EDINBURGH CRITICAL CARE RESEARCH GROUP

Nutritional challenges in the recovery phase of critical illness

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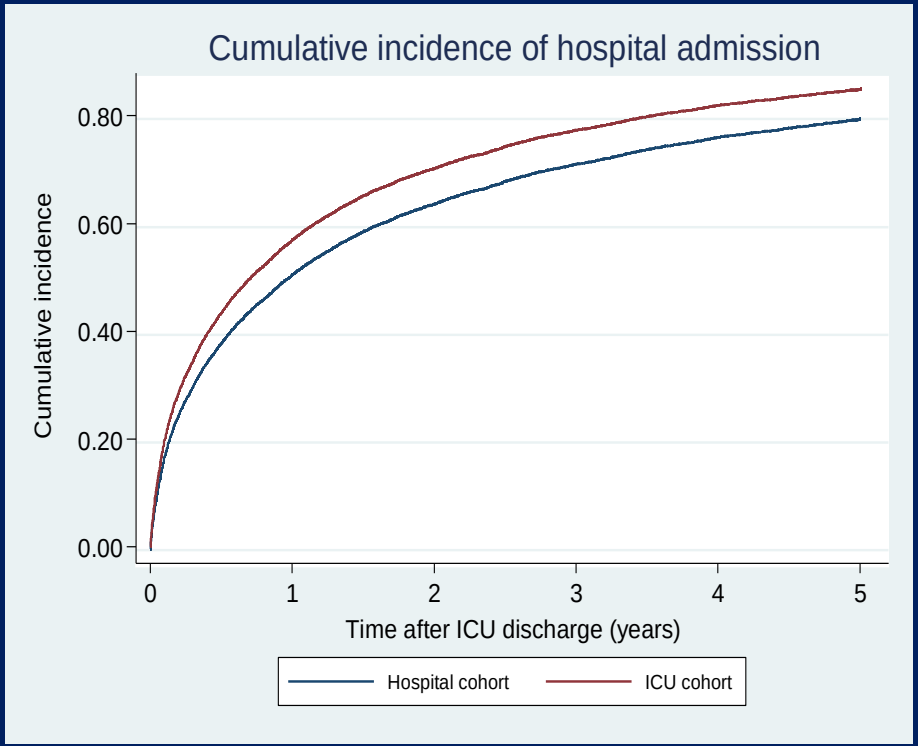
The Post-Intensive Care Syndrome

Crit Care Med, 2014. 42: 2518-26.

- Decline in physical, psychological, or cognitive status following a critical illness
- Characterised by:
  - **Physical:** fatigue, muscle weakness, joint stiffness, pain, mobility issues
  - **Psychological:** anxiety, depression, PTSD
  - **Cognitive:** Acute cognitive decline
- Reduced HRQoL and ADLs



Unplanned hospital readmission among survivors of critical illness

Lone et al Am J Respir Crit Care Med 2016

≈25% of all ICU survivors readmitted as an emergency within 3 months

≈55% of all ICU survivors readmitted as an emergency within 12 months

Original Communication

Malnutrition, Critical Illness Survivors, and Postdischarge Outcomes: A Cohort Study

Kris M. Mogensen, MS, RD, LDN, CNSC[1]; Clare M. Horkan, MB, BCh[2]; Steven W. Purtle, MD[3]; Takuhiro Moromizato, MD, SM[4]; James D. Rawn, MD[5]; Malcolm K. Robinson, MD[5]; and Kenneth B. Christopher, MD, SM[6]

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Volume XX Number X
Month 201X 1–9

DOI: 10.1177/0148607117709766
journals.sagepub.com/home/pen
SAGE

Malnutrition is a significant predictor of unplanned 30-day hospital readmission

What do we know about nutritional issues?

- High prevalence of malnutrition on admission to ICU (Giner et al 1996 Nutrition 12 23-9)
- Nutritional status deteriorates in and after ICU (Nematy et al 2005 Criti Care 10 R10)
- During severe illness and immobility, skeletal muscle declines by 2% to 4% per day (Helliwell et al 1998 Neuropathol Appl Neurobiol 24 507-17)
- Rebuilding lost muscle requires the stimuli of exercise and nutrition (Rennie 2007 Biochem Soc Trans 35 1302-1305)

Research

Open Access

Quantification of lean and fat tissue repletion following critical illness: a case report

Clare L Reid[1], Peter R Murgatroyd[2], Antony Wright[3] and David K Menon[1]

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Critical Care 2008, **12**:R79 (doi:10.1186/cc6929)

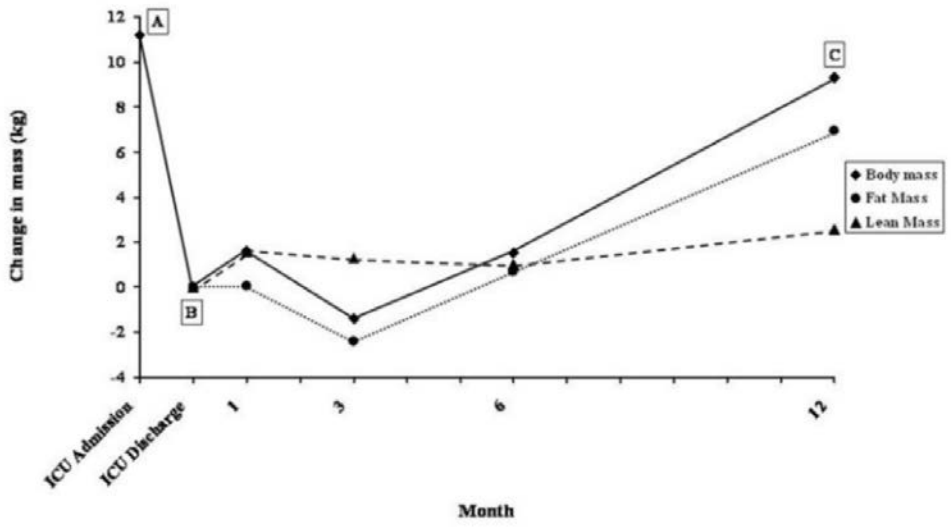


Figure 2
Changes in body mass and composition. Change in mass relative to the time of intensive care unit (ICU) discharge. A, pre-illness weight, 69 kg; B, weight at discharge from the intensive care unit, 58.3 kg; C, weight at 12 months after ICU discharge, 67.1 kg.

