nurse

Sarah Bowrey
Tel: 0116-2585291

1. Study background and purpose

We are undertaking a study aimed at finding out more about the factors which we think may contribute to some patients developing psychological disturbance such as anxiety or stress following a period in the intensive care unit (ICU), and the role of different types of memory that may or may not contribute to the development of these.

2. Why am I being invited to take part?

You are being invited to take part in this research study because your personal/nominated consultee provided assent for us to include you in the part of the study which took place in the Intensive Care Unit. This involved playing a tape to you for a short interval whilst you were still under sedation for organ-system support whilst you were recovering from your illness/injury/operation. It also involved monitoring your sedation, consciousness levels, cognitive functioning and collecting basic demographic data. All your data has been given a code to anonymise it as a way of ensuring it is not identifiable to anyone other than the research team if need be. We would like you to continue taking part in the study because this would be useful to our research but you must decide whether you wish to continue with this now that you are able to make the decision for yourself. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

3. What will happen to me if I agree to take part in the study?

During your admission to hospital, as part of your normal care, we carefully monitored and recorded your clinical condition. This included monitoring your levels of sedation and your conscious state. We then asked your personal/nominated consultee for permission to play you a story tape whilst you were conscious but still under sedation. We would now like to ask you to participate in the rest of the investigation which will involve an interview at 1-2 weeks after your discharge from the ICU at which the researcher will ask you about your memories of the ICU, your memory state and a question regarding the story we played to you. After this, we will ask you to attend a clinic appointment 4-5 weeks after you leave the ICU. This will be to meet with the researcher so that they may test for any memory of the tape which was played to you in the ICU, as well as asking you to complete some questionnaires looking at traumatic memory, anxiety, depression, social support, memory and general physical and emotional health. We will also play another tape of sounds and record your stress responses to this using a skin conductance machine. We will also be asking you about any unusual dreams, nightmares, flashbacks or daydreams you may have experienced during and following your ICU stay, in addition to recording these in the ICU memories diary during your hospital stay.

We understand that it might be quite upsetting for you to return to the same part of the hospital and ICU so we would like to ask you to return to a different part of the hospital to meet with us and complete this series of tasks. We would expect that this would take no longer than an hour (and may even take less than this). Travel expenses will be reimbursed for this return visit. We would then like to examine all of this data to see if there are any links between them for those patients who go on to develop post-traumatic stress disorder or experience reduced emotional well-being.

4. Are there any risks?

The study does not involve medicinal products and is very low risk. It may be that you may find that some of the sounds or the questions we might ask might cause you to become upset but that this might be due to your experiences that lead to your admission. If this does happen it is highly unlikely that hearing either the tape or us asking you questions is going to be the only situation in which this occurs, as people who have been through a traumatic experience can often feel this way. Should this occur we would hopefully be able to reassure you that this is to be seen as an expected response to such an experience and if it is felt to be significant we would check to see if you required follow up in the ICU Follow-up Clinic.

5. What are the benefits to me?

Although there will be no direct benefit to you (as with most other kinds of research), unless of course you do require follow-up in the ICU Follow-up Clinic, what we do learn from these tests may help us to better identify and treat patients who experience PTSD-type symptoms in the future. You will not benefit financially from participation in the study. By agreeing to take part in this study you agree that the researchers, the Leicester Royal Infirmary and the University of Leicester may report on the results of the research and disseminate the results via articles in academic journals and by presentations and posters at meetings, conferences and symposiums. Your names or any other personal identifiers will not appear on this information.

6. Will personal information about me be kept confidential?

The study has been designed in such a way that your personal details such as name and address will be kept separate from your medical notes and the results of the tests and questionnaires. All data you provide to us will be coded using a unique code number before they are analysed. Only the above-named researchers involved in the study will have access to these codes. The research results will not be recorded in your medical records. All information collected about you during the process of the research will be kept strictly confidential. Any information about you, which leaves the hospital (to be analysed by the researcher) will have any of your identifiers (for example, your name, date of birth and address) removed so that you are not identifiable. Once it has been collected, analysed and, if necessary, used clinically to help anyone experiencing post-traumatic stress symptoms, it will be stored safely in a locked cabinet, in a locked room for 5 years in accordance with EC directives and professional guidelines. Patients will not be informed of their individual results although a summary sheet highlighting the overall findings of all of the research will be sent out to you on completion of the study.

