Psychological Outcomes following a nurse-led Preventative Psychological Intervention for critically ill patients

MREC Number:	*<To be inserted>*
Trial Sponsor:	**ICNARC**
Trial Sponsor reference:	**01/03/14**
Trial funder(s):	**NIHR HS&DR Programme**
Funder(s) reference:	**12/64/124**
ISRCTN no:	*<To be inserted>*
NIHR CRN Portfolio no:	*<To be inserted>*
CSP reference no:	*<To be inserted>*
Protocol version:	**1.0**
Protocol version date:	**21 February 2014**

Role, Name and Position	**Signature:**	**Date:**
Chief Investigator: Professor Kathryn Rowan Director of Scientific & Strategic Development, ICNARC		21 February 2014
Lead Clinical Investigator: Dr Dorothy Wade Chartered Health Psychologist, UCLH		21 February 2014
For the Sponsor: Keryn Vella Operations Director, ICNARC		21 February 2014

NHS
National Institute for Health Research

Study Management

For general queries, please contact:

Paul Mouncey, Senior Trial Manager

Clinical Trials Unit

Intensive Care National Audit & Research Centre (ICNARC)

Napier House

24 High Holborn

London WC1V 6AZ

Tel: +44 (0)20 7269 9277

Fax: +44 (0)20 7831 6879

Email: poppi@icnarc.org

Study Team

Chief Investigator	
Prof Kathryn Rowan	Director of Scientific & Strategic Development, ICNARC
Lead Clinical Investigator	
Dr Dorothy Wade	Chartered Health Psychologist, University College London Hospitals NHS Foundation Trust (UCLH)
Public/Patient	
Mr David Aaronovitch	News UK
Clinical	
Prof Chris Brewin	Professor of Clinical Psychology, University College London (UCL)
Dr David Howell	Divisional Clinical Director, Critical Care, UCLH
Prof Michael Mythen	Professor of Anaesthesia & Critical Care, UCLH/UCL
Miss Deborah Smyth	Senior Nurse, Critical Care, UCLH
Prof John Weinman	Professor of Psychology, King's College London
Mr John Welch	Consultant Nurse, UCLH
Methodological	
Prof Richard Grieve	Professor of Health Economics, London School of Hygiene & Tropical Medicine (LSHTM)
Dr David Harrison	Senior Statistician, ICNARC
Dr Sheila Harvey	Senior Research Fellow, ICNARC
Dr Zia Sadique	Research Fellow, Health Economics, LSHTM

Sponsor

ICNARC
Napier House
24 High Holborn
London WC1V 6AZ

Sponsor contact
Ms Keryn Vella, Operations Director
Tel: +44 (0)20 7931 6878
Fax: +44 (0)20 7831 6879
Email: keryn.vella@icnarc.org

Funding

National Institute for Health Research – Health Services & Delivery Research Programme
(Project: 12/64/124)

Table of contents

Abbreviations

CAM-ICU	Confusion Assessment Method for ICU
CBT	Cognitive Behavioural Therapy
CBTp	Cognitive Behavioural Therapy for psychosis
CEA	Cost-effectiveness Analysis
CES-D	Centre for Epidemiological Studies Depression Scale
CMP	Case Mix Programme
CTU	Clinical Trials Unit
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
EQ-5D-5L	European Quality of Life Scale
EPAG	Expert Psychology Advisory Group
GCP	Good Clinical Practice
GLMM	Generalised Linear Mixed Model
GP	General Practitioner
HA	Health Anxiety
HRQoL	Health-related Quality of Life
HS&DR	Health Services & Delivery Research
ICH	International Conference on Harmonisation
ICNARC	Intensive Care National Audit & Research Centre
ICU	Intensive Care Unit
IPAT	Intensive Care Psychological Assessment Tool
ISF	Investigator Site File
LSHTM	London School of Hygiene & Tropical Medicine
MRC	Medical Research Council
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NIHR	National Institute for Health Research
PDS	Posttraumatic Stress Disorder Scale
PHQ-2	Patient Health Questionnaire
PI	Principal Investigator
POPPI	Psychological Outcomes following a nurse-led Preventative Psychological Intervention for critically ill patients
PTSD	Posttraumatic Stress Disorder
QALY	Quality-adjusted Life Year
R&D	Research & Development
RCT	Randomised Controlled Trial
SMG	Study Management Group
SOP	Standard Operating Procedure
STAI	State Trait Anxiety Inventory
TSC	Trial Steering Committee

UCLH	University College London Hospitals NHS Foundation Trust
VAS	Visual Analogue Scale

1 Protocol summary

Title (acronym):	Psychological Outcomes following a nurse-led Preventative Psychological Intervention for critically ill patients (POPPI): Feasibility Study
Public Title	Improving patients' well-being after critical care
Short Title:	POPPI Study
Sponsor name	ICNARC
Funder name & reference:	NIHR Health Services & Delivery Research Programme, 12/64/124
Design:	Feasibility study followed by cluster randomised controlled trial (RCT)
Overall aim:	To develop and evaluate the clinical and cost-effectiveness of a complex, nurse-led psychological intervention in reducing psychological morbidity in critically ill patients.
Objectives:	Phase 1 Feasbility Study: • to develop an education package (training and associated materials) as part of a complex psychological intervention; • to pilot test the intervention, including the education package; • to refine the intervention, including the education package; • to pilot test the feasibility of proposed processes and procedures for a cluster-RCT; • to set up the cluster-RCT; and • to formally evaluate the feasibility of the intervention and progress to the cluster-RCT at a pre-specified stop point. • . Phase 2 Cluster-RCT: • to evaluate, using a parallel groups cluster-RCT design, the effect of the complex intervention on patient-reported PTSD symptom severity (primary outcome) and other psychological morbidities and quality of life (secondary outcomes) at six months; • to conduct an integrated process evaluation to assess the fidelity and quality of implementation of the intervention, and identify important contextual factors to better understand how the intervention works; and • to estimate, in an integrated economic analysis, the cost-effectiveness of the intervention.
Target accrual:	• Feasibility Study: 110 critical care patients • Cluster-RCT: 2904 critical care patients
Inclusion criteria:	• Age 18 years or greater • Receipt of Level 2 or Level 3 critical care for 48 hours or more • Between +1 and -1 on the Richmond Agitation Sedation Scale • English-speaking; and ability to communicate
Exclusion criteria:	• Glasgow Coma Score of less than 15 • Pre-existing chronic cognitive impairment, such as dementia • Pre-existing psychotic illness • Pre-existing chronic posttraumatic stress disorder • Terminally ill/receiving end-of-life care
Planned number of units:	• Feasibility Study: four adult, general critical care units • Cluster-RCT: 24 adult, general critical care units
Anticipated duration of recruitment:	• Feasibility Study: three months • Cluster-RCT: 17 months
Duration of follow up:	• Feasibility Study: two months • Cluster-RCT: six months
Definition of end of Study:	Last patient followed-up

2 Background & rationale

Over 100,000 patients are admitted to adult, general critical care units in the National Health Service (NHS) each year and it has been estimated that around two thirds suffer serious emotional distress, and/or hallucinations and delusions, while in the unit.[1,2] Emotional distress, including severe symptoms of anxiety, low mood and panic, may be caused by a range of stressful, cumulative experiences that are common in critical care: fear of dying; invasive treatments such as mechanical ventilation; pain and discomfort; inability to communicate; and terrifying hallucinatory delusions.[1,3,4] The characteristic hallucinations and delusions of a critical care patient have been linked to delirium, the provision and withdrawal of sedative and other psychoactive drugs, effects of illness (such as sepsis), immobility, and sensory and sleep deprivation.[2,4] Hallucinations and delusions are known to be exacerbated by, and co-morbid with, emotional stress; thus a vicious cycle of stress, confusion, and terror is common for critical care patients.

Experiencing acute psychological stress in the critical care unit, or having frequent memories of hallucinations and delusions, are also among the strongest identified risk factors for longer-term post-critical care posttraumatic stress disorder (PTSD), depression or anxiety.[4-7] The most recently published systematic review of survivors of critical care[3] identified rates of PTSD up to 27%, months or years after leaving critical care, with rates varying by studies' risk of bias. These results are consistent with a previous systematic review, which found a median prevalence of "clinically significant" PTSD symptoms of 22%.[8] High rates (40%) of onset of depression following critical care have also been reported, as much as two years later.[9] Patients who develop serious psychological morbidities are at much higher risk of further physical morbidities and mortality[10-12] representing a serious burden to patients, to their carers and to the NHS.[13,14]

It is more than a decade since the Department of Health explicitly recognised this serious problem, stating in the year 2000 that critical care was extremely distressing for patients and that there was considerable need for psychological support for traumatised patients.[15] In 2009, the National Institute for Health and Care Excellence (NICE) recommended that all critically ill patients should be assessed for risk of non-physical morbidity, and that those at high risk of adverse outcomes such as PTSD, should receive structured psychological support, both during and after their unit stay.[16] NICE guidance on the diagnosis, prevention and management of delirium recommends that patients identified as being at high risk of delirium (including all critically ill patients), should be monitored closely, and strategies for intervention implemented as soon as possible.[17] Even more recently, in 2012, NICE has highlighted the importance of patients being regularly assessed for psychological needs, so that these can be rapidly addressed.[18]

Rigorous and relevant evidence is now urgently needed to reduce the burden of serious psychological morbidity on critical care patients and their carers, and cost effective strategies are needed to reduce the burden on the NHS. The modification of clinical risk factors for PTSD such as duration of mechanical ventilation and sedation have been discussed in the literature,[19,20] but less invasive medical interventions or better drugs are not currently available. Yet little high-quality research has been conducted to evaluate psychological interventions that could alleviate the emotional distress experienced by patients in critical care, with a view to preventing longer-term psychological morbidity.[21] An unpublished systematic review[22] of 15 studies, found mostly weak and some moderate evidence that non-pharmacological interventions including music therapy, complementary therapy or patient diaries could reduce short-term distress for critical care patients. Only the patient diary intervention was shown to have an effect on longer-term psychological outcomes in a sufficiently large sample. However, this intervention targets critical care patients' memory gaps rather than stress, and has been critiqued for its lack of a solid psychological theoretical underpinning.[23]

However, recent advances in the study of critical care psychology have made the evaluation of psychological interventions for the critically ill more feasible. Valid psychological assessment tools now exist for use with critical care patients, including a tool measuring critical care-related distress (the Intensive Care Psychological Assessment Tool ((appendix B)) that was developed and validated by our research team.[24,25] With respect to the best timing to provide psychological interventions for critical illness survivors, research suggests that post-discharge (e.g. at six weeks[26] or at outpatient follow-up clinics[14]) may be too late, and earlier intervention could be more beneficial. For example, a

study with critically ill trauma patients indicated that considerably fewer individuals experienced PTSD, depression or anxiety a year after critical care, having received psychological interventions while in the critical care unit. [27] In today's NHS, clinical psychologists are a scarce resource, and a more pragmatic approach would be to standardise brief evidence-based psychological interventions to be carried out by existing critical care staff, who would be given the necessary training.

Aiming to develop a nurse-led psychological intervention for critical care unit patients that would commence before they leave the unit, our research team has identified the most relevant, up-to-date evidence concerning psychological techniques that are effective in: a) reducing acute emotional distress; b) reducing the impact of psychosis-like symptoms; and c) preventing PTSD after a trauma (the triad of psychological problems most associated with admission to critical care). The evidence is summarised below:

Interventions comprising Cognitive Behavioural Therapy (CBT) techniques have been found to be effective in reducing many types of emotional distress in both physical and mental health settings. Studies have evaluated CBT as effective even when delivered in brief form, or by non-expert staff (including nurses) who receive specific training. For example, a randomised controlled trial (RCT) showed that twice as many patients with excessive health anxiety (HA) who received brief CBT from newly-trained, non-expert clinical staff in medical clinics, achieved normal HA levels, compared to a control group.[28]

A specific CBT model has also proved effective in reducing the impact of symptoms such as hallucinations and delusions in patients with psychosis.[29-33] CBT for psychosis (CBTp) interventions have proved to be particularly effective in cases of early, first episode or acute psychosis, which equate most closely to the critical care experience.[34,35] Recent CBTp research has demonstrated the efficacy of brief interventions, targeting specific symptoms such as delusions.[36] CBTp has also been successfully delivered by nurses and other non-expert therapists to patients with psychosis in mental health settings.[37 -39]

Finally RCTs have shown CBT to be the most effective psychological intervention in reducing existing PTSD symptoms following different types of trauma, including episodes of psychosis.[40, 41] There is also increasing evidence that *early* interventions soon after a trauma may help to *prevent* PTSD symptoms from developing in the longer-term. A recent update to the NICE PTSD guidelines[42] states specifically that a brief trauma-focused psychological intervention of three sessions, delivered in the period immediately after a trauma, may reduce the development of subsequent PTSD symptoms.

Given that these existing evidence-based psychological interventions could be modified to reduce the stress and trauma experienced by critical care unit patients, and be delivered by highly trained/motivated critical care nurses, there is an urgent need to evaluate their effectiveness in the critical care setting. Increasing psychological support may also provide a further benefit to patients and the NHS by permitting a reduction in use and duration of pharmacological sedation.

The POPPI Study (Psychological Outcomes following a nurse-led Preventative Psychological Intervention for critically ill patients) is a 46-month project with the aim to evaluate the clinical and cost-effectiveness of a complex psychological intervention to reduce patient-reported PTSD symptom severity and other psychological morbidities and quality of life at six months.

3 Study Overview

The POPPI Study consists of two phases – a feasibility study and a cluster-RCT.