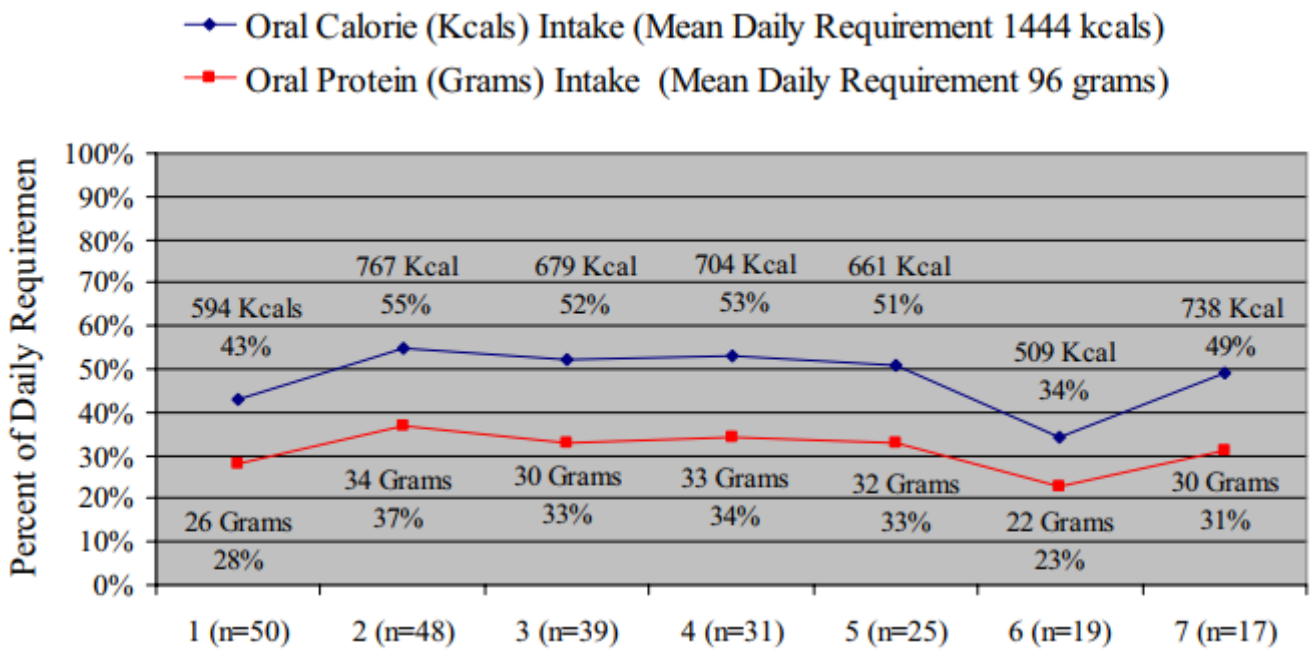
American Dietetic Association

RESEARCH

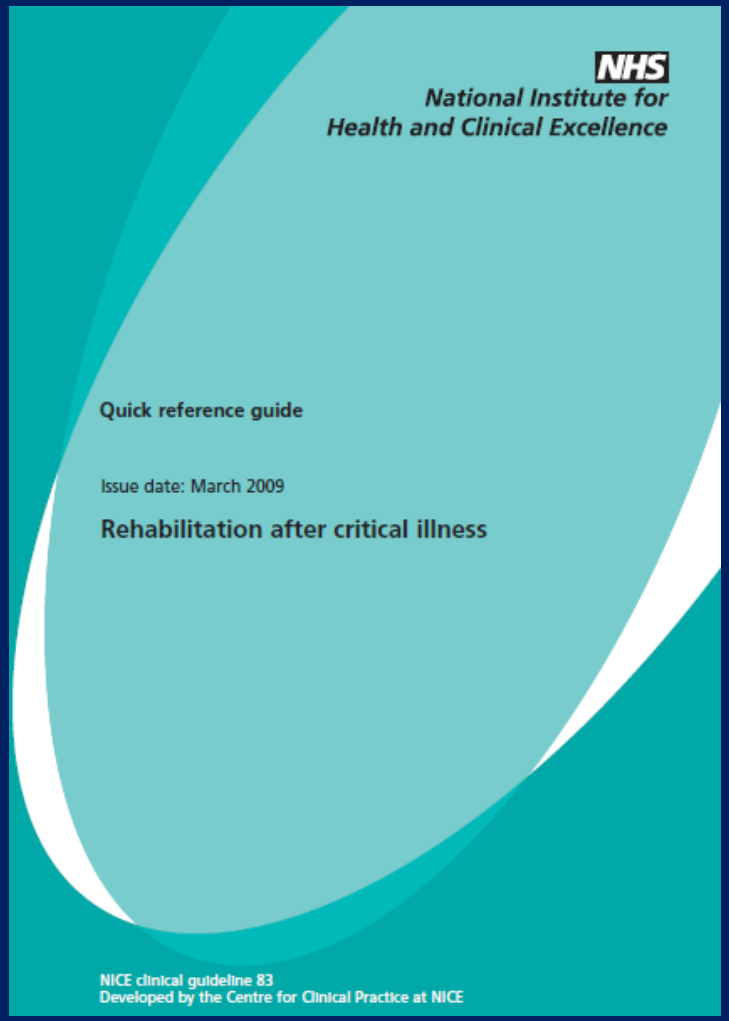
Research and Practice Innovations

Adequacy of Oral Intake in Critically Ill Patients 1 Week after Extubation

SARAH J. PETERSON, MS, RD; ANNALISA A. TSAI, MD, RD; CELINA M. SCALA, MS, RD; DIANE C. SOWA, MBA, RD; PATRICIA M. SHEEAN, PhD, RD; CAROL L. BRAUNSCHWEIG, PhD, RD



NICE clinical guideline 83
Developed by the Centre for Clinical Practice at NICE



NICE (2009) Rehabilitation after critical illness guideline contains very little reference to nutrition.

Very little research looking at nutritional recovery after critical illness.