Implicit Memory and Psychological Disturbance in ICU Version 2 (Patient Information Sheet Version 3) December 18th, 2008

As a safety precaution your general practitioner will be informed in writing that you are taking part in our study, although we will not pass on any information gathered from the study to your GP. If, however, it became obvious to any of the researchers that you were in urgent need of medical intervention or had symptoms causing us concern, we would inform your hospital consultant and we might also seek to inform your general practitioner to do this, but we would always attempt to discuss this with you before we did this, except if we were unable to contact you and the matter required urgent action.

7. Do I have to take part?

Absolutely not, it is your fundamental right to refuse to participate in research of any kind. It is up to you to consider the information we provide to you and then decide whether or not you wish to participate. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you do decide to take part you are free to withdraw at any time and without providing us with a reason.

Whether you decide to participate, decide to participate and then withdraw, or you decide not to participate, whatever decision you make will not affect the standard of care you receive. If you do decide to withdraw, you may ask for all the information collected on you up to that point to be taken out of the data-set. It will be the responsibility of the researchers to do this. In addition, your GP or hospital consultant can also choose to remove you from the study at any time.

8. What if something goes wrong?

Our study does not involve any drug or treatment. You will continue to receive the required amounts of care you need whether or not you participate in this study. If you are harmed by taking part in this research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. If you are not happy with any aspect of the study, or the way in which the study is being conducted then feel free to make a complaint.

9. What if new information becomes available?

If new information becomes available which has significant implications for the continuation of the study, the investigators will seek advice of the Regional Ethics Committees and Trust R&D Departments regarding further action.

10. What happens when the research study stops?

When the research study stops all patients and nearest relative/friends who have contributed to the study will receive communication relating to the summarised results but there will be no further contact with the investigators after this point and the study will cease to function. Any other necessary follow-up will be made in the relevant hospital follow-up clinics.

11. Can I be excluded from the study?

You may be excluded from the study if your study doctor feels it would be in your best interests.

12. Who is organising and funding the research?

The research is being jointly funded by the Leicestershire Partnership NHS Trust, University of Leicester and Leicester Royal Infirmary.

13. Who has reviewed the study?

The study has been reviewed and approved by the Local Research and Ethics Committee (LREC) and the R&D Department for Leicester Royal Infirmary.

14. What does giving informed Consent mean?

If you agree to take part, you will be asked to sign the “Informed Consent” form. By signing the “Informed Consent” form you will not in any way waive your legal rights.

15. Additional information

If you do decide to give consent to your continued participation in the study, your GP will be informed of this in writing. Other than this, your participation in the study is kept confidential. The only time the investigators would break this confidentiality will be in the case where it is indicated to them that you are at risk from yourself or others, or that others are at risk from you. In cases such as this, we would be required to inform relevant authorities.

The only time when we might be forced to abandon participation in the research will be if any patient becomes seriously ill and/or the research is likely to seriously jeopardise their treatment, or if they are demonstrating physical and verbal aggression within the sessions.

Results from the study will be written up in:

- Academic Report form
- Poster Presentation
- Conference Presentation
- Academic Journal Submission

Participants will not be identified from any of the data presented in any of the above. Some quotations may be extracted from the ICU Memories interview, but these will be presented in a way which does not identify anyone.

Thank you in advance for considering participating in this study. If you have any questions about this research, the study staff will be more than happy to answer them. Their contact details are given below:

Yours sincerely,

Jonathan Thompson
Chief Investigator

Sherley Tordoff
Trainee Clinical Psychologist & Clinical Collaborating Investigator

Michael Wang
Professor of Clinical Psychology, Honorary Consultant Clinical Psychologist & Clinical Collaborating Investigator

Sarah Bowrey
Research Nurse

Appendix Y: Assent Form (Personal Consultee)

University Hospitals of Leicester 
NHS Trust

Directorate of Anaesthesia, Critical Care & Pain Management,
Leicester Royal Infirmary,
Leicester,
LE1 5WW.
Tel 0116 258 5291
Fax 0116 247 0141



Senior Lecturer: Dr Jonathan Thompson

ASSENT FORM FOR PERSONAL CONSULTTEE



Study Title: **Implicit Memory and Psychological Disturbance in ICU**

NHS REC Number 08/H0403/148

R&D Number 10649

Patient Identifier.....