The POPPI Feasibility Study (Phase I, months 1 – 18) has six objectives:

1. to develop an education package (training and associated materials) as part of a proposed complex psychological intervention;
2. to pilot test the intervention, including the education package;
3. to refine the intervention, including the education package;
4. to pilot test the feasibility of all proposed processes and procedures for the cluster-RCT;
5. to set up the cluster-RCT;

6. to formally evaluate the feasibility of the intervention and progress to the cluster-RCT at a pre-specified stop point.

Objective 1
The education package will be developed by Dr Dorothy Wade and the clinical team at UCLH with expert advisors (Dr Vaughan Bell – a clinical psychologist and expert trainer in CBT for psychosis – and Dr Dane Goodsman – an expert in medical and nursing education) and Expert Psychology Advisory Group (EPAG) comprising study investigators and independent experts (see: Section 6.3).

Objectives 2 to 4
Objectives 2 to 4 will be addressed in two feasibility sub-studies conducted in four adult, general, critical care units:

- the Intervention Feasibility Study will be conducted in two adult, general critical care units and will address objectives 2 to 3 (see: Section 4); and
- the RCT Processes Feasibility Study will be conducted in two adult, general critical care units and will address objective 4 (see: Section 5).

Objective 5
An application to the Health Research Agency National Research Ethics Service for the cluster-RCT (with an integrated process evaluation and economic evaluation), following preparation of a protocol and related study documentation, will be submitted. Twenty four critical care units will be invited to participate in the cluster-RCT, excluding the two units taking part in the Intervention Feasibility Study. Following approval from the Research Ethics Committee, applications will be made to the research & development (R&D) departments of each Trust for each of the 24 critical care units. Investigator Site Files (ISFs) containing all essential documents (including standard operating procedures) and other supportive materials (e.g. posters, pocket cards) for the cluster-RCT will be prepared. A dedicated, secure web-based data entry system will be set up to enable local data entry and validation.

Objective 6
At the end of the Feasibility Study, there is a formal stop point at which a decision will be made whether to progress to the cluster-RCT based on the feasibility of the intervention and feasibility of the processes and procedures for the cluster-RCT have been demonstrated. A formal feasibility report will be prepared for the NIHR HS&DR programme and submitted at the end of the Feasibility Study. Feasibility will be assessed against the following reported criteria for continuation:

- development of all required materials for the intervention, including the education package;
- delivery of the education package to participating sites;
- completion of the Intervention Feasibility Study to pilot test the intervention (confirmation of acceptability and feasibility of the intervention);
- enrolment into the RCT Processes Feasibility Study;
- collection of outcome data in the RCT Processes Feasibility Study;
- confirmation of excess treatment costs for the cluster-RCT; and
- sign-up of the required sites for the cluster-RCT, including satisfactory progress with obtaining governance approvals.

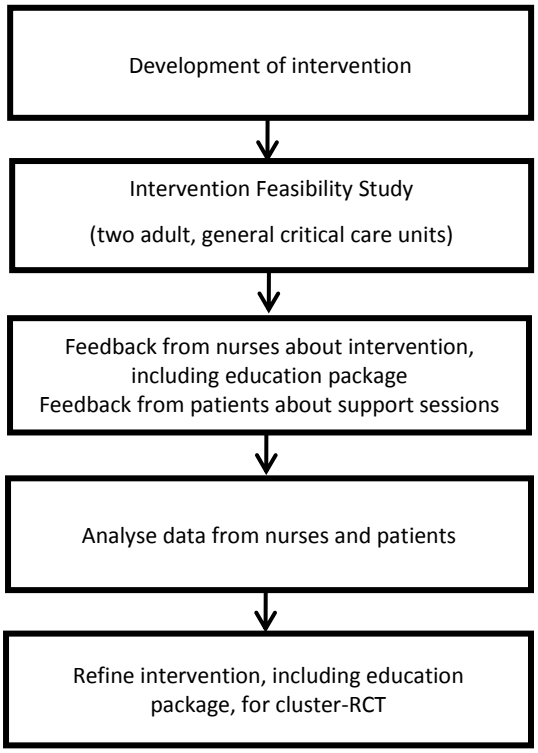
The cluster-RCT (Phase II, months 19 – 46) has three objectives::

1. to evaluate, using a parallel groups cluster-RCT design, the effect of the complex intervention on patient-reported PTSD symptom severity (primary outcome) and other psychological morbidities and quality of life (secondary outcomes) at six months;
2. to conduct an integrated process evaluation to assess the fidelity and quality of implementation of the intervention, and identify important contextual factors to better understand how the intervention works; and
3. to estimate, in an integrated economic analysis, the cost-effectiveness of the intervention.

4 Intervention Feasibility Study

4.1 Study design

Figure 1. Overview of study design



4.2 Study setting

Two NHS adult, general critical care units.

4.3 Eligibility criteria

Inclusion

- Age 18 years or greater
- Receipt of Level 2 or Level 3 critical care for 48 hours or more
- Between +1 and -1 on the Richmond Agitation Sedation Scale[43]
- English-speaking; and ability to communicate

Exclusion

- Glasgow Coma Score of less than 15
- Pre-existing chronic cognitive impairment, such as dementia
- Pre-existing psychotic illness
- Pre-existing chronic PTSD
- Terminal illness/receiving end-of-life care

4.4 Screening and informed consent

All patients in participating critical care units will be routinely screened for eligibility by unit staff. Patients who meet the eligibility criteria will be invited by an authorised staff member (on the POPPI

Delegation of Study Duties Log) to take part in the study. The patient will be provided with written information about the study which will be supplemented with information provided orally. The information provided will include details about the purpose of the study, how the study is being funded, the consequences of taking part or not and data security. The contact details for the local Principal Investigator (PI) will be included on the Patient Information Sheet. Patients will be given copies of both the full and short versions of the Patient Information Sheet. Given the severity of their illness, it is likely that most patients will find it easier to read or have read to them the short version of the Patient Information Sheet initially. Patients will be given the opportunity to ask questions and to discuss the study with family or friends.

Patients who agree to take part in the study, after the authorised staff member is satisfied that the Patient Information Sheet has been read and understood, will be invited to sign the Consent Form. Patients will be asked to indicate on the Consent Form if they agree to their support sessions being audiotaped to assess the fidelity of the intervention. This is optional and will not preclude the patient taking part in the study. Once the patient has signed the Consent Form, the person taking informed consent will add their own name and countersign in the presence of the patient. A copy of the signed Consent Form will be given to the patient, a copy placed in the ISF, and a copy placed in the medical notes.

If a patient subsequently withdraws their consent to taking part in the study, all data collected to the point of withdrawal will be retained for the analysis, however no further follow-up or outcome data will be collected unless agreed with the patient.

Standard operating procedures (SOPs) for screening and informed consent will be provided in the ISF.

4.5 Intervention

The intervention to be assessed is a complex psychological intervention comprising four related elements:

1. An education package (two training courses and associated materials) to train critical care unit staff to carry out elements 2-4;
2. Creating a therapeutic environment to promote calm and minimise stress in critical care (all critical care staff);
3. Screening for acute psychological stress and psychosis-like symptoms in critical care patients using the IPAT (all critical care staff);
4. Carrying out three, one-to-one CBT-inspired stress support sessions, for patients screened as distressed and at high risk of psychological morbidity (delivered by specially trained POPPI nurses).

4.5.1 Education package

The education package consists of two modules.

Module 1 (part A)

Module 1 (part A) is a three-day central training course for three critical care nurses from each participating critical care unit – the POPPI nurses. As part of the module, appropriate materials will be provided that cover:

- understanding and practising therapeutic communication styles and CBT-inspired psychological techniques to deal with distress;
- how to conduct one-to-one stress support sessions for high risk patients (see: Section 4.5.2) - training manuals with clear guidelines on the content of the three stress support sessions will be provided;
- guidance on assessing patient distress using visual analogue scales (VAS), the IPAT and other validated measures;
- advice on encouraging culture change in their unit by ensuring that all clinical staff complete Module 2 of the education package (an e-learning course) and with information provided on posters and other materials.

On completion of Module 1 (part A), the POPPI nurses will return to their critical care units to oversee delivery of Module 2 of the education package and one-to-one stress support sessions (see: Section 4.5.2) to patients who consent to take part in the study and are assessed as being stressed and at high risk of psychological morbidity.

Module 2

Module 2 is an e-learning course for all clinical critical care staff. The objectives of the course are:

- to learn to create a calm, less stressful environment with good communication in the unit (culture change); and
- to learn to screen patients for psychological distress using the IPAT.

The e-learning course will take approximately 30 minutes to complete and comprises five sections:

1. Understanding the causes of patients' psychological distress in the critical care unit;
2. Recognition of psychological distress and delirium in the critical care unit (including using the IPAT);
3. Good communication with distressed or delirious patients in the critical care unit;
4. Reducing stress and conflict in the critical care unit;
5. Online knowledge test and course evaluation.

The POPPI nurses will encourage culture change in their unit to ensure a therapeutic environment is created by ensuring that all clinical critical care staff complete the e-learning course and through micro-teaching clinical staff at the bedside. In addition, they will ensure that POPPI materials are clearly displayed (e.g. posters) and distributed (e.g. clip-on cards) throughout the unit.

Module 1 (part B)

One month after completing Module 1 (part A), the POPPI nurses will attend the Module 1 (part B), a one-day central course for feedback, supervision and competency testing.

4.5.2 Delivery of one-to-one stress support sessions

All participating patients who are assessed as being distressed and at high risk of psychological morbidity (scoring 8 or more on the IPAT) will receive three one-to-one stress support sessions delivered by the POPPI nurses. The aims of the sessions are:

- to reduce stress, fear and intrusive memories of critical care before the patient leaves hospital; and
- to help patients find a path to psychological recovery and well-being after their stay in critical care.

To achieve these aims, the POPPI nurses' objectives during the stress support sessions will be:

- to develop a trusting relationship with the patient;
- to help the patient open up to discuss worries and fears; and
- to make links between stressful experiences in the critical care unit and the patient's psychological reactions.

The three stress support sessions will be structured as follows:

Session 1: rapport building; normalising common stress responses in the critical care unit; psycho-education about common causes of distress in the critical care unit; identifying patient's individual worries and fears; setting homework to practise coping strategies using a tablet computer.
Session 2: individual normalising of patient's most stressful and unusual experiences and education about likely causes; distinguishing realistic and unrealistic fears; increasing control and information to

help coping with realistic fears; re-thinking and re-evaluating unrealistic fears; homework – practising a "test your fears" technique.

Session 3: review of key messages; safe-place imagery exercise; summarising to create context and collaborating on a staying calm plan; providing patient with a "stay well" booklet and DVD of materials from the tablet computer; arranging follow-up.

For patients who consent, audio recording of the three one-to-one stress support sessions will be carried out by the POPPI nurse. This is to enable fidelity of delivery of the stress support sessions to be assessed by independent assessors (Appendix P). The aim is for 18 stress support sessions with six patients to be audio recorded for independent assessment.

All patients who receive one-to-one stress support sessions will receive a follow-up call from the POPPI nurse within one month of the first session to see how they are feeling.

4.6 Outcomes

The main outcomes of the Intervention Feasibility Study will be the feasibility and acceptability of the intervention for the POPPI nurses and for patients, which will be assessed quantitatively and qualitatively.

Assessment of feasibility and acceptability for POPPI nurses

- Confidence questionnaire (Appendix E) – completed before the start of the Module 1 (part A), at the end of Module 1 (part A), and at the end of Module 1 (part B);
- Key learning objectives (Appendix G) – completed after end of Module 1 (part A) and Module 1 (part B);
- Course feedback on Module 1 (part A) (Appendix F) – completed after completion of Module 1 (part A); and
- Focus groups on the feasibility and acceptability of the intervention – completed after the completion of intervention period for last patient recruited.

All clinical critical care staff completing the e-learning course will be asked to complete a short questionnaire at the end of the e-learning course (Appendix H).

Assessment of feasibility and acceptability for patients

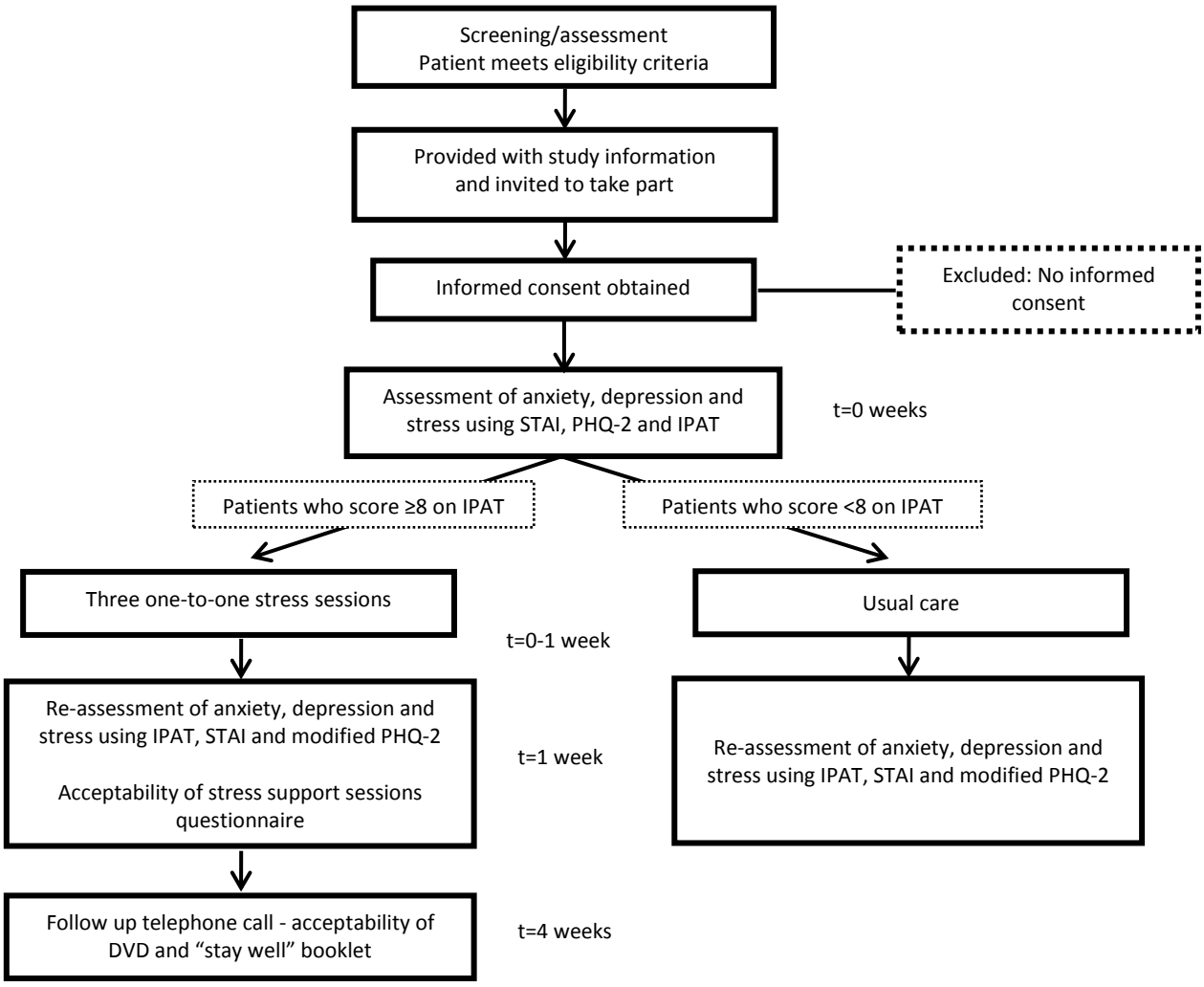
- Satisfaction and acceptability of the one-to-one stress support sessions after they have been delivered (Appendix J); and
- Acceptability of DVD and "stay well" booklet one month after the three one-to-one stress support sessions (Appendix K).