Original Investigation

Increased Hospital-Based Physical Rehabilitation and Information Provision After Intensive Care Unit Discharge
The RECOVER Randomized Clinical Trial

Timothy S. Walsh, MD; Lisa G. Salisbury, PhD; Judith L. Merriweather, PhD; Julia A. Boyd, PhD; David M. Griffith, MD; Guro Huby, PhD; Susanne Kean, PhD; Simon J. Mackenzie, MBChB; Ashma Krishan, MSc; Stephanie C. Lewis, PhD; Gordon D. Murray, PhD; John F. Forbes, PhD; Joel Smith, PhD; Janice E. Rattray, PhD; Alastair M. Hull, MD; Pamela Ramsay, PhD; for the RECOVER Investigators

Invited Commentary page 911

Supplemental content at jamainternalmedicine.com

IMPORTANCE Critical illness results in disability and reduced health-related quality of life (HRQOL), but the optimum timing and components of rehabilitation are uncertain.

OBJECTIVE To evaluate the effect of increasing physical and nutritional rehabilitation plus information delivered during the post-intensive care unit (ICU) acute hospital stay by dedicated rehabilitation assistants on subsequent mobility, HRQOL, and prevalent disabilities.

DESIGN, SETTING, AND PARTICIPANTS A parallel group, randomized clinical trial with blinded outcome assessment at 2 hospitals in Edinburgh, Scotland, of 240 patients discharged from the ICU between December 1, 2010, and January 31, 2013, who required at least 48 hours of mechanical ventilation. Analysis for the primary outcome and other 3-month outcomes was performed between June and August 2013; for the 6- and 12-month outcomes and the health economic evaluation, between March and April 2014.

INTERVENTIONS During the post-ICU hospital stay, both groups received physiotherapy and dietetic, occupational, and speech/language therapy, but patients in the intervention group received rehabilitation that typically increased the frequency of mobility and exercise therapies 2- to 3-fold, increased dietetic assessment and treatment, used individualized goal setting, and provided greater illness-specific information. Intervention group therapy was coordinated and delivered by a dedicated rehabilitation practitioner.

MAIN OUTCOMES AND MEASURES The Rivermead Mobility Index (RMI) (range 0-15) at 3 months; higher scores indicate greater mobility. Secondary outcomes included HRQOL, psychological outcomes, self-reported symptoms, patient experience, and cost-effectiveness during a 12-month follow-up (completed in February 2014).

RESULTS Median RMI at randomization was 3 (interquartile range [IQR], 1-6) and at 3 months was 13 (IQR, 10-14) for the intervention and usual care groups (mean difference, −0.2 [95% CI, −1.3 to 0.9; $P = .71$]). The HRQOL scores were unchanged by the intervention (mean difference in the Physical Component Summary score, −0.1 [95% CI, −3.3 to 3.1; $P = .96$]; and in the Mental Component Summary score, 0.2 [95% CI, −3.4 to 3.8; $P = .91$]). No differences were found for self-reported symptoms of fatigue, pain, appetite, joint stiffness, or breathlessness. Levels of anxiety, depression, and posttraumatic stress were similar, as were hand grip strength and the timed Up & Go test. No differences were found at the 6- or 12-month follow-up for any outcome measures. However, patients in the intervention group reported greater satisfaction with physiotherapy, nutritional support, coordination of care, and information provision.

CONCLUSIONS AND RELEVANCE Post-ICU hospital-based rehabilitation, including increased physical and nutritional therapy plus information provision, did not improve physical recovery or HRQOL, but improved patient satisfaction with many aspects of recovery.

TRIAL REGISTRATION isrctn.com Identifier: ISRCTN09412438

JAMA Intern Med. 2015;175(6):901-910. doi:10.1001/jamainternmed.2015.0822
Published online April 13, 2015.

Author Affiliations: Author affiliations are listed at the end of this article.

Group Information: The RECOVER Investigators are listed at the end of this article.

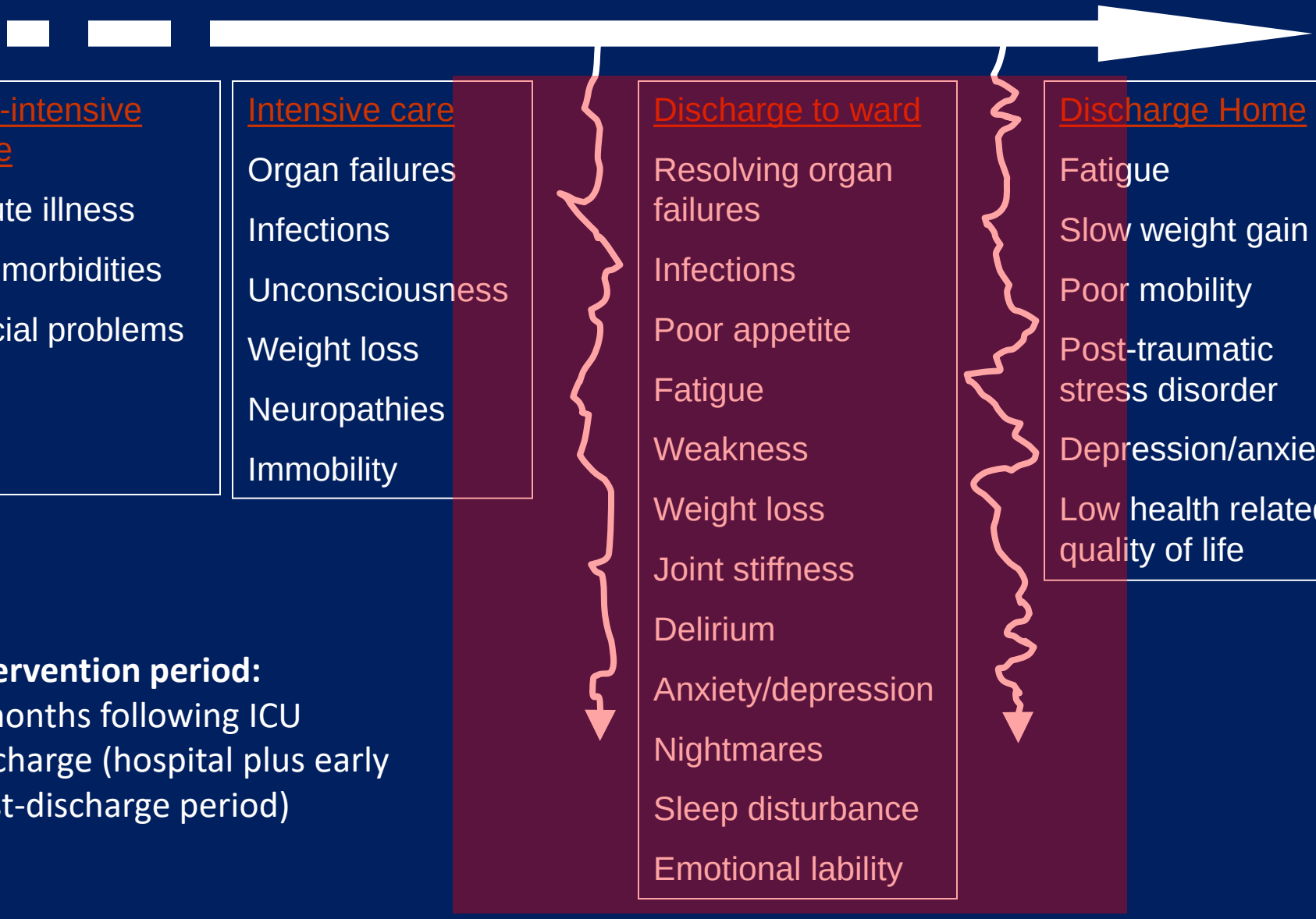
Corresponding Author: Timothy S. Walsh, MD, Anaesthetics, Critical Care, and Pain Medicine, School of Clinical Sciences, Queens Medical Research Institute, University of Edinburgh, 47 Little France Crescent, Edinburgh EH16 4TJ, Scotland (twalsh@staffmail.ed.ac.uk).