Study Number

Chief Investigator:

Dr. Jonathan Thompson
0116-2585291

Clinical/Collaborating
Investigators:

Sherley Tordoff
Tel: 0116-2231639

& Professor Michael Wang
0116-2231639

Research Nurse

Sarah Bowrey
Tel: 0116-2585291

Implicit Memory and Psychological Disturbance in ICU Version 2 (Patient Information Sheet Version 3) December 18th, 2008

Please initial box

1. I confirm that I have read and understood the information sheet dated 5th November, 2008 (Version 2) for the above-mentioned study.
2. I have had the opportunity to ask questions about the study.
3. I confirm that any questions that I might have in relation to the Study have been answered to my satisfaction.
4. I understand that I am free to withdraw my assent at any time/ my relative/friend is free to refuse to answer any questions/ participate in any tests/tasks I do not wish them to/they do not wish and that they can withdraw from the research at any time without having to state a reason, and without their current or future medical care and legal rights being affected.
5. I agree to the researchers holding the research data anonymised
6. I understand that any records will be stored securely on NHS premises whilst in use and for 5years before being destroyed by incineration
7. I understand that any data/quotes used will be anonymous and will not identify me or my relative/friend
8. I understand that quotations from the thematic analysis of ICU memories diary and free recall of ICU memories will be analysed and used in the write up of the research but these will not identify my relative/friend in any way

☐☐☐☐☐☐☐☐

9. I give permission for a story-tape to be played to my relative/friend whilst they are in intensive care and also for the following data to be collected: ☐

Sedation levels ☐

Levels of consciousness ☐

Demographic details
(eg. age, gender, type of illness/injury) ☐

Memories of ICU ☐

10. I understand that my decision to give/not give assent to my relative/friend's participation in the study must be based upon consideration of my knowledge of the person, their past and present wishes and feelings, their beliefs and values that would be likely to influence this decision if they were making it for themselves. ☐

11. I understand that although my relative/friend will not be given details of their individual results of the study, that they will receive a summary of research results after the report has been written. ☐

12. I understand that as soon as they are able to give consent themselves, that they will be approached to make a decision regarding participation in the study and my assent will no longer apply. ☐

13. I understand that travel expenses for the 4/5 week return visit will be reimbursed. ☐

14. I agree to my relative/friend's participation in the above-mentioned study.

☐

Name of personal consultee

Signature

Date

Chief Investigator

Signature

Date

Witness

Signature

Date

Appendix Z: Consent Form for Patient

University Hospitals of Leicester 
NHS Trust

Directorate of Anaesthesia, Critical Care & Pain Management,
Leicester Royal Infirmary,
Leicester,
LE1 5WW.
Tel 0116 258 5291
Fax 0116 247 0141



Senior Lecturer: Dr Jonathan Thompson

CONSENT FORM FOR PATIENT (Following ICU)



Study Title: **Implicit Memory and Psychological Disturbance in ICU**

NHS REC Number 08/H0403/148

R&D Number 10649

Patient Identifier.....

Study Number

Chief Investigator:

Dr. Jonathan Thompson
0116-2585291

Clinical/Collaborating
Investigators:

Sherley Tordoff
Tel: 0116-2231639

& Professor Michael Wang
0116-2231639

Research Nurse

Sarah Bowrey
Tel: 0116-2585291

Please initial box

1. I confirm that I have read and understood the information sheet dated 5th November, 2008 (Version 2) for the above-mentioned study.

☐

2. I confirm that I have had the opportunity to ask questions about the study.

☐

3. I confirm that any questions that I might have in relation to the study have been answered to my satisfaction.

☐

4. I agree to the researchers holding the research data anonymised

☐

5. I understand that any records will be stored securely on NHS premises whilst in use and for 5 years before being destroyed by incineration

☐

6. I understand that any data/quotes used will be anonymous and will not identify me.

☐

7. I understand that quotations from the thematic analysis of ICU memories diary and free recall of ICU memories will be analysed and used in the write up of the research but these will not identify me in any way

☐

8. I give permission for my data to be used in relation to the following:

Sedation levels

☐

Levels of consciousness

☐

Demographic details
(eg. age, gender, type of illness/injury)