4.7 Patient timeline

Eligible patients who have provided informed consent will be assessed for acute psychological stress by trained nurses using the IPAT, State Trait Anxiety Inventory[45] (STAI) (Appendix C - Patient stress assessment questionnaire – Emotions) and modified Patient Health Questionnaire-2[46] (PHQ-2) (Appendix D – Patient stress assessment questionnaire – Mood), and assessment will take place as soon as possible (within 48 hours) following informed consent. If a patient is deemed to be distressed and at high risk of psychological morbidity (scoring 8 or more on the IPAT), and is not currently delirious as assessed by the Confusion Assessment Method for the Intensive Care Unit[44] (CAM-ICU) they will receive three one-to-one stress support sessions delivered by a POPPI nurse, ideally within one week. Following delivery of the three one-to-one stress support sessions, the patient will be re-assessed by a research nurse using the IPAT, STAI and modified PHQ-2 and asked to complete a short questionnaire about the acceptability of the stress sessions. All patients who receive the

one-to-one stress support sessions will receive a follow-up call from their POPPI nurse within one month of the first session. During the call the patient will be asked about the acceptability of the DVD and "stay well" booklet they were given. Patients who were deemed to be at a low risk of psychological morbidity (scoring 7 or less on the IPAT) will receive usual care in the hospital and will be re-assessed after one week using the IPAT, STAI and modified PHQ-2.

Figure 2. Patient timeline



4.8 Post-study care

If a participating patient shows signs of serious distress at the end of the three one-to-one stress support sessions with the POPPI nurse (scoring 8 or more on the IPAT) or on the follow-up phone call at one month, the medical team responsible for the patient will be informed.

4.9 Sample size

It is anticipated that approximately 66 patients will be recruited into the Intervention Feasibility Study based on an average recruitment rate of 11 patients per month at each of the two participating critical care units. Anticipated recruitment is based on robust data from the Case Mix Programme (CMP), combined with data from previous and ongoing clinical trials among critically ill patients. The CMP is the national clinical audit of adult critical care coordinated by ICNARC, which is ongoing in over 200 adult, general critical care units in England, Wales and Northern Ireland (over 90%). We are therefore confident that the recruitment rate presented represents a good estimate of the average for a typical critical care unit.

4.10 Data collection methods

Data will be collected from patients, the POPPI nurses and clinical critical care staff during the study period.

Patient data

All patients

- Baseline: basic demographic and clinical data.
- Initial assessment: IPAT, STAI and modified PHQ-2.

Patients scoring 8 or more on IPAT

- After completion of the three one-to-one stress support sessions: IPAT, STAI and modified PHQ-2 and satisfaction and acceptability of the stress support sessions questionnaire.
- One month after the stress support sessions: acceptability of the DVD and "stay well" booklet questionnaire.

Patients scoring 7 or less on IPAT

- One week after recruitment: IPAT, STAI and modified PHQ-2.

Clinical critical care staff data

POPPI nurses

- Before Module 1 (part A): basic demographic data and confidence questionnaire – completed by nurses.
- At end of Module 1 (part A): confidence, key learning objectives and course feedback questionnaires – completed by nurses.
- During Module 1 (part B): competency ratings scale (Appendix O) – completed by assessors
- At the end of Module 1 (part B): confidence and key learning objectives questionnaires – completed by nurses.
- During the three one-to-one stress support sessions: fidelity ratings scale (audio tapes) (Appendix P) – completed by assessors.
- At the end of recruitment: qualitative data from focus groups on the feasibility and acceptability of the intervention.

Figure 3. POPPI nurses data schedule

	Before Module 1 (part A)	End of Module 1 (part A)	During Module 1 (part B)	End of Module 1 (part B)	During stress support sessions	End of recruitment period
Completed by POPPI nurses						
Demographic data	✓					
Confidence Questionnaire	✓	✓		✓		
Key learning objectives questionnaire		✓		✓		
Course feedback questionnaire		✓				
Attend focus group						✓
Completed by assessors						
Competency ratings scale			✓			
Fidelity ratings scale					✓	

All staff data

- End of e-learning module: number (%) and demographics of critical care staff completing module; feedback and key learning objectives questionnaire (Appendix I); knowledge test; number of attempts to pass knowledge test and number (%) of those who passed the test.

4.11 Statistical methods

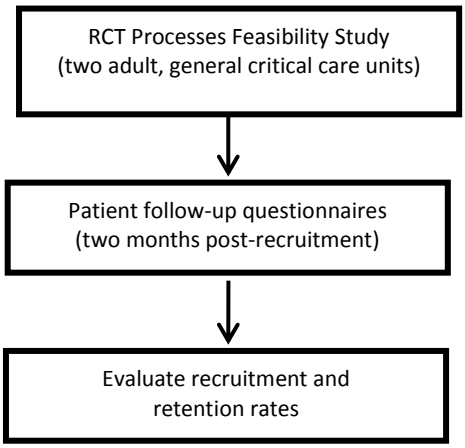
Descriptive analysis will be conducted to assess the objectives of the POPPI Feasibility Study.

Changes in the POPPI nurses' confidence in psychological support skills and key learning objectives will be evaluated to ensure improvement. The effect of the one-to-one stress support sessions on immediate patient outcomes will be also assessed to compare values before and after the stress support sessions. Based on 66 patients recruited, we anticipate that approximately 33 patients will be assessed as being distressed and at high risk of psychological morbidity, and will therefore receive three one-to-one stress support sessions.

5 RCT Processes Feasibility Study

5.1 Study design

Figure 4. Overview of study design



5.2 Study setting

Two NHS adult, general critical care units.

5.3 Eligibility criteria

Inclusion

- Age 18 years or greater
- Receipt of Level 2 or Level 3 critical care for 48 hours or more
- Between +1 and -1 on the Richmond Agitation Sedation Scale[43]
- English-speaking and ability to communicate.

Exclusion

- Glasgow Coma Score of less than 15
- Pre-existing chronic cognitive impairment, such as dementia
- Pre-existing psychotic illness
- Pre-existing chronic PTSD
- Terminal illness/receiving end-of-life care

5.4 Screening and informed consent

All patients in participating critical care units will be routinely screened for eligibility by unit staff. Patients who meet the eligibility criteria will be invited by an authorised staff member (on the POPPI Delegation of Study Duties Log) to take part in the study. The patient will be provided with written information about the study which will be supplemented with information provided orally. The information provided will include details about the purpose of the study, how the study is being funded, the consequences of taking part or not and data security. The contact details for the local PI will be included on the Patient Information Sheet. Patients will be given copies of both the full and short versions of the Patient Information Sheet. Given the severity of their illness, it is likely that most patients will find it easier to read or have read to them the short version of the Patient Information Sheet initially. Patients will be given the opportunity to ask questions and to discuss the study with family or friends.

Patients who agree to take part in the study, after the authorised staff member is satisfied that the Patient Information Sheet has been read and understood, will be invited to sign the Consent Form. Once the patient has signed the Consent Form, the person taking informed consent will add their own name and countersign in the presence of the patient. A copy of the signed Consent Form will be given to the patient, a copy placed in the ISF, and a copy placed in the medical notes.

If a patient subsequently withdraws their consent to taking part in the study, all data collected to the point of withdrawal will be retained for the analysis, however no further follow-up or outcome data will be collected unless agreed with the patient.

SOPs for screening and informed consent will be provided in the ISF.

5.5 Intervention

Recruited patients will continue to receive usual care in the critical care unit.

5.6 Outcomes

The main outcomes are feasibility of estimated recruitment and retention rates.

Assessment of feasibility of estimated recruitment rate:

- At the end of the recruitment period: assessment of study screening and recruitment logs for numbers of eligible patients identified and approached, and of these, the number who consented to take part.

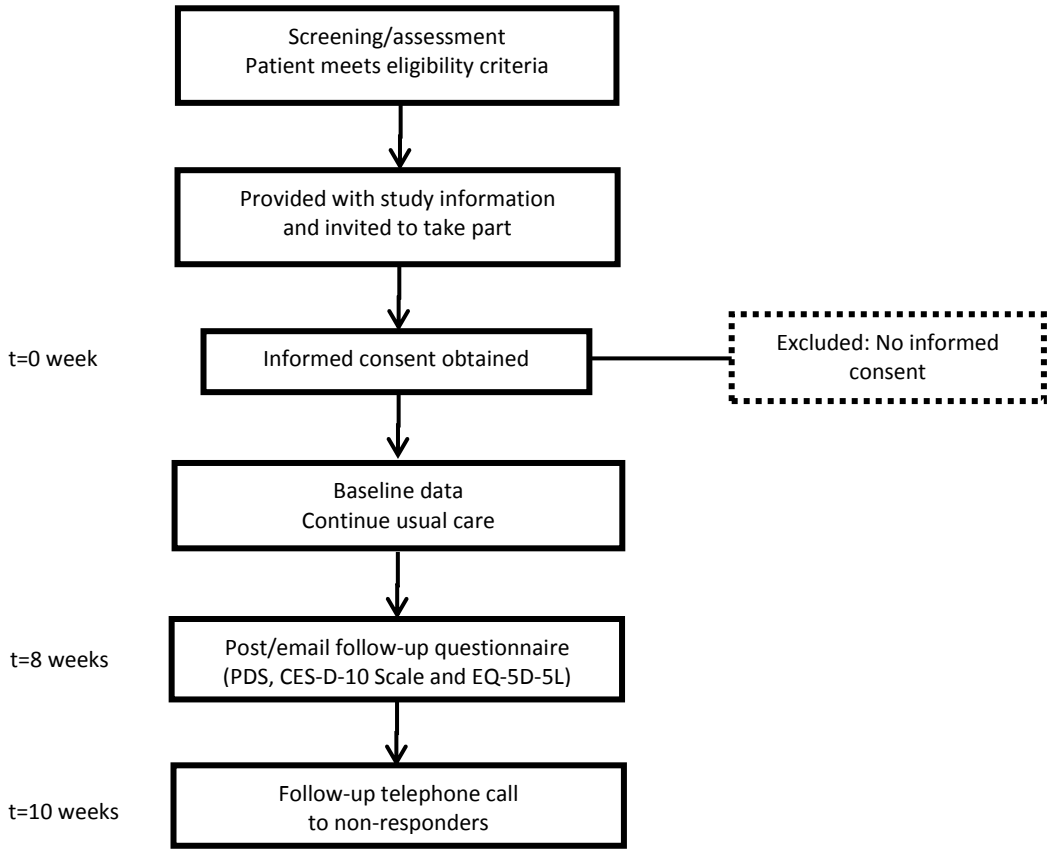
Assessment of feasibility of estimated retention rate:

- At the end of the follow-up period the proportion of patients who returned a follow-up questionnaire and the method of return (e.g. via post, email and/or following a telephone call) will be assessed.
- The completeness of questionnaires will be assessed.

5.7 Patient timeline

Eligible patients who provide informed consent will continue to receive usual care in the critical care unit. Two months after recruitment into the study, a questionnaire will be sent to the patient either via post or email, depending on their preference, from the ICNARC CTU. The questionnaire will include the EuroQoL health questionnaire (EQ-5D-5L) (Appendix N), Post Traumatic Diagnostic Scale[47] (PDS) (Appendix L – Patient emotional reactions questionnaire) and Centre for Epidemiologic Studies Depression Scale (short form)[48] (CES-D-10) (Appendix M – Patient mood questionnaire). Questionnaires sent by post will include a pen and a stamped addressed envelope. Non-responders will be telephoned two weeks later to check that the questionnaire has been received. Patients will be given the option to complete the questionnaire over the telephone.

Figure 5. Patient timeline



5.8 Post-study care

Completed follow-up questionnaires received will be reviewed on receipt at the ICNARC CTU. If the questionnaire data indicates that the patient is showing signs of serious stress or depression, the patient's GP or the site's POPPI Principal Investigator will be informed (using the 'Referral Letter') by Dr Dorothy Wade, Lead Clinical Investigator for the POPPI Study, depending on which method is deemed most appropriate for the site and individual.