RECOVER

Parallel group RCT
Registration: ISRCTN09412438
Funder: Chief Scientists Office Scotland

JAMA Internal Medicine 2015; 175: 901

The critical care patient pathway



Intervention period:
3 months following ICU discharge (hospital plus early post-discharge period)

Developing the complex intervention trial

Pilot RCT

Salisbury LG, Merriweather J, Walsh TS: *Clinical Rehabilitation* 2010, **24**: 489-500.

Development and description of a novel Generic Rehabilitation Assistant role

Salisbury LG, Merriweather J, Walsh TS: *Nurs Crit Care* 2010, **15:** 57-65.

Final construct and taxonomy (work from 2005-10)

Ramsay P, Salisbury LG, Merriweather JL et al: *Trials* 2014, **15:** 38.

Protocol

Walsh TS, Salisbury LG, Boyd J et al: A Randomised Controlled Trial Evaluating a Rehabilitation Complex Intervention Care Discharge. The RECOVER study. *BMJ* Open 2012, **2:** e001475.

Analysis Plan Published (website)

Study Objectives

Primary Objective

- To evaluate the effect of increased physical and nutritional rehabilitation intensity plus information provision during the early post-intensive care (ICU) period on mobility, HRQoL and a range of prevalent disabilities.

Secondary Objectives

- To evaluate the cost-effectiveness of the novel approach.
- To compare patient and carer experiences and satisfaction between usual care and the new strategy

Groups

Intervention

- Existing rehabilitation teams PLUS dedicated generic rehabilitation assistant (GRA) Mon-Friday
- Key pre-determined components (especially around information-giving)
- Individualised physical/nutritional rehabilitation programme

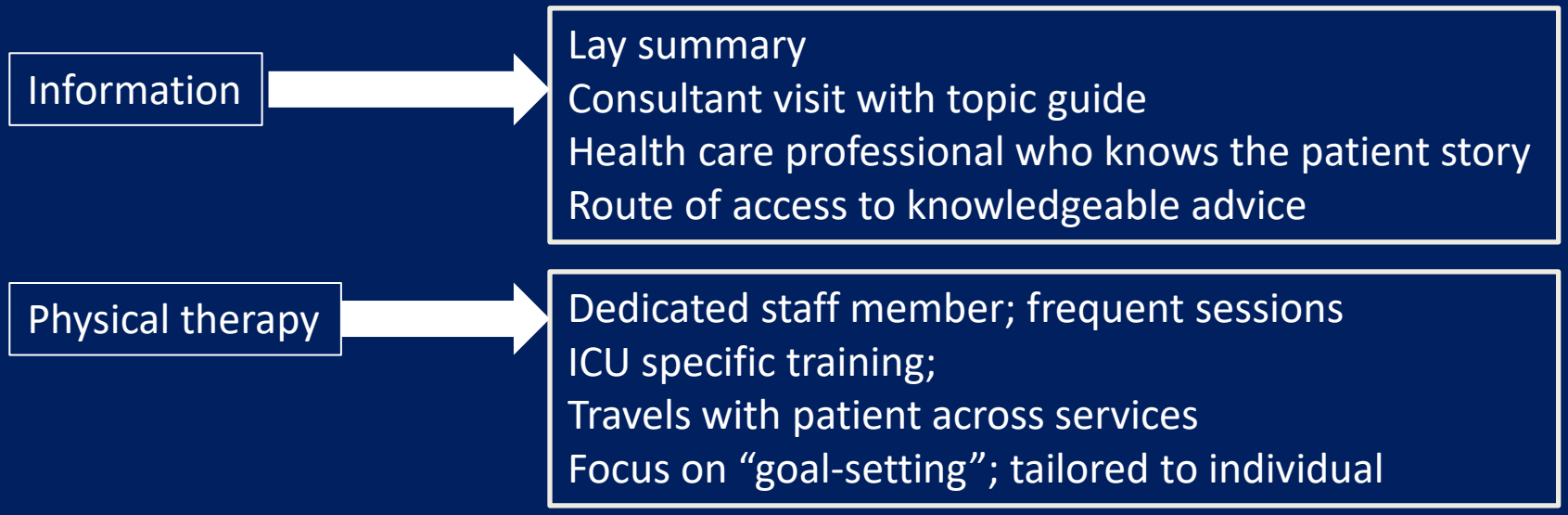
Usual Care

- Existing rehabilitation provision from existing staff

ICU discharge to 3 months (hospital plus discharge planning)