☐

Memories of ICU

☐

Anxiety & Depression

☐

PTSD

☐

Social Support

☐

ICU Memories since leaving hospital

☐

Responses to sounds

☐

Cognitive state

☐

General Health

☐

9. I understand that although I will not be given details of my individual results from the study, but that I will receive a summary of research results after the report has been written. ☐
10. I understand that my participation is voluntary, that I am free to refuse to answer any questions/participate in any tests/tasks I do not wish to and that I can withdraw my consent from the research at any time without having to state a reason, and without my current or future medical care and legal rights being affected. ☐
11. I understand that travel expenses for the 4/5 week return visit will be Reimbursed. ☐
12. I give permission for my data to be analysed in order to produce the final report from the study. ☐

Name of patient Signature Date

Name of person taking consent Signature Date
(if different from investigator)

Investigator Signature Date

Witness Signature Date

Appendix AA: Notes for contributors to Target Journal

British Journal of Clinical Psychology (BJCP)

Notes for Contributors

The **British Journal of Clinical Psychology** publishes original contributions to scientific knowledge in clinical psychology. This includes descriptive comparisons, as well as studies of the assessment, aetiology and treatment of people with a wide range of psychological problems in all age groups and settings. The level of analysis of studies ranges from biological influences on individual behaviour through to studies of psychological interventions and treatments on individuals, dyads, families and groups, to investigations of the relationships between explicitly social and psychological levels of analysis.

The following types of paper are invited:

- Papers reporting original empirical investigations
- Theoretical papers, provided that these are sufficiently related to the empirical data
- Review articles which need not be exhaustive but which should give an interpretation of the state of the research in a given field and, where appropriate, identify its clinical implications
- Brief reports and comments

1. Circulation

The circulation of the Journal is worldwide. Papers are invited and encouraged from authors throughout the world.

2. Length

Papers should normally be no more than 5000 words (excluding abstract, reference list, tables and figures), although the Editor retains discretion to publish papers beyond this length in cases where the clear and concise expression of the scientific content requires greater length.

3. Submission and reviewing

All manuscripts must be submitted via our [online peer review system](#). The Journal operates a policy of anonymous peer review.

4. Manuscript requirements

- Contributions must be typed in double spacing with wide margins. All sheets must be numbered.
- Tables should be typed in double spacing, each on a separate page with a self-explanatory title. Tables should be comprehensible without reference to the text. They should be placed at the end of the manuscript with their approximate locations indicated in the text.
- Figures can be included at the end of the document or attached as separate files, carefully labelled in initial capital/lower case lettering with symbols in a form consistent with text use. Unnecessary background patterns, lines and shading should be avoided. Captions should be listed on a separate sheet. The resolution of digital images must be at least 300 dpi.
- For articles containing original scientific research, a structured abstract of up to 250 words should be included with the headings: Objectives, Design, Methods, Results, Conclusions. Review articles should use these headings: Purpose, Methods, Results, Conclusions. Please see the document below for further details:

 [British Journal of Clinical Psychology - Structured Abstracts Information](#)

- For reference citations, please use APA style. Particular care should be taken to ensure that references are accurate and complete. Give all journal titles in full.
- SI units must be used for all measurements, rounded off to practical values if appropriate, with the imperial equivalent in parentheses.
- In normal circumstances, effect size should be incorporated.
- Authors are requested to avoid the use of sexist language.
- Authors are responsible for acquiring written permission to publish lengthy quotations, illustrations, etc. for which they do not own copyright.

For guidelines on editorial style, please consult the [APA Publication Manual](#) published by the American Psychological Association.

5. Brief reports and comments

These allow publication of research studies and theoretical, critical or review comments with an essential contribution to make. They should be limited to 2000 words, including references. The abstract should not exceed 120 words and should be structured under these headings: Objective, Method, Results, Conclusions. There should be no more than one table or figure, which should only be included if it conveys information more efficiently than the text. Title, author name and address are not included in the word limit.

6. Publication ethics

All submissions should follow the ethical submission guidelines outlined in the documents below:

 [Ethical Publishing Principles – A Guideline for Authors](#)

 [Code of Ethics and Conduct \(2006\)](#)

7. Supplementary data

Supplementary data too extensive for publication may be deposited with the [British Library Document Supply Centre](#). Such material includes numerical data, computer programs, fuller details of case studies and experimental techniques. The material should be submitted to the Editor together with the article, for simultaneous refereeing.

8. Copyright

On acceptance of a paper submitted to a journal, authors will be requested to sign an appropriate assignment of copyright form. To find out more, please see our [Copyright Information for Authors](#).