5.9 Sample size

It is anticipated that approximately 44 patients will be recruited into the RCT Processes Feasibility Study based on an average recruitment rate of 11 patients per month at each of the two participating critical care units. Anticipated recruitment is based on robust data from the CMP. We are therefore confident that the recruitment rate presented represents a good estimate of the average for a typical critical care unit.

5.10 Data collection methods

Data will be collected on all participating patients during the study period.

- Baseline: basic demographic and clinical data, contact details (i.e. postal address, email address, telephone number).
- Two months post recruitment: follow-up questionnaire containing the EQ-5D-5L, PDS and CES-D-10.

5.11 Statistical methods

A descriptive analysis will be conducted. The feasibility of the anticipated sample size for the cluster-RCT will be assessed using data from the study screening and recruitment logs. Retention in the study will be assessed by examining the proportion of follow-up questionnaires returned and the method of return (via post, email or telephone). The completeness of the questionnaires will be examined to inform the feasibility of follow-up using the EQ-5D-5L, PDS and CES-D-10.

6 Cluster randomised controlled trial

6.1 Study design

A parallel groups cluster-RCT.

6.2 Study setting

Twenty four NHS adult, general critical care unit will be selected to ensure representativeness and enhance generalisability of the study results by including such factors as geography, teaching status (university/non-university) and size of unit.

Sites will commence recruitment in blocks of six sites (three intervention, three control) every two months from month 19 onwards. All eligible patients will be asked for their informed consent to participate in the POPPI Study and to be followed up at six months. For the first five months of recruitment in each site (baseline period), all sites will deliver usual care. At the end of the five-month baseline period, there will be a one-month transition (training/'wash-in') period during which intervention sites transition to delivering the intervention.

6.3 Eligibility criteria

Inclusion

- Age 18 years or greater
- Receipt of Level 2 or Level 3 critical care for 48 hours or more
- Between +1 and -1 on the Richmond Agitation Sedation Scale[43]
- English-speaking and ability to communicate

Exclusion

- Glasgow Coma Score of less than 15
- Pre-existing chronic cognitive impairment, such as dementia
- Pre-existing psychotic illness
- Pre-existing chronic PTSD
- Terminal illness/receiving end-of-life care

6.4 Screening and informed consent

All patients in participating critical care units will be routinely screened for eligibility by unit staff. Patients who meet the eligibility criteria will be invited by an authorised staff member (on the POPPI Delegation of Study Duties Log) to take part in the study. The patient will be provided with written information about the study which will be supplemented with information provided orally. The information provided will include details about the purpose of the study, how the study is being funded, the consequences of taking part or not and data security. The contact details for the local Principal Investigator (PI) will be included on the Patient Information Sheet. Patients will be given copies of both the full and short versions of the Patient Information Sheet. Given the severity of their illness, it is likely that most patients will find it easier to read or have read to them the short version of the Patient Information Sheet initially. Patients will be given the opportunity to ask questions and to discuss the study with family or friends.

Patients who agree to take part in the study, after the authorised staff member is satisfied that the Patient Information Sheet has been read and understood, will be invited to sign the Consent Form. Patients will be asked to indicate on the Consent Form if they agree to their support sessions being audiotaped to assess the fidelity of the intervention. This is optional and will not preclude the patient taking part in the study. Once the patient has signed the Consent Form, the person taking informed consent will add their own name and countersign in the presence of the patient. A copy of the signed Consent Form will be given to the patient, a copy placed in the ISF, and a copy placed in the medical notes.

If a patient subsequently withdraws their consent to taking part in the study, all data collected to the point of withdrawal will be retained for the analysis, however no further follow-up or outcome data will be collected unless agreed with the patient.

SOPs for screening and informed consent will be provided in the ISF.

6.5 Intervention

The intervention to be assessed is a complex psychological intervention comprising four related elements:

1 An education package (two training courses and associated materials) to train critical care unit staff to carry out elements 2-4;
2 Creating a therapeutic environment to promote calm and minimise stress in critical care (all critical care staff);
3 Screening for acute psychological stress and psychosis-like symptoms in critical care patients using the IPAT (all critical care staff);
4 Carrying out three, one-to-one CBT-inspired stress support sessions, for patients screened as distressed and at high risk of psychological morbidity (delivered by specially trained POPPI nurses).

6.5.1 Education package

The education package consists of two modules.

Module 1 (part A)

Module 1 (part A) is a three-day central training course for three critical care nurses from each participating critical care unit – the POPPI nurses. As part of the module, appropriate materials will be provided that cover:

- understanding and practising therapeutic communication styles and CBT-inspired psychological techniques to deal with distress;
- how to conduct one-to-one stress support sessions for high risk patients (see: Section 6.5.2) - training manuals with clear guidelines on the content of the three stress support sessions will be provided;
- guidance on assessing patient distress using visual analogue scales (VAS), the IPAT and other validated measures;
- advice on encouraging culture change in their unit by ensuring that all clinical staff complete Module 2 of the education package (an e-learning course) and with information provided on posters and other materials.

On completion of Module 1 (part A), the POPPI nurses will return to their critical care units to oversee delivery of Module 2 of the education package and one-to-one stress support sessions (see: Section 6.5.2) to patients who consent to take part in the study and are assessed as being stressed and at high risk of psychological morbidity.

Module 2

Module 2 is an e-learning course for all clinical critical care staff. The objectives of the course are:

- to learn to create a calm, less stressful environment with good communication in the unit (culture change); and
- to learn to screen patients for psychological distress using the IPAT.

The e-learning course will take approximately 30 minutes to complete and comprises five sections:

6. Understanding the causes of patients' psychological distress in the critical care unit;
7. Recognition of psychological distress and delirium in the critical care unit (including using the IPAT);

8. Good communication with distressed or delirious patients in the critical care unit;
9. Reducing stress and conflict in the critical care unit;
10. Online knowledge test and course evaluation.

The POPPI nurses will encourage culture change in their unit to ensure a therapeutic environment is created by ensuring that all clinical critical care staff complete the e-learning course and through micro-teaching clinical staff at the bedside. In addition, they will ensure that POPPI materials are clearly displayed (e.g. posters) and distributed (e.g. clip-on cards) throughout the unit.

Module 1 (part B)
One month after completing Module 1 (part A), the POPPI nurses will attend the Module 1 (part B), a one-day central course for feedback, supervision and competency testing.

6.5.2 Delivery of one-to-one stress support sessions

All participating patients who are assessed as being distressed and at high risk of psychological morbidity (scoring 8 or more on the IPAT) will receive three one-to-one stress support sessions delivered by the POPPI nurses. The aims of the sessions are:

- to reduce stress, fear and intrusive memories of critical care before the patient leaves hospital; and
- to help patients find a path to psychological recovery and well-being after their stay in critical care.

To achieve these aims, the POPPI nurses' objectives during the stress support sessions will be:

- to develop a trusting relationship with the patient;
- to help the patient open up to discuss worries and fears; and
- to make links between stressful experiences in the critical care unit and the patient's psychological reactions.

The three stress support sessions will be structured as follows:

Session 1: rapport building; normalising common stress responses in the critical care unit; psycho-education about common causes of distress in the critical care unit; identifying patient's individual worries and fears; setting homework to practise coping strategies using a tablet computer.
Session 2: individual normalising of patient's most stressful and unusual experiences and education about likely causes; distinguishing realistic and unrealistic fears; increasing control and information to help coping with realistic fears; re-thinking and re-evaluating unrealistic fears; homework – practising a "test your fears" technique.

Session 3: review of key messages; safe-place imagery exercise; summarising to create context and collaborating on a staying calm plan; providing patient with a "stay well" booklet and DVD of materials from the tablet computer; arranging follow-up.

For patients who consent, audio recording of the three one-to-one stress support sessions will be carried out by the POPPI nurse. This is to enable fidelity of delivery of the stress support sessions to be assessed by independent assessors (Appendix P). The aim is for 18 stress support sessions with six patients to be audio recorded for independent assessment.

All patients who receive one-to-one stress support sessions will receive a follow-up call from the POPPI nurse within one month of the first session to see how they are feeling.

6.6 Outcomes

The primary outcome for the clinical evaluation will be patient-reported PTSD symptom severity at six months, measured using the PDS[47] which conforms to all DSM-IV diagnostic criteria for PTSD and which has been validated for use in critical care survivors (Appendix L – Patient emotional reactions questionnaire). Secondary outcomes for the clinical evaluation will be:

- days alive and free from sedation to day 30;
- duration of critical care unit stay;
- PDS[47] greater than 18 points at six months;
- depression at six months, measured using the CES-D-10 (Appendix M – Patient mood questionnaire);
- health-related quality of life (HRQoL) at six months, measured by the EQ-5D-5L questionnaire (Appendix N).

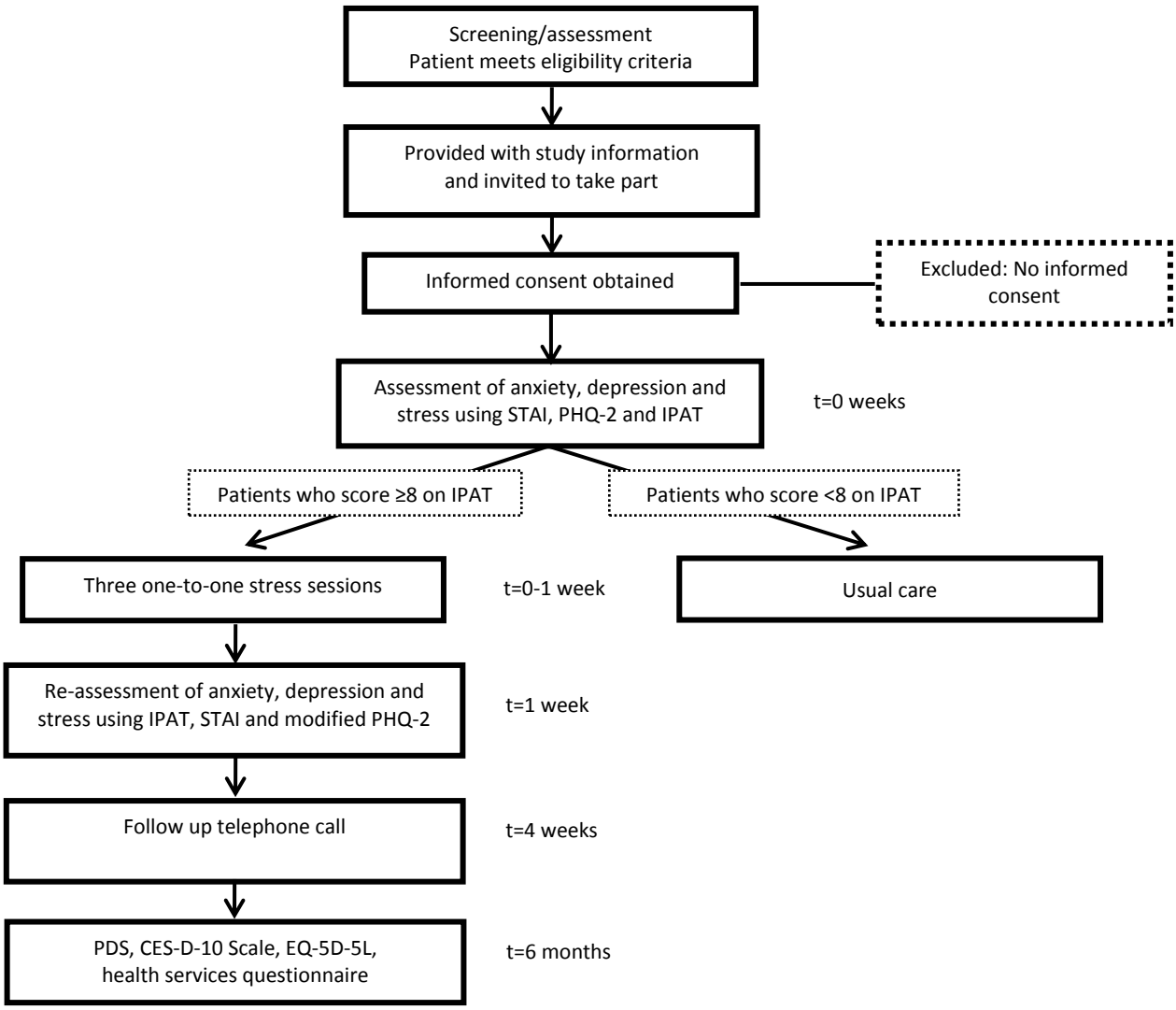
The primary outcomes for the economic evaluation will be incremental costs, quality-adjusted life years (QALYs) and net monetary benefit.

6.7 Patient timeline

Eligible patients who have provided informed consent will be assessed for acute psychological stress by trained nurses using the IPAT, STAI[45] and modified PHQ-2[46], and assessment will take place as soon as possible (within 48 hours) following informed consent. If a patient is deemed to be distressed and at high risk of psychological morbidity (scoring 8 or more on the IPAT), and is not currently delirious as assessed by the CAM-ICU[44] they will receive three one-to-one stress support sessions delivered by a POPPI nurse, ideally within one week. Following delivery of the three one-to-one stress support sessions, the patient will be re-assessed by a research nurse using the IPAT, STAI and modified PHQ-2. All patients who receive the one-to-one stress support sessions will receive a follow-up call from their POPPI nurse within one month of the first session. Six months after recruitment into the study, patients will be asked to complete the PDS symptom severity score, short-form of the CES-D-10 Scale, EQ-5D-5L and health services questionnaire (Appendix Q).