A construct to improve quality during the early post ICU period

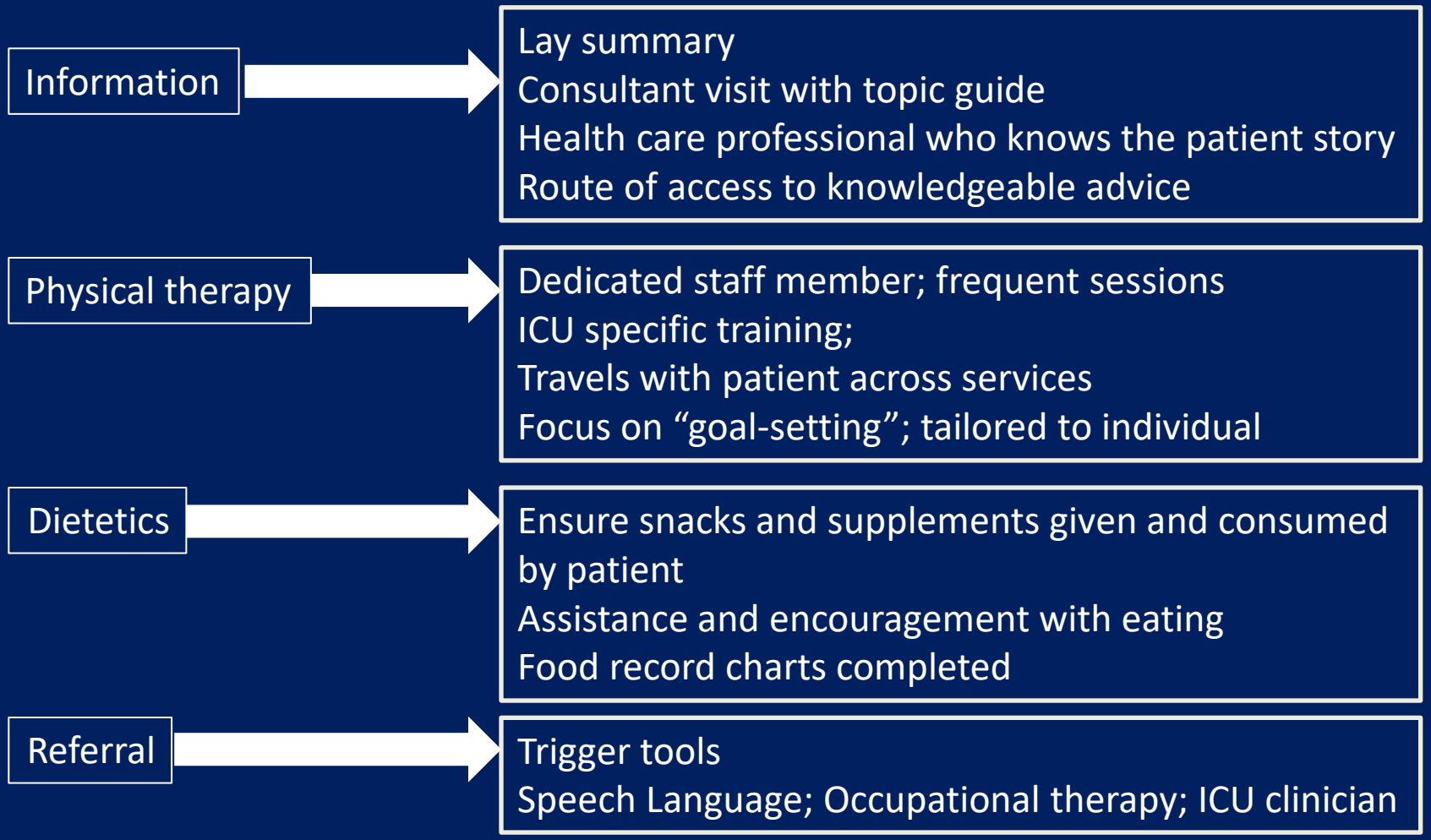
A construct to improve quality during the early post ICU period



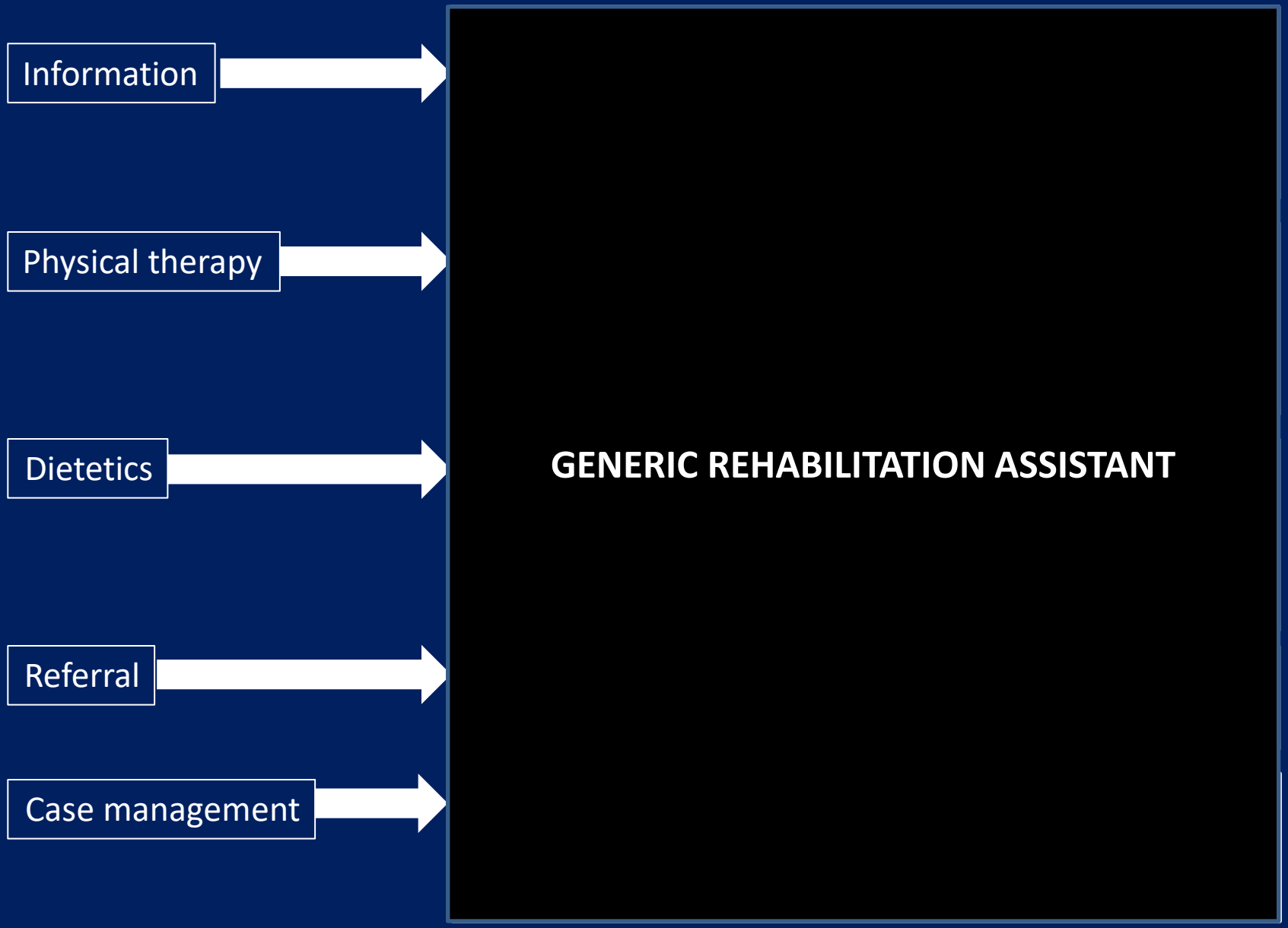
A construct to improve quality during the early post ICU period