Patients who were deemed to be at a low risk of psychological morbidity (scoring 7 or less on the IPAT) will continue to receive usual care in the hospital. Six months after recruitment into the study, patients will also be asked to complete the PDS symptom severity score, short-form of the CES-D-10 Scale, EQ-5D-5L and health services questionnaire.

Figure 2. Patient timeline



6.8 Post-study care

If a participating patient shows signs of serious distress at the end of the three one-to-one stress support sessions with the POPPI nurse (scoring 8 or more on the IPAT) or on the follow-up phone call at one month, the medical team responsible for the patient will be informed.

Completed follow-up questionnaires received will be reviewed on receipt at the ICNARC CTU. If the questionnaire data indicates that the patient is showing signs of serious stress or depression, the patient's GP or the site's POPPI Principal Investigator will be informed (using the 'Referral Letter') by Dr Dorothy Wade, Lead Clinical Investigator for the POPPI Study, depending on which method is deemed most appropriate for the site and individual.

6.9 Sample size

The total required sample size for the RCT is 2,904 patients recruited from twenty-four sites, which will be randomly assigned to either intervention or control using a restricted randomisation approach to ensure balance across the arms in geographical location and teaching status. The required sample size was calculated using the approach of Hussey & Hughes[49] to achieve 90% power to detect a

reduction from 14 points to 10 points ($p<0.05$) in the mean PDS at six months, based on the following assumptions:

- Mean (14) and standard deviation (12) of the PDS were taken from control patients in a previous single centre study.[1]
- Between-site coefficient of variation 0.5 corresponding to between-site standard deviation 7 (conservative estimate as no multicentre data available[50]) and intracluster correlation coefficient 0.25. Note: the inclusion of a baseline recruitment period means that the sample size calculation is less sensitive to the degree of clustering.[49]
- Treatment effect of a reduction of four points on the PDS based on: reliable change index for the PDS of eight points[51]; 50% of eligible patients in the intervention periods assessed as being at high risk of psychological morbidity [25]; to achieve an eight-point reduction among high risk patients after receiving brief CBT, an average four-point reduction in PDS across the whole population is required.
- Harmonic mean of the number of patients completing follow-up (76 per site per annum – corresponding to 32 in a five-month period) based on the CMP.

Of the 2,904 patients recruited to the POPPI Study, it is anticipated that 792 will be psychologically assessed, of which 396 (50%) will be assessed as being at high risk of psychological morbidity and receive brief CBT, equivalent to 5.5 patients receiving brief CBT per site per month during intervention periods.

Anticipated rates of recruitment have been based on robust data from the CMP combined with data from previous and ongoing trials among critically ill patients. The CMP is the national clinical audit of adult critical care coordinated by ICNARC, which is ongoing in over 200 adult, general critical care units in England, Wales and Northern Ireland (>90%). We are therefore confident that the recruitment rates presented represent good estimates of the average for a typical critical care unit. Due to variation in the size, throughput and case mix of units, these estimates will be confirmed during Phase I based on data from the actual units selected to participate in the cluster-RCT.

6.10 Data collection methods

- Baseline data: will be collected at the point of recruitment and will include documented pre-existing anxiety and depression, duration of sedation, use of benzodiazepines, anaesthetic agents, sleep medications, antipsychotics, opioids and new antidepressants, prior delirium (assessed using the CAM-ICU) and baseline EQ-5D-5L. In addition, data from the CMP will include demographics, surgical status, acute severity of illness (APACHE II score and ICNARC Physiology Score)
- At discharge from the critical care unit: status at discharged; number of days patient received sedation, use of benzodiazepines, anaesthetic agents, sleep medications, antipsychotics, opioids and new antidepressants. Data from the CMP will include duration of organ support and duration of critical care unit stay.
- At discharge from hospital: status at discharge from an acute hospital.
- At six months: PDS symptom severity score, short-form of the CES-D-10 Scale, EQ-5D-5L and health services questionnaire.

Data collected up to hospital discharge will be abstracted onto a POPPI case report form (CRF). CRFs will be piloted prior to commencement of recruitment to improve ease of use and accuracy of data collection. Different CRFs will be used during control and intervention periods. Data will be entered onto a secure, web-based, electronic case report form (eCRF). Range and consistency checks at the point of data entry will ensure valid data are submitted. Dedicated POPPI staff at ICNARC will work closely with staff at participating units to ensure accurate (complete, valid and reliable) data. Data management and validation processes will mimic those that have been developed over the past fifteen years for the CMP, which has been independently rated as a high quality clinical database on the Directory of Clinical Databases (http://docdat.ic.nhs.uk/), and for previous and ongoing multicentre research studies managed by the ICNARC CTU. Data collected at six months will be via a postal, email or telephone questionnaire.

6.10.1 Intervention sites only

Compliance

Data to monitor compliance with the intervention (for intervention patients only) will include initial assessment of delirium (CAM-ICU) and IPAT score, dates, times and durations of one-to-one stress support sessions, and assessments of anxiety, depression and stress immediately before the first one-to-one stress support session and after the last one-to-one stress support session using the short-form of the STAI, PHQ-2 and IPAT.

Process evaluation

The process evaluation will incorporate site visits to intervention sites to observe and discuss the delivery of the intervention with the POPPI nurses and wider critical care unit staff. Each intervention site will receive at least two site visits. As well as giving support to the POPPI nurses, the site visits will observe, monitor and assess the delivery of the four elements of the intervention. Qualitative data will be collected in the form of researcher observations, interviews with staff and structured field notes. A checklist of key items will be used to record adherence to the approach to promoting a therapeutic environment. Fidelity of the one-to-one stress support sessions will be assessed with a purpose-built measure of adherence to therapy assessed by expert observers based on therapy sessions observed during site visits and a random sample of additional sessions digitally recorded by the POPPI nurses and sent centrally for evaluation. Quantitative data for the process evaluation will include assessments of nurse competence following the training course and for patients; change in STAI, PHQ-2 and IPAT between the first and last one-to-one psychological therapy sessions.

Economic evaluation

The economic evaluation will consider the resource use required for psychological assessments, training the nurses, and the provision of one-to-one stress support sessions for those assessed as being at high risk of psychological morbidity. Site visits will be used to collect detailed information on the staff time required in:

- training all critical care unit staff to promote a therapeutic environment to promote calm and minimise stress in critical care;
- training bedside critical care nurses to assess patients for acute psychological stress and psychosis-like symptoms using the IPAT;
- assessing patients for acute psychological stress and psychosis-like symptoms using the IPAT; and
- delivering the one-to-one stress support sessions.

The additional materials required to deliver the intervention (e.g. CDs/DVDs/booklets) will also be recorded. The cluster-RCT dataset will record the length of stay in critical care and general medical wards. Patient questionnaires at six months will record contacts with community health services (GP, practise nurse, psychiatrist, clinical psychologist, occupational therapist, community psychiatric nurse and general counsellor) after discharge from the index hospital admission, together with any hospital readmissions.

6.11 Statistical methods

The primary analysis for the clinical evaluation will determine if there is a significant difference in the mean PDS at six months between patients recruited during the intervention period in intervention sites compared with control sites of the cluster-RCT using a generalised linear mixed model (GLMM) at the individual patient level (patients nested within sites and time periods) including a random effect of site and a fixed effect of period (baseline or intervention), and adjusted for site-level factors included within the restricted randomisation algorithm. For the primary outcome, the link function will be the identity link (i.e. linear regression) and standard errors will be estimated using a jackknife variance estimate, which has been demonstrated in simulation studies to maintain the size of the test.[49] A secondary analysis will adjust for pre-specified baseline factors associated with poor psychological outcome (e.g. sedation) and ability to resource and deliver the intervention (e.g. size of critical care unit, teaching status) at both patient and site level. Results of the GLMMs will be reported as differences in means, 95% confidence intervals and p-values.

Analyses of secondary outcomes will be conducted using GLMMs, with the identity link (i.e. linear regression) for continuous secondary outcomes, reported as differences in means, and the logit link (i.e. logistic regression) for binary secondary outcomes, reported as odds ratios.

The above analyses will evaluate the effectiveness of the intervention among all patients meeting the inclusion criteria and consenting to follow-up, based on the intention to treat principle. However, most of the treatment effect would be expected to be seen among those patients assessed as being at high risk of psychological morbidity and receiving the one-to-one stress support sessions. Therefore, a further secondary analysis will use structural mean models with an instrumental variable of allocated treatment to estimate the efficacy (compliance adjusted causal effect) of the one-to-one stress support sessions among those patients consenting to psychological assessment and the one-to-one stress support sessions, assessed as being at high risk of psychological morbidity and receiving all three one-to-one stress support sessions.[51]

Analysis of the process evaluation will use a combination of qualitative and quantitative methods to assess and describe the variation in the delivery of the intervention across sites.[53] Analysis of the process evaluation will be conducted before the outcome evaluation to avoid any bias in the interpretation of the process data and to generate hypotheses that may be subsequently tested in statistical analyses of integrated process and outcome data. The structural mean models described above will be extended to incorporate additional potential mediator variables on the causal pathway between treatment allocation and treatment effect, e.g. nurse competence following training, adherence to the approach to promoting a therapeutic environment and adherence to therapy.[54]

A full cost-effectiveness analysis (CEA) will be undertaken to assess the relative cost-effectiveness of the proposed intervention (comprising the four elements of promoting a therapeutic environment to minimise stress in critical care, routine assessment of acute psychological stress and positive psychotic symptoms, one-to-one psychological therapy sessions for patients assessed as being at high risk of psychological morbidity, and the education package) versus usual care. Resource use and outcome data collected as part of the cluster-RCT will be used to report cost-effectiveness at six months and to project the lifetime cost-effectiveness of each strategy.

The cost analysis will take a health and personal health services perspective. Resource use data from the training courses, site visits, RCT dataset and six-month questionnaires will be combined with unit costs from the NHS Payment by Results database and from local Trust Finance Departments, to report the total costs per patient at six months for intervention versus usual care.[55,56] HRQoL data from the EQ-5D-5L questionnaires at baseline and six months will be combined with survival data using linear interpolation to report QALYs at six months.

The CEA will report the mean (95% confidence interval) incremental costs, QALYs and net monetary benefit at six months. The CEA will use multilevel linear regression models that allow for clustering[57] including a random effect of site and a fixed effect of period. The analysis will adjust for pre-specified baseline covariates at both patient and site level. Lifetime cost-effectiveness will be projected using a decision model informed by the best evidence on long-term survival and HRQoL after critical care.[58,59] The long-term modelling will extrapolate from the RCT data by fitting alternative parametric survival curves (e.g. Weibull, exponential, lognormal, log logistic and Gompertz) to the observed survival data. The chosen method of extrapolation for the base case will be the one judged most plausible.[60] In the base case, quality of life calculated at six months will be assumed to apply to each subsequent year of life, after allowing for decrements in quality of life according to advancing age. Predicted survival and HRQoL will be combined to report lifetime QALYs, and to project lifetime incremental costs, incremental QALYs, and incremental net benefits for the alternative strategies of care. Sensitivity analyses will test whether the results are robust to methodological assumptions (e.g. specification of the statistical model, extrapolation approach, alternative HRQoL assumptions, and learning curve effects).

Analyses will be conducted once all patients have been recruited and followed up at six months. Interim analysis of the six month psychological outcomes is not appropriate due to the long duration of follow-up relative to recruitment (at the end of recruitment, only 45% of intervention patients will have been followed up).

7 Monitoring and oversight

7.1 Study Management Group

As Chief investigator, Professor Kathy Rowan will take overall responsibility for study management and overseeing progress against timelines/milestones. Professor Rowan will work closely with Dr Wade, as Lead Clinical Investigator, and Dr Sheila Harvey, as CTU Manager and Senior Research Fellow.

All day-to-day management of the feasibility study and cluster-RCT and will be the responsibility of the Study Management Group (SMG which will include Dr Wade, Dr Harvey, Mr John Welch, Ms Deborah Smyth, Mr Paul Mouncey (POPPI Trial Manager) and the POPPI Research Assistants based at UCLH and ICNARC). The SMG will meet regularly to review progress of the study against timelines/milestones.

7.2 Expert Psychology Advisory Group

The Expert Psychology Advisory Group (EPAG) will oversee the POPPI Feasibility Study and comprise study investigators (Dr Wade, Professor Chris Brewin, Professor John Weinman, Miss Deborah Smyth, Mr John Welch and Dr Sheila Harvey), independent experts (Dr Vaughan Bell and Dr Dane Goodsman) and patient representatives (Nicole Als and Margaret Harvey). The EPAG will be chaired by an independent expert in CBT for psychosis, Professor Daniel Freeman. The EPAG will meet every two months to provide expert advice on refinement and piloting of the intervention and to monitor progress of the study against timelines/milestones.

7.3 Trial Steering Committee

The progress of the POPPI Study will be monitored and supervised by the POPPI Trial Steering Committee (TSC), which will be established in line with NIHR guidelines ensuring 75% independent members. The TSC will comprise Professor Kathy Rowan, Dr Dorothy Wade, Mr David Aaronovitch plus independent members (including patient representatives), including an independent chair. Representatives of the funder and the sponsor will be invited to observe at TSC meetings, which will take place at least annually during the study.

7.4 Data Monitoring & Ethics Committee

An independent Data Monitoring & Ethics Committee, chaired by an experienced trialist, will be set-up to monitor recruitment and retention, compliance with the intervention and patient safety throughout the cluster-RCT.

The DMEC will monitor recruitment and retention, compliance with the intervention and adverse events during the RCT. Any adverse events related to the intervention will be reported to the ICNARC CTU and monitored by the DMEC and, if there is evidence that the treatment is harmful, then the trial would be stopped.

8 Ethical Approval

8.1 Research ethics approval

This protocol, patient information sheets, informed consent forms and other study-related documents will be reviewed and approved by the Sponsor and Research Ethics Committee with respect to scientific content and compliance with applicable research regulations involving human subjects.