Information	Lay summary Consultant visit with topic guide Health care professional who knows the patient story Route of access to knowledgeable advice
Physical therapy	Dedicated staff member; frequent sessions ICU specific training; Travels with patient across services Focus on “goal-setting”; tailored to individual
Dietetics	Ensure snacks and supplements given and consumed by patient Assistance and encouragement with eating Food record charts completed

A construct to improve quality during the early post ICU period



A construct to improve quality during the early post ICU period



Outcomes

Primary

Rivermead Mobility Index 3 months post-randomisation

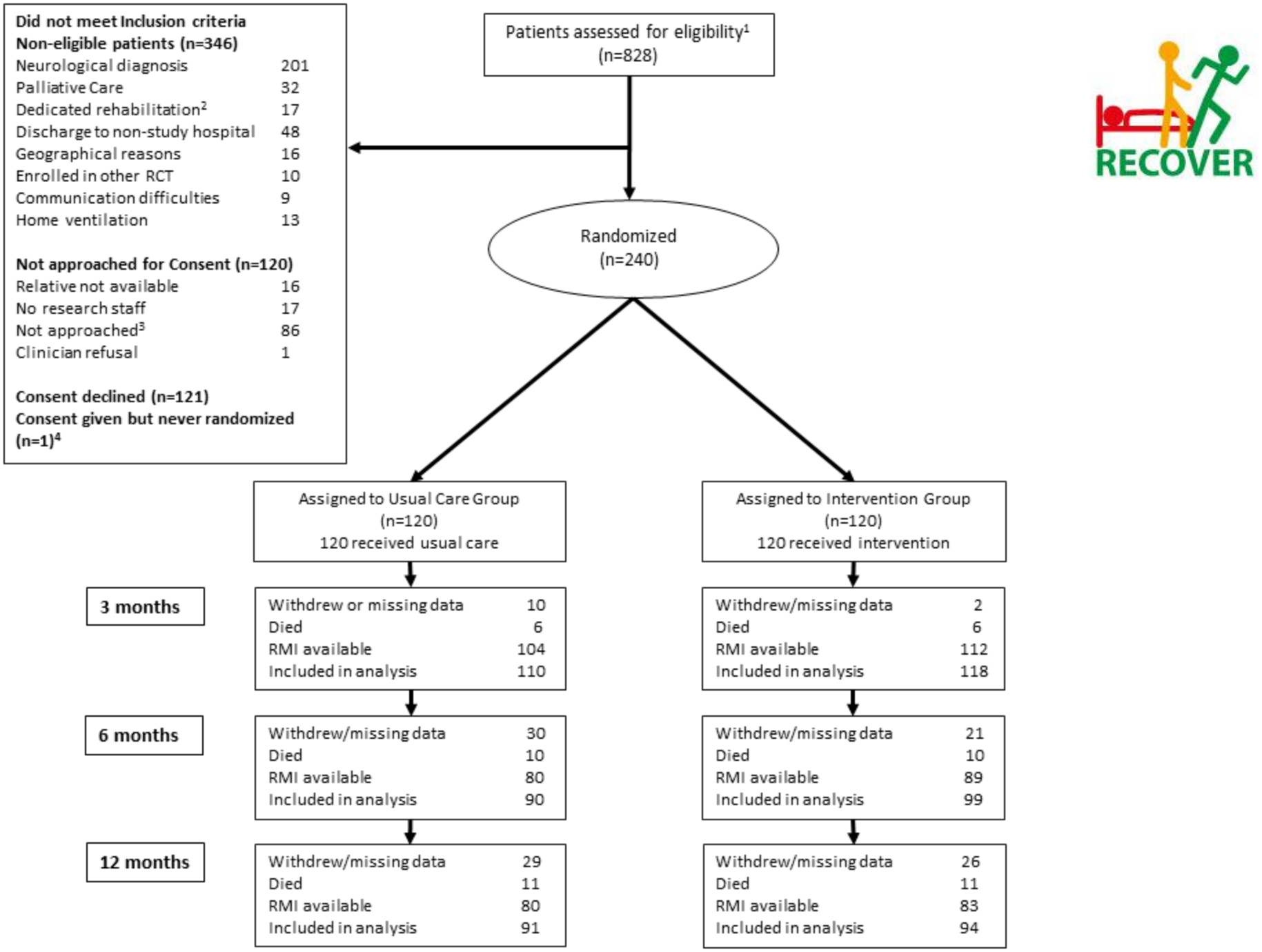
Secondary (3, 6, and 12 months post-randomisation)

Mortality

PROMs:	SF-12 (PCS and MCS)
	Patient symptomatology (VAS: fatigue, breathlessness, appetite, pain, joint stiffness)
	Anxiety/depression symptomatology (HADS)
	PTSD symptomatology (DTS)
Function:	RMI over 12 months follow up
	Timed-up-and-go test
	Hand grip strength
PREM:	Satisfaction in key domains (informed by pre-trial work)
Resource:	Hospital length of stay
	Health economic questionnaire

Qualitative evaluation (focus groups 2 x 2)