8.2 Protocol amendments

Any modification to the protocol and/or study-related documents which may impact on the conduct of the study, potential benefit to patients or patient safety will require a formal amendment to the

protocol. Such amendments will be agreed by the Sponsor, SMG and EPAG and approved by the Research Ethics Committee. Administrative changes of the protocol, which have no impact on the conduct of the study or patient safety, will be agreed by the Sponsor, SMG and EPAG. The Research Ethics Committee will be notified but formal approval will not be required.

9 Confidentiality

The POPPI Study will be managed according to the Medical Research Council's (MRC) Guidelines for Good Clinical Practice in Clinical Trials and Good Research Practice: Principles and Guidelines, which are based on the principles of the International Conference on Harmonisation (ICH) Good Clinical Practice (GCP). The ICNARC CTU has developed its own policies and procedures, based on these MRC guidelines, for the conduct of all its research activities.

Identifiable patient data, including full name, postal address, email address (if applicable), date of birth and NHS number will be required by the ICNARC CTU to successfully follow-up patients at two months post-recruitment during the feasibility study and at six months during the cluster-RCT. The ICNARC CTU will act to preserve patient confidentiality and will not disclose or reproduce any information by which patients could be identified. Any patient identifiable data leaving the hospital will be encrypted to ensure anonymity. All procedures for handling, processing, storing and destroying data are compliant with the Data Protection Act 1998.

10 Declaration of interests

None.

11 Sponsorship and Indemnity

ICNARC is the Sponsor for the POPPI Study and holds professional indemnity insurance (Markel International Insurance Co Ltd) to meet the potential legal liability of the Sponsor and employees for harm to participants arising from the design and management of the research.

Indemnity to meet the potential legal liability of investigators/collaborators for harm to participants arising from the conduct of the research is provided by the NHS indemnity scheme or through professional indemnity.

12 Dissemination policy

The progress and results of the POPPI Study will be widely and actively disseminated.

12.1 Study progress reports

To ensure all stakeholders are kept informed, progress of the POPPI Study will be disseminated to: participating units through newsletters, emails and telephone contact; to the wider critical care community through relevant professional newsletters, professional meetings and national and international conferences; and to consumers via the ICNARC website.

Six-month progress reports will be submitted to the NIHR HS&DR programme and annual progress reports to the Research Ethics Committee.

12.2 Study results

A formal report of the feasibility study will be prepared and submitted to the NIHR HS&DR programme at the end of the feasibility study, assessed against the predefined criteria detailed in Section 3, for continuation to the cluster-RCT.

The results of the POPPI Study (feasibility and cluster-RCT) will be presented at: regional critical care network meetings; national professional conferences (e.g. Intensive Care Society, British Association of Critical Care Nurses); the Annual Meeting of the Case Mix Programme; the UK Critical Care Research Forum; and national and international critical care and clinical and health psychology conferences/meetings.

A Study Report to the NIHR HS&DR programme will present a detailed description of the project and the results (Phase I and Phase II) along with recommendations for future policy, practice and research. Articles will be prepared for publication in peer-reviewed scientific journals, as well as in relevant professional journals.

Dissemination of the results of the POPPI Study to patients, their families and the lay public will be conducted in collaboration with the Intensive Care Unit Support Teams for Ex-Patients (ICUsteps) charity.

12.3 Knowledge mobilisation

If the psychological intervention delivered to patients assessed as being at high risk of psychological morbidity, in association with a unit-wide approach to promoting a therapeutic environment to minimise stress in critical care, is found to be clinically and cost-effective, the main knowledge outputs from the POPPI Study to be implemented across critical care in the NHS will be disseminated as described above.

It is anticipated that implementation of these outputs in the NHS will lead to improvements in surveillance and detection of the signs and symptoms of acute psychological stress and positive psychotic symptoms in the critical care unit. Both improved detection of patients who are at high risk of psychological morbidity and initiation of early treatment, e.g. whilst the patient is still in the critical care unit, will prevent longer term psychological morbidity (and, in turn, reduce the risk of other physical morbidities). This will reduce the burden on patients and their carers and to the NHS.

This will need an effective implementation strategy. Active and wide dissemination of the results of the POPPI Study will be an important part of this strategy. Although the evidence base for effective implementation is limited, a number of approaches have been identified, including: involving stakeholders; providing evidence in an integrated and graded way; taking account of the context and identifying the elements relevant to decision making, e.g. benefits, harms and costs; making recommendations as specific as possible; and using a multifaceted approach. This is what we propose to do. In addition, the results of the integrated process evaluation during Phase II, which will assess fidelity and quality of implementation and identify important contextual factors and better understanding of how the intervention works, will be used to inform implementation across the NHS. Long-term surveillance and monitoring of the impact of psychological assessment and a nurse-led psychological intervention for critically ill patients will be important to fully assess the effect size and generalisability as well as to identify any unanticipated consequences not detected during the evaluation.

References

1. Wade DM, Howell DC, Weinman JA et al. Investigating risk factors for psychological morbidity three months after intensive care: a prospective cohort study. *Crit Care* 2012; 16:R192.
2. Ely EW, Siegel MD, Inouye SK. Delirium in the intensive care unit: an under-recognized syndrome of organ dysfunction. *Semin Respir Crit Care Med* 2001; 22:115-26.
3. Wade D, Hardy R, Howell D, Mythen M. Identifying clinical and acute psychological risk factors for PTSD after critical care: a systematic review. Minerva Anestesiol 2013; 79: 944-963.
4. Jones C, Backman C, Capuzzo M et al. Precipitants of post-traumatic stress disorder following intensive care: a hypothesis generating study of diversity in care. *Intensive Care Med* 2007; 33:978-85.
5. Samuelson KA, Lundberg D, Fridlund B. Stressful memories and psychological distress in adult mechanically ventilated intensive care patients - a 2-month follow-up study. *Acta Anaesth Scand* 2007; 51:671-8.
6. Granja C, Gomes E, Amaro A et al. Understanding posttraumatic stress disorder-related symptoms after critical care: the early illness amnesia hypothesis. *Crit Care Med* 2008; 36:2801-9.
7. Myhren H, Toien K, Ekeberg O et al. Patients' memory and psychological distress after ICU stay compared with expectations of the relatives. *Intensive Care Med* 2009; 35:2078-86.
8. Davydow DS, Gifford JM, Desai SV et al. Posttraumatic stress disorder in general intensive care unit survivors: a systematic review. *Gen Hosp Psychiatry* 2008; 30:421-34.
9. Bienvenu OJ, Colantuoni E, Mendez-Tellez PA et al. Depressive symptoms and impaired physical function after acute lung injury: a 2-year longitudinal study. *Am J Respir Crit Care Med* 2012; 185:517-24.
10. Ballenger JC, Davidson JR, Lecrubier Y et al. Consensus statement on posttraumatic stress disorder from the International Consensus Group on Depression and Anxiety. *J Psychiatry* 2000; 61 Suppl 5:60-6.
11. Boscarino JA. A prospective study of PTSD and early-age heart disease mortality among Vietnam veterans: implications for surveillance and prevention. *Psychosom Med* 2008; 70:668-76.
12. Dedert EA, Calhoun PS, Watkins LL et al. Posttraumatic stress disorder, cardiovascular, and metabolic disease: a review of the evidence. *Ann Behav Med* 2010; 39:61-78.
13. Azoulay E, Pochard F, Kentish-Barnes N et al. Risk of post-traumatic stress symptoms in family members of intensive care unit patients. *Am J Respir Crit Care Med* 2005; 171:987-94.
14. Cuthbertson BH, Rattray J, Campbell MK et al. The PRaCTICaL study of nurse led, intensive care follow-up programmes for improving long term outcomes from critical illness: a pragmatic randomised controlled trial. *BMJ* 2009; 339:b3723.
15. Department of Health. *Comprehensive critical care: a review of adult critical care services*. London: Department of Health, 2000. Available from: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4006585
16. National Institute for Health and Clinical Excellence (NICE). *NICE clinical guideline 83 – Rehabilitation after acute illness*. London: NICE, 2009. Available from: http://guidance.nice.org.uk/CG83/
17. National Institute for Health and Clinical Excellence (NICE). *NICE clinical guideline 103 – Delirium: diagnosis, prevention and management*. London: NICE, 2010. Available from: http://guidance.nice.org.uk/CG103/

18. National Institute for Health and Clinical Excellence (NICE). *NICE clinical guideline 138 – Patient experience in adult NHS services: improving the experience of care for people using adult NHS services*. London: NICE, 2012. Available from: http://guidance.nice.org.uk/CG138/
19. Strom T, Martinussen T, Toft P. A protocol of no sedation for critically ill patients receiving mechanical ventilation: a randomised trial. *Lancet* 2010; 375:475-80.
20. Treggiari MM. Randomized trial of light versus deep sedation on mental health after critical illness. *Crit Care Med* 2009; 37:2526-34.
21. Hatch R, McKechnie S, Griffiths J. Psychological intervention to prevent ICU-related PTSD: who, when and for how long? Critical Care, 2011; 15:141.
22. Moon Z, Windgassen S, Morris L, Weinman J, Wade D. Non-pharmacologic interventions in the Intensive care unit to reduce short- or medium-term psychological stress: A systematic review (In prep)
23. Aitken LM, Rattray J, Hull A et al. The use of diaries in psychological recovery from intensive care *Crit Care* 2013; 17: 253
24. Ely EW, Inouye SK, Bernard GR et al. Delirium in mechanically ventilated patients: validity and reliability of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU). *JAMA* 2001; 286:2703-10.
25. Wade D, Howell D, Hankins M et al. Development of a new questionnaire to assess psychological stress in intensive care. *Am J Respir Crit Care Med* 2012; 185:A2292.
26. Jones C, Skirrow P, Griffiths RD et al. Rehabilitation after critical illness: a randomized, controlled trial. *Crit Care Med* 2003; 31:2456-61.
27. Peris A, Bonizzoli M, Iozzelli D et al. Early intra-intensive care unit psychological intervention promotes recovery from post traumatic stress disorders, anxiety and depression symptoms in critically ill patients. *Crit Care* 2011; 15:R41.
28. Tyrer P, Cooper S, Salkovskis P et al. Clinical and cost-effectiveness of cognitive behaviour for health anxiety in medical patients: a multicentre randomised trial. *Lancet*; 383: 219-225.
29. Gould RA, Mueser KT, Bolton E et al. Cognitive therapy for psychosis in schizophrenia: an effect size analysis. *Schizophr Res* 2001; 48:335-42.
30. Rector NA, Beck AT. Cognitive behavioural therapy for schizophrenia: an empirical review. *J Nerv Ment Dis* 2001; 189:278-87.
31. Pfammatter M, Junghan UM, Brenner HD. Efficacy of psychological therapy in schizophrenia: conclusions from meta-analyses. *Schizophr Bull* 2006; 32 Suppl 1:S64-80.
32. Wykes T, Steel C, Everitt B, Tarrier N. Cognitive behavior therapy for schizophrenia: effect sizes, clinical models, and methodological rigor. *Schizophr Bull* 2008; 34:523-37.
33. Zimmermann G, Favrod J, Trieu VH, Pomini V. The effect of cognitive behavioural treatment on the positive symptoms of schizophrenia spectrum disorders: a meta-analysis. *Schizophr Res* 2005; 77:1-9.
34. Erickson DH. Cognitive-behaviour therapy for medication-resistant positive symptoms in early psychosis: a case series. *Early Interv Psychiatry* 2010; 4:251-6.
35. Bernard M, Jackson C, Jones C. Written emotional disclosure following first-episode psychosis: Effects on symptoms of post-traumatic stress disorder. *Br J Clin Psych* 2006; 45:403-15.
36. Freeman D. Improving cognitive treatments for delusions. *Schizophr Res* 2011; 132:135-9.
37. Turkington D, Kingdon D, Turner T. Effectiveness of a brief cognitive-behavioural therapy intervention in the treatment of schizophrenia. *Br J Psychiatry* 2002; 180:523-7.
38. McCann E, Bowers L. Training in cognitive behavioural interventions on acute psychiatric inpatient wards. *J Psychiatr Ment Health* 2005; 12:215-22.
39. Turkington D, Kingdon D, Rathod S et al. Outcomes of an effectiveness trial of cognitive-behavioural intervention by mental health nurses in schizophrenia. *Br J Psychiatry* 2006; 189:36-40.