Health economic evaluation 12 months follow up


Did not meet Inclusion criteria
Non-eligible patients (n=346)
Neurological diagnosis 201
Palliative Care 32
Dedicated rehabilitation[2] 17
Discharge to non-study hospital 48
Geographical reasons 16
Enrolled in other RCT 10
Communication difficulties 9
Home ventilation 13
Not approached for Consent (n=120)
Relative not available 16
No research staff 17
Not approached[3] 86
Clinician refusal 1
Consent declined (n=121)
Consent given but never randomized (n=1)[4]
Patients assessed for eligibility[1] (n=828)
Randomized (n=240)
Assigned to Usual Care Group (n=120) 120 received usual care
Assigned to Intervention Group (n=120) 120 received intervention
3 months
Withdrew or missing data 10
Died 6
RMI available 104
Included in analysis 110
Withdrew/missing data 2
Died 6
RMI available 112
Included in analysis 118
6 months
Withdrew/missing data 30
Died 10
RMI available 80
Included in analysis 90
Withdrew/missing data 21
Died 10
RMI available 89
Included in analysis 99
12 months
Withdrew/missing data 29
Died 11
RMI available 80
Included in analysis 91
Withdrew/missing data 26
Died 11
RMI available 83
Included in analysis 94
RECOVER

Describing what happened: the treatment received

Stage of patient journey	Usual care (N=120)	Intervention (N=120)
ICU discharge N (%)		
Provision of ICU recovery manual	120 (100)	120 (100)
Structured discussion with ICU consultant	0 (0)	68 (57)
Provision of lay summary of illness	0 (0)	114 (95)
Ward based rehabilitation		
Proportion of patients receiving therapy types at least once during ward stay N (%)		
PT	111 (93)	118 (98)
Dietetics	80 (67)	114 (95)
OT	39 (33)	52 (43)
SLT	19 (16)	23 (19)

Treatment received

Stage of patient journey	**Usual care (N=120)**	**Intervention (N=120)**
Hospital discharge N (%)		
Offered ICU visit prior to hospital discharge	0 (0)	90 (75)
Visited ICU	2 (2)	17 (14)
Structured status summary sent to general practitioner/family doctor	0 (0)	116 (97)
Post hospital discharge		
Follow up contact with study rehabilitation team (N (%))	0 (0)	90 (75)
Number of contacts (median 1st, 3rd quartiles)	0 (0)	2 (1, 2)

Conclusions

- Early rehabilitation following ICU discharge that included increased physical and nutritional therapy plus information provision did not improve physical recovery or HRQoL, or other measures of disability during 12 month follow-up.

BMJ Open

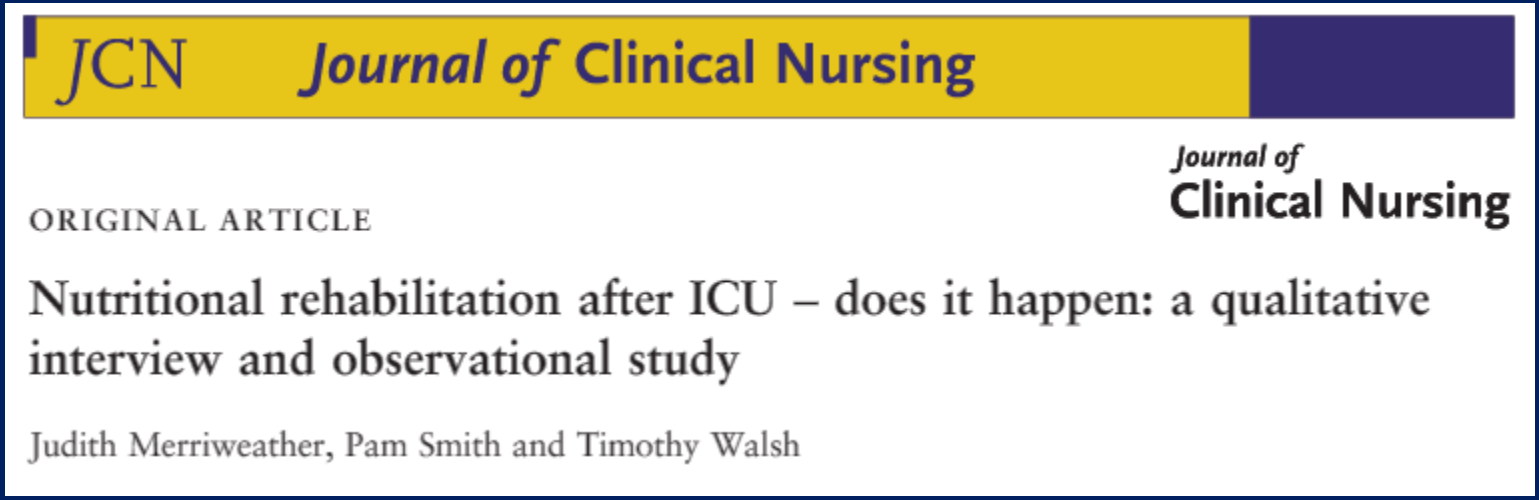
Patient and carer experience of hospital-based rehabilitation from intensive care to hospital discharge: mixed methods process evaluation of the RECOVER randomised clinical trial

Pam Ramsay,[1] Guro Huby,[2] Judith Merriweather,[1] Lisa Salisbury,[3] Janice Rattray,[4] David Griffith,[1] Timothy Walsh,[1] on behalf of the RECOVER collaborators

BMJ Open 2016;**6**:e012041. doi:10.1136/bmjopen-2016-012041

Satisfaction Domain	Excellent Anchor Quotation	Poor Anchor Quotation	*P* Value
Transfer from ICU to the ward	"The ICU staff prepared me well for going to the ward."	"No one told me what was happening or what the wards would be like."	.48
Ward staff's understanding of your time in intensive care	"They really understood and cared about what I'd been through."	"No one had a clue about what had happened to me."	.85
Exercises to get you moving/back on your feet	"I had all the help, support, and advice I needed to get me moving/back on my feet."	"I had little or no help, support, or advice, and my recovery suffered as a result."	.04
Help, support, and advice with being independent	"I had all the help, support, and advice I needed to get my independence back."	"I had little or no help, support, or advice, and I really struggled to get my independence back."	.79
Help with eating and nutrition	"I had all the help and advice I needed with eating and nutrition."	"No one seemed to notice or care if I was able to eat ok."	.04
Being involved in decisions about your care	"I was always asked about what was best for me, and I felt listened to."	"No one asked about what was best for me, and I felt invisible."	.23
Organization and coordination of care	"Everyone knew what was happening and worked together well."	"No one seemed to know what was happening. It was totally disorganized."	.04
Information about what happened in intensive care	"I was given a clear understanding of how I ended up in intensive care and what happened to me."	"No one told me anything about how I ended up in intensive care or about what happened to me."	<.01
Knowing what to expect after you got home	"I was given a clear understanding of what being at home might be like."	"No one told me anything about what being at home might be like."	.49

Exploration of the factors that influence nutritional recovery. The EATEN study



JCN *Journal of* Clinical Nursing

Journal of
Clinical Nursing

ORIGINAL ARTICLE

Nutritional rehabilitation after ICU – does it happen: a qualitative interview and observational study

Judith Merriweather, Pam Smith and Timothy Walsh

BDA The Association of UK Dietitians

THE OFFICIAL JOURNAL OF THE BRITISH DIETETIC ASSOCIATION

Journal of Human Nutrition and Dietetics

Journal of Human Nutrition and Dietetics

RESEARCH PAPER

Nutritional care after critical illness: a qualitative study of patients' experiences

J. L. Merriweather,[1,2] L. G. Salisbury,[1,3] T. S. Walsh[1,2] & P. Smith[1,3]

Research Questions

- How do patients experience eating after critical illness?
- How do organisational, psychosocial and physiological factors affect nutritional recovery?
- How do organisational, psychosocial and physiological factors interact to affect nutritional recovery?

Study

- Sample: 17 patients

Eligibility Criteria

Inclusion

- ≥48 hours of ventilation and ready for ICU discharge.

Exclusion

- Pre-existing rehabilitation programmes e.g. stroke or liver transplant.

Methods - mixed method study

Quantitative methods

- Nutritional assessment using Subjective Global Assessment
- Food diaries

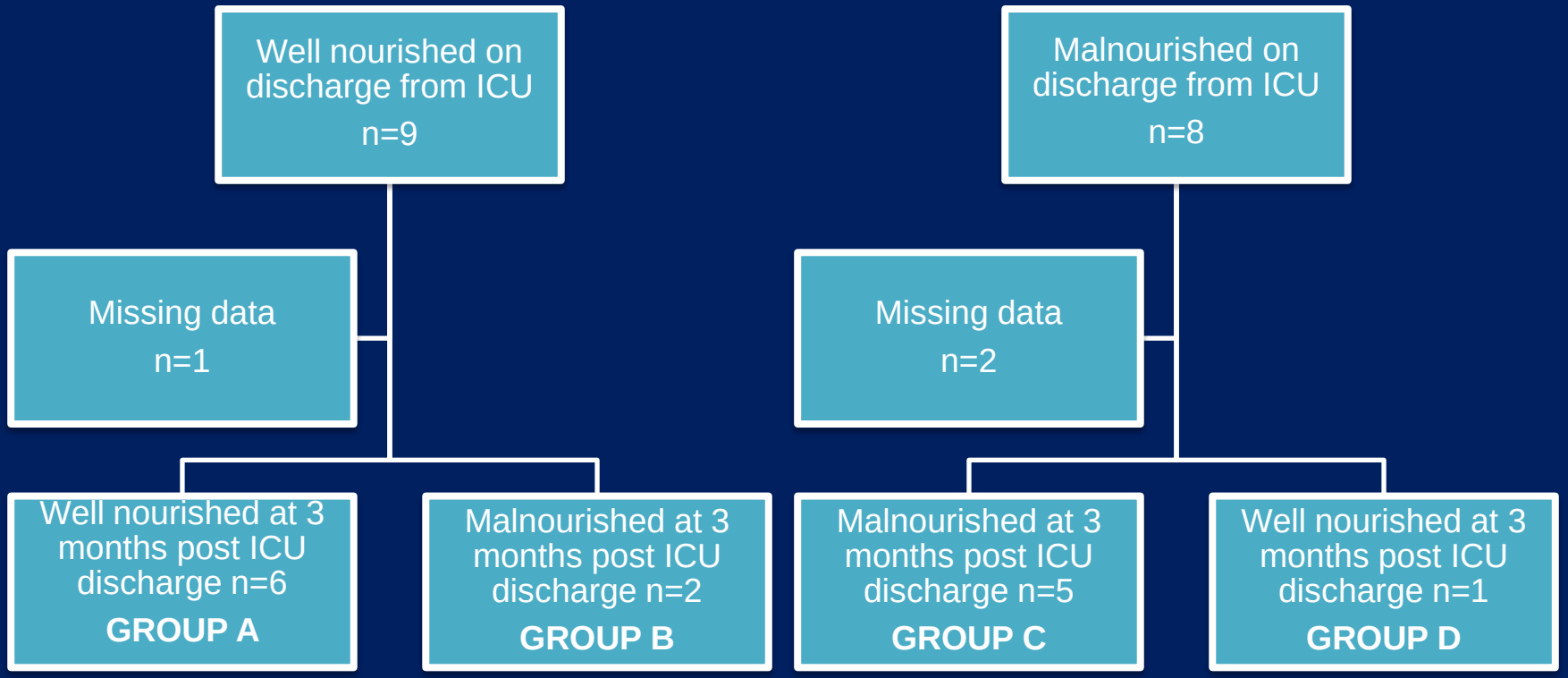
Qualitative methods

- Interviews on discharge from ICU, weekly during ward stay and at three months post ICU discharge
- Observation of ward practice.

Demographic details of patients

	Patients (n=17) Median (IQR)
Gender	11 male : 6 female
Age (years)	55 (46-68.5)
APACHE II score	18 (14.4-25)
Ventilation days	19 (5-33)
RECOVER group	9 intervention : 8 control
Ward destination	5 surgery : 12 medical
Length of ward stay (days)	10 (6-17.5)

Classification of groups



Nutritional intake as a percentage of estimated nutritional requirements

Ward Stay

	Group A n=6		Group C n=5	
	Median (IQR)	Min Max	Median (IQR)	Min Max
Mean calorie intake (% of req)	62.5 (34.5-101.5)	33 124	77.25 (53.5-91.75)	48 96
Mean protein intake (% of req)	55.38 (33.0-78.44)	18 82.75	73.25 51.75-96.35)	33 109.71

3 months post ICU discharge