40. Mueser KT, Rosenberg SD, Xie H et al. A randomized controlled trial of cognitive-behavioural treatment for posttraumatic stress disorder in severe mental illness. *J Consult Clin Psychol* 2008; 76:259-71.
41. Jackson C, Trower P, Reid I et al. Improving psychological adjustment following a first episode of psychosis: A randomised controlled trial of cognitive therapy to reduce post psychotic trauma symptoms. *Behaviour Res Therapy* 2009; 47:454-62.
42. National Institute for Health and Care Excellence. Post-traumatic stress disorder (PTSD) Evidence Update 49, December 2013. London: NICE.
43. Sessler CN, Gosnell M, Grap MJ et al. The Richmond Agitation-Sedation Scale: validity and reliability in adult intensive care patients. *Am J Respir Crit Care Med* 2002; 166:1338-44.
44. Ely EW, Inouye SK, Bernard GR et al. Delirium in mechanically ventilated patients: validity and reliability of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU). *JAMA* 2001; 286:2703-10.
45. Spielberger CD, Gorsuch RL, Lushene R et al. *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press, 1983.
46. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. *Med Care* 2003; 41:1284-92.
47. Foa EB, Cashman L, Jaycox L, Perry K. The validation of a self-report measure of posttraumatic stress disorder: the Posttraumatic Diagnostic Scale. *Psychol Assess* 1997; 9:445-51.
48. Irwin M, Artin KH, Oxman MN. Screening for Depression in the Older Adult: Criterion Validity of the 10-Item Center for Epidemiological Studies Depression Scale (CES-D). *Arch Intern Med* 1999; 159:1701-4.
49. Hussey MA, Hughes JP. Design and analysis of stepped wedge cluster randomized trials. *Contemp Clin Trials* 2007; 28:182-91.
50. Hayes RJ, Bennett S. Simple sample size calculation for cluster-randomized trials. *Int J Epidemiol* 1999; 28:319-26.
51. Brewin CR, Fuchkan N, Huntley Z et al. Outreach and screening following the 2005 London bombings: usage and outcomes. *Psychol Med* 2010; 40:2049-57.
52. Maracy M, Dunn G. Estimating dose-response effects in psychological treatment trials: the role of instrumental variables. *Stat Methods Med Res* 2011; 20:191-215.
53. Oakley A, Strange V, Bonell C et al. Process evaluation in randomised controlled trials of complex interventions. *BMJ* 2006; 332:413-6.
54. Emsley R, Dunn G, White IR. Mediation and moderation of treatment effects in randomised controlled trials of complex interventions. *Stat Methods Med Res* 2010; 19:237-70.
55. Curtis L. *Unit costs of health & social care 2011*. Canterbury, UK: Personal Service Research Unit, University of Kent, 2011.
56. Department of Health. *NHS reference costs 2010-11*. London: Department of Health, 2011. Available from: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_131140
57. Grieve R, Nixon R, Thompson SG. Bayesian hierarchical models for cost-effectiveness analyses that use data from cluster randomized trials. *Med Decis Making* 2010; 30:163-75.
58. Wright JC, Plenderleith L, Ridley SA. Long-term survival following intensive care: subgroup analysis and comparison with the general population. *Anaesthesia* 2003; 58:637-42.
59. Green C, Dinnes J, Takeda AL, Cuthbertson BH. Evaluation of the cost-effectiveness of drotrecogin alfa (activated) for the treatment of severe sepsis in the United Kingdom. *Int J Technol Assess Health Care* 2006; 22:90-100.
60. Latimer N. Survival analysis for economic evaluations alongside clinical trials – extrapolation with patient-level data. NICE DSU technical support documents: No. 14. Sheffield: University of Sheffield, 2011.

Appendix A: Protocol version history

Protocol:		**Amendments:**		
Version no.	**Date**	**Amendment no.**	**Protocol Section (no./title)**	**Summary of main changes from previous version.**
v1.0	21/02/2014	N/A	N/A	N/A

Appendix B: Intensive Care Psychological Assessment Tool (IPAT)

I would like to ask you some questions about your stay in intensive care, and how you've been feeling in yourself. These feelings can be an important part of your recovery. To answer, please circle the answer that is closest to how you feel, or answer in any way you are able to, e.g. by speaking or pointing.

	Since you've been in intensive care:	**A**	**B**	**C**
1	Has it been hard to communicate?	No	Yes, a bit	Yes, a lot
2	Has it been difficult to sleep?	No	Yes, a bit	Yes, a lot
3	Have you been feeling tense?	No	Yes, a bit	Yes, a lot
4	Have you been feeling sad?	No	Yes, a bit	Yes, a lot
5	Have you been feeling panicky?	No	Yes, a bit	Yes, a lot
6	Have you been feeling hopeless?	No	Yes, a bit	Yes, a lot
7	Have you felt disorientated (not quite sure where you are)?	No	Yes, a bit	Yes, a lot
8	Have you had hallucinations (seen or heard things you suspect were not really there)?	No	Yes, a bit	Yes, a lot
9	Have you felt that people were *deliberately* trying to harm or hurt you?	No	Yes, a bit	Yes, a lot
10	Do upsetting memories of intensive care keep coming into your mind?	No	Yes, a bit	Yes, a lot

Do you have any comments to add in relation to any of the answers?

_____

_____

SCORING

Any answer in column A = 0 points

Any answer in column B = 1 point

Any answer in column C = 2 points

Sum up the scores of each item for a total I-PAT score out of 20

Cut-off point ≥8 - indicates patient at risk

Appendix C: Patient stress assessment questionnaire - Emotions (*STAI*)

Please read the words below and after each one, circle the answer that is closest to how you have been feeling in the past few days.

During the past few days I have been feeling:

1. **Calm**	Not at all	Somewhat	Moderately	Very much
2. **Tense**	Not at all	Somewhat	Moderately	Very much
3. **Upset**	Not at all	Somewhat	Moderately	Very much
4. **Relaxed**	Not at all	Somewhat	Moderately	Very much
5. **Content**	Not at all	Somewhat	Moderately	Very much
6. **Worried**	Not at all	Somewhat	Moderately	Very much

Appendix D: Patient stress assessment questionnaire – Mood (*PHQ-2*)

Please read the statements below and after each one, circle the answer that is closest to how you have been feeling in the past few days

How often have you been bothered by any of the following problems **in the past few days?**

1. **Feeling down, depressed, or hopeless**	Not at all	Some of the time	Most of the time	Nearly all the time
2. **Little interest or pleasure in doing things**	Not at all	Some of the time	Most of the time	Nearly all the time

Appendix E: POPPI nurses - confidence questionnaire

To answer each question please circle a number between 1 and 5 where 1 = not at all confident, and 5 = completely confident.

How confident do you feel about:

1. Encouraging your colleagues to create a calm, non-threatening environment in the ICU?

Not confident at all	**1**	**2**	**3**	**4**	**5**	**Completely confident**

2. Encouraging your colleagues to use measurement tools to detect delirium or distress in the ICU?

Not confident at all	**1**	**2**	**3**	**4**	**5**	**Completely confident**

3. Establishing rapport and a supportive relationship with patients, so they feel they can openly talk about their difficulties?

Not confident at all	**1**	**2**	**3**	**4**	**5**	**Completely confident**

4. Discussing disturbing psychological experiences or symptoms with patients (e.g., hallucinations, delusions or panic)?

Not confident at all	**1**	**2**	**3**	**4**	**5**	**Completely confident**

5. Educating patients about common psychological responses to critical care?

Not confident at all	**1**	**2**	**3**	**4**	**5**	**Completely confident**

6. Explaining to patients what causes the common psychological responses to critical care?

Not confident at all	**1**	**2**	**3**	**4**	**5**	**Completely confident**

7. Talking to hallucinating/delusional patients in ICU in a helpful way?

Not confident at all	**1**	**2**	**3**	**4**	**5**	**Completely confident**

8. Helping patients to cope with acute stress in ICU?

Not confident at all	**1**	**2**	**3**	**4**	**5**	**Completely confident**

9. Preparing patients to deal with their concerns about leaving the ICU?

Not confident at all	**1**	**2**	**3**	**4**	**5**	**Completely confident**

Appendix F: POPPI nurse training - course feedback questionnaire

For every item please give a score that most closely represents how you feel about the training course.

1. The training course was:

Stimulating	**5**	**4**	**3**	**2**	**1**	**Boring**
Useful in my role as a POPPI nurse	**5**	**4**	**3**	**2**	**1**	**Useless**
Relevant to my work as POPPI nurse	**5**	**4**	**3**	**2**	**1**	**Irrelevant**
Well conducted	**5**	**4**	**3**	**2**	**1**	**Poorly conducted**

2. How motivated are you to use what you have learned in the course in your daily work in intensive care?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

3. What did you like best about the course?

_____

_____

4. What did you like least about the course?

_____

_____

5. Do you have any suggestions about how the course could be improved?

_____

_____

Appendix G: POPPI nurse training – key learning objectives questionnaire

Please answer the following questions about what you have learned during the training course:

To what extent have you learned about:

1. Stressful experiences and psychosis-like symptoms (hallucinations and delusions) in ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

2. Promoting a calm, non-threatening, friendly environment to minimise stress in ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

3. Assessing acute psychological stress and psychosis-like symptoms in ICU patients (e.g., using I-PAT)?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

4. Introducing a stress support session and establishing rapport with ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

5. Increasing the patient's understanding of common psychological responses in ICU (normalising)?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

6. Encouraging ICU patients to open up about their worries and fears?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

7. A range of techniques for managing psychological distress in ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

8. Encouraging coping (using relaxation, mindfulness, or music) in ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

9. Using the ABC model of stress?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

10. Introducing ICU patients to new thinking styles to help them re-evaluate stressful interpretations of their experiences?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

11. The different approaches needed for dealing with ICU patients' realistic and unrealistic fears?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

12. Using the 'testing your fears' technique to enable ICU patients to reduce the stress associated with any fears?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

13. Developing a collaborative 'staying calm plan' with the ICU patient?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

14. Encouraging the ICU patient to use the resources provided on the DVD?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

15. Managing the end of each stress support session?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

Appendix H: E-learning course – feedback questionnaire

For every item please give a score that most closely represents how you feel about the training course.

1. The e-learning package was:

Stimulating	**5**	**4**	**3**	**2**	**1**	**Boring**
Useful in my role	**5**	**4**	**3**	**2**	**1**	**Useless**
Relevant to my work	**5**	**4**	**3**	**2**	**1**	**Irrelevant**
Well conducted	**5**	**4**	**3**	**2**	**1**	**Poorly conducted**

2. Are the videos showing good communication with patients likely to be useful in your daily work in intensive care?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

3. Do you think you will use the information provided in the course in your daily work in intensive care?

2.

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

4. Did this course give you new ideas about how to care for distressed patients in intensive care?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

5. Did this course give you new ideas about how to care for delirious patients in ICU?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

6. What did you like best about the course?

The quizzes and tests	**The patient interviews**
The videos	**The information bullet points**

7. What did you like least about the course?

The quizzes and tests	**The patient interviews**
The videos	**The information bullet points**

Appendix I: E-learning course – key learning objectives questionnaire

Please answer the following questions about what you have learned during the training course

To what extent have you learned about:

1. The prevalence of psychological distress in ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

2. Patients' experiences of delusions and hallucinations in ICU?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

3. Causes of distress in ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

4. Causes of delusions and hallucinations in ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

5. The prevalence of poor psychological outcomes post-ICU, such as depression, and PTSD?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

6. Using measurement tools to detect distress, delirium and hallucinations in ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

7. Showing understanding and sensitivity to ICU patients' experiences and feelings?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

8. Using verbal communication to avoid triggering distress or psychosis-like symptoms in ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

9. Using non-verbal communication to avoid triggering distress or psychosis-like symptoms in ICU patients?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

10. Speaking to delirious/hallucinating/delusional patients in ICU in a non-confrontational way ?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

11. Responding to violently agitated patients in ICU in a calming way?

A lot	**5**	**4**	**3**	**2**	**1**	**Not at all**

Appendix J: Patient satisfaction - acceptability of stress support sessions questionnaire

We would like to know your opinions about the stress support sessions you received from your POPPI nurse. For every item (1-10) please circle the answer in the box below it, that is closest to how you feel.

1. The sessions have helped me to express my worries and fears about my experience in intensive care.

Strongly agree	**Agree**	**not sure**	**Disagree**	**Strongly disagree**

2. I felt the nurse understood me and was sensitive to my feelings

Strongly agree	**Agree**	**Not sure**	**Disagree**	**Strongly disagree**

3. The nurse told me about normal psychological experiences in intensive care, in words that I could understand

Strongly agree	**Agree**	**Not sure**	**Disagree**	**Strongly disagree**

4. The sessions allowed me to think of my experience in intensive care in a different way, which made me feel less upset

Strongly agree	**Agree**	**Not sure**	**Disagree**	**Strongly disagree**

5. After talking to the nurse, I felt less stressed about my experience in intensive care

Strongly agree	**Agree**	**Not sure**	**Disagree**	**Strongly disagree**

6. The sessions gave me useful ideas about coping with any worries and fears after leaving intensive care

Strongly agree	**Agree**	**Not sure**	**Disagree**	**Strongly disagree**

7. How did you feel about the number of stress support sessions you had?

Definitely too many	**Maybe too many**	**just right**	**Maybe too few**	**Definitely too few**

8. How did you feel about the length of the sessions?

Much too short	**A bit too short**	**just right**	**A bit too long**	**Much too long**

9. I found the music/relaxation exercises provided on the tablet easy to use

Strongly agree	**Agree**	**Not sure**	**Disagree**	**Strongly disagree**

10. Overall, I think this treatment was…

Very useful	**Useful**	**Somewhat useful**	**Not very useful**	**Not at all useful**

Appendix K: Patient satisfaction - acceptability of DVD and booklet package questionnaire

1. Have you used the relaxation DVD you were given in hospital?

Not at all	Somewhat	A lot

2. Did you find any parts of the DVD helpful?

- Relaxation tape **yes/no**
- Body scan tape **yes/no**
- Meditation tape **yes/no**
- Calm music tape **yes/no**
- Breathing exercises for panic **yes/no**
- Patient recovery stories **yes/no**

3. Have you read the booklet?

No	Yes, some of it	Yes, all of it

4. Did you find any parts of the booklet useful?

- Common psychological reactions after Intensive care **yes/no**
- Self-care (sleep, diet, exercise) **yes/no**
- Dealing with panic and anxiety **yes/no**
- Dealing with flashbacks and nightmares **yes/no**
- Positive ways to improve your mood **yes/no**
- Sources of psychological support **yes/no**

Appendix L: Patient emotional reactions questionnaire (*PDS*)

These questions are about reactions people may have after intensive care.

Please circle how often a problem has bothered you **in the past month**.

1. Have you had upsetting thoughts or images about intensive care that came into your head when you didn't want them to?

Not at all	**Once per week or less**	**2 – 4 times per week**	**5 or more times per week**

2. Have you had bad dreams or nightmares about intensive care?

Not at all	**Once per week or less**	**2 – 4 times per week**	**5 or more times per week**

3. Have you relived your time in intensive care, acting or feeling as if it were happening again?

Not at all	**Once per week or less**	**2 – 4 times per week**	**5 or more times per week**

4. Have you felt emotionally upset when you were reminded of your time in intensive care (e.g. feeling scared, angry, sad, guilty)?

Not at all	**Once per week or less**	**2 – 4 times per week**	**5 or more times per week**

5. Have you had physical reactions when you remember your time in intensive care (e.g. breaking into a sweat, heart beating fast?)

Not at all	**Once per week or less**	**2 – 4 times per week**	**5 or more times per week**

6. Have you tried not to think about, talk about, or have feelings about your time in intensive care?

Not at all	**Once per week or less**	**2 – 4 times per week**	**5 or more times per week**

7. Have you tried to avoid activities, people or places that remind you of your time in intensive care?

Not at all	**Once per week or less**	**2 – 4 times per week**	**5 or more times per week**

8. Have you found that you were not able to remember an important part of your time in intensive care?

Not at all	**Once per week or less**	**2 – 4 times per week**	**5 or more times per week**

9. Have you had much less interest in important activities?

Not at all	Once per week or less	2 – 4 times per week	5 or more times per week

10. Have you felt distant or cut off from people around you?

Not at all	Once per week or less	2 – 4 times per week	5 or more times per week

11. Have you felt emotionally numb (unable to cry or have loving feelings?)

Not at all	Once per week or less	2 – 4 times per week	5 or more times per week

12. Have you felt as if your future plans or hopes would not come true?

Not at all	Once per week or less	2 – 4 times per week	5 or more times per week

13. Have you had trouble falling or staying asleep?

Not at all	Once per week or less	2 – 4 times per week	5 or more times per week

14. Have you felt irritable or had fits of anger?

Not at all	Once per week or less	2 – 4 times per week	5 or more times per week

15. Have you had trouble concentrating (e.g. forgetting what you read, losing track of a story on television)?

Not at all	Once per week or less	2 – 4 times per week	5 or more times per week

16. Have you been too alert (for example, checking to see who is around you, not being comfortable with your back to a door)?

Not at all	Once per week or less	2 – 4 times per week	5 or more times per week

17. Have you been jumpy or easily startled (for example, when someone walks up behind you)?

Not at all	Once per week or less	2 – 4 times per week	5 or more times per week

The next two questions are about the timing of emotional reactions people may have after intensive care.

Please circle the answer that is closest to your experience.

18. If you reported any problems in your answers to questions 1-17, how long have you experienced these problems?

Not at all	Less than 1 month	1 to 3 months	More than 3 months

19. If you reported any problems in your answers to questions 1-17, how long after leaving Intensive care did these problems begin?

I have not had these type of problems	Less than 1 month	1 to 3 months	More than 3 months

Appendix M: Patient mood questionnaire (*CES-D-10*)

How often you have felt any of the following during **the past week**?
Please circle one answer for each item.

1. I was bothered by things that usually don't bother me

Less than 1 day	1- 2 days	3-4 days	5-7 days

2. I had trouble keeping my mind on what I was doing

Less than 1 day	1- 2 days	3-4 days	5-7 days

3. I felt depressed

Less than 1 day	1- 2 days	3-4 days	5-7 days

4. I felt that everything I did was an effort

Less than 1 day	1- 2 days	3-4 days	5-7 days

5. I felt hopeful about the future

Less than 1 day	1- 2 days	3-4 days	5-7 days

6. I felt fearful

Less than 1 day	1- 2 days	3-4 days	5-7 days

7. My sleep was restless

Less than 1 day	1- 2 days	3-4 days	5-7 days

8. I was happy

Less than 1 day	1- 2 days	3-4 days	5-7 days

9. I felt lonely

Less than 1 day	1- 2 days	3-4 days	5-7 days

10. I could not "get going"

Less than 1 day	1- 2 days	3-4 days	5-7 days

Appendix N: Patient health questionnaire (EuroQoL - EQ-5D-5L)

Under each heading, please tick the ONE box that best describes your health TODAY

MOBILITY

I have no problems in walking about ❑

I have slight problems in walking about ❑

I have moderate problems in walking about ❑

I have severe problems in walking about ❑

I am unable to walk about ❑

SELF-CARE

I have no problems washing or dressing myself ❑

I have slight problems washing or dressing myself ❑

I have moderate problems washing or dressing myself ❑

I have severe problems washing or dressing myself ❑

I am unable to wash or dress myself ❑

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

I have no problems doing my usual activities ❑

I have slight problems doing my usual activities ❑

I have moderate problems doing my usual activities ❑

I have severe problems doing my usual activities ❑

I am unable to do my usual activities ❑

PAIN / DISCOMFORT

I have no pain or discomfort ❑

I have slight pain or discomfort ❑

I have moderate pain or discomfort ❑

I have severe pain or discomfort ❑

I have extreme pain or discomfort ❑

ANXIETY / DEPRESSION

I am not anxious or depressed ❑

I am slightly anxious or depressed ❑

I am moderately anxious or depressed ❑

I am severely anxious or depressed ❑

I am extremely anxious or depressed ❑

We would like to know how good or bad your health is **TODAY**.

This scale is numbered from 0 to 100.

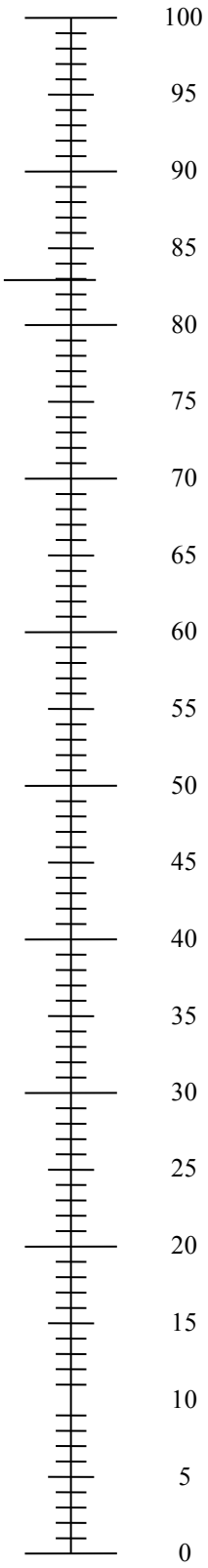
100 means the **best** health you can imagine.
0 means the **worst** health you can imagine.

Mark an **X** on the scale to indicate how your health is **TODAY**.

Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY =

The best health you can imagine



The worst health you can imagine

Appendix O: Stress support sessions - competency ratings scale

Each session is rated separately. Each item scores on a 3-point Likert scale: 0 (poor), 1 (fair), 2 (good). Items are summed to give a total competency score for each session.

Rater _____ **Trainee** _____

For each item rate the trainee's performance	**Poor (0)**	**Fair (1)**	**Good (2)**
SESSION I			
1. Providing a proper introduction to the POPPI treatment (aims, duration)			
2. Adopting an empathic, positive and supportive therapeutic style			
3. Providing a clear description and explanation of normal psychological responses to critical care			
4. Normalising common psychological responses to critical care			
5. Helping the patient to open up about worries and fears			
6. Guiding the patient to use the relaxation package			
Total competency score (session I)			
SESSION II			
1. Adopting an empathic, positive and supportive therapeutic style			
2. Encouraging the patient to discuss his/her disturbing psychological experiences			
3. Normalising the patient's personal disturbing psychological experiences (including hallucinations and delusions, if relevant)			
4. Helping the patient re-evaluate stressful interpretations of their experiences			
5. Helping the patient to test his/her fears			
6. Encouraging the continued use of relaxation programme/adaptive coping strategies			
Total competency score (session II)			

SESSION III			
1. Adopting an empathic, positive and supportive therapeutic style			
2. Reviewing key messages of previous sessions (normalising, rethinking, “test your fears” method)			
3. Carrying out safe place/guided imagery			
4. Summarising the work done together with the patient, putting their experience in context			
5. Creating a “staying calm plan” together in an appropriate way			
6. Concluding the final session (including follow-up arrangements) in an appropriate way			
Total competency score (session III)			

F**urther Comments:**

_____

_____

_____

Signed: _____ Date: _____

Appendix P: Stress support sessions - fidelity ratings scale

Each session is rated separately. Each item scores on a 3-point Likert scale, from 0 to 2. Items are summed to give a total fidelity score for each session.

Rater _____ **Trainee**_____

Please rate to what extent the nurse carried out the elements below during each session:	**Did not carry it out (0)**	**Partly carried it out (1)**	**Fully carried it out (2)**
SESSION I			
1. Provided an introduction to the POPPI treatment (aims, duration)			
2. Adopted an empathic, positive and supportive therapeutic style			
3. Provided a clear description of normal psychological responses to critical care			
4. Provided a clear explanation of normal psychological response to critical care			
5. Helped the patient to open up about worries and fears			
6. Guided the patient to use the relaxation package			
Total fidelity score (session I)			
SESSION II			
1. Adopted an empathic, positive and supportive therapeutic style			
2. Created a 'safe space' for the patient's self-disclosure of thoughts and feelings			
3. Encouraged the patient to discuss his/her disturbing psychological experiences			
4. Normalised the patient's personal disturbing psychological experiences (including hallucinations and delusions, if relevant)			
5. Helped the patient re-evaluate stressful interpretations of their experiences			

6. Helped the patient to test his/her fears			
7. Encouraged the continued use of relaxation programme/adaptive coping strategies			
Total fidelity score (session II)			
SESSION III			
1. Adopted an empathic, positive and supportive therapeutic style			
2. Reviewed key messages of previous sessions (normalising, rethinking, "test your fears" method)			
3. Carried out safe place/guided imagery			
4. Summarised the work done together with the patient, putting their experience in context			
5. Created a "staying calm plan" together in an appropriate way			
6. Concluded the final session (including follow-up arrangements)			
Total fidelity score (session III)			

Further Comments:

_____

_____

_____

Signed: _____ **Date:** _____

Appendix Q: Health services questionnaire

HEALTH SERVICES QUESTIONNAIRE

We would be grateful if you would complete this questionnaire. It will help us understand the care you needed after leaving the hospital.

Please answer multiple choice questions by putting a ✓ in ONE BOX for each question.

The questions refer to ALL health services that you have used since leaving the hospital on XX/XX/XXXX

Part 1. Hospital Stay

A Since you left hospital on **XX/XX/XXXX** have you stayed overnight in hospital for any reason?

☐ No - Go to Part 2

☐ Yes - Please give details about the number of stays below

B For EACH TIME you stayed in hospital please answer the following

	Number of nights		1-3 nights	4-10 nights	11 or more nights	Did you spend any part of your stay in critical care?
1st Stay	_____	or…	☐	☐	☐	☐
2nd Stay	_____	or…	☐	☐	☐	☐
3rd Stay	_____	or…	☐	☐	☐	☐
4th Stay*	_____	or…	☐	☐	☐	☐

**If you have stayed in hospital overnight more than 4 times, please could you provide information on these further hospital stays in Part 6 of the questionnaire.*

Part 2. Hospital outpatient visits

Outpatient visits are when a patient comes to the hospital to see a specialist (e.g. consultant) but does not stay overnight.

A Since you left the hospital on **XX/XX/XXXX** have you visited hospital outpatients about ANY ASPECT of your health?

☐ No - Go to Part 3

☐ Yes - Please give details about the number of outpatients visit(s) below

B

Number of visits		or…	1-3 visits	4-10 visits	11 or more visits
	_____		☐	☐	☐

Part 3. Visits to health care providers

A Since you left the hospital on **XX/XX/XXXX** have you visited any of the health care providers listed below?

☐ No - Go to Part 4

☐ Yes - Please give details about your visits below

B For EACH PROVIDER please answer the following

Did you visit this provider?		Number of visits		1-3 visits	4-10 visits	11 or more visits
GP	☐	_____	or…	☐	☐	☐
Nurse at your GP clinic	☐	_____	or…	☐	☐	☐
Nurse at hospital or elsewhere	☐	_____	or…	☐	☐	☐
Health visitor	☐	_____	or…	☐	☐	☐

Part 4. Visits to your home by health care providers

A Since you left the hospital on **XX/XX/XXXX** have you had home visits from any the following health care providers about ANY ASPECT of your health?

☐ No - Go to Part 5

☐ Yes - Please give details about your visits below

B For EACH HOME VIST please answer the following

Were you visited at home by this provider?		Number of visits		1-3 visits	4-10 visits	11 or more visits
GP	☐	____	or…	☐	☐	☐
Nurse from your GP clinic	☐	____	or…	☐	☐	☐
Occupational Therapist	☐	____	or…	☐	☐	☐
Health visitor or District nurse	☐	____	or…	☐	☐	☐

Part 5. Visits to other service providers

A Since you left the hospital on **XX/XX/XXXX** please indicate whether you have had contact (either visits to the provider or home visits) with any of the following service providers about any aspect of your health?

☐ No - Go to Part 6

☐ Yes - Please give details below

B For EACH PROVIDER please answer the following

Have you had contact with any of these providers?		Number of visits		1-3 visits	4-10 visits	11 or more visits
Occupational therapist	☐	____	or…	☐	☐	☐
Psychologist	☐	____	or…	☐	☐	☐
Speech and Language therapist	☐	____	or…	☐	☐	☐
Physiotherapist	☐	____	or…	☐	☐	☐
Dietician	☐	____	or…	☐	☐	☐

Part 6. Other services not listed so far

A Since you left the hospital on **XX/XX/XXXX** have you had further hospital stays or used
ANY OTHER health care services for any aspect of your health that you haven't included above?

☐ No - Go to Part 7

☐ Yes - Please give details below

B For EACH PROVIDER please answer the following

Type of service provider	Number of visits	Reason

Part 7. Comments

Your views are important to us. Please feel free to provide any other comments you have in the box below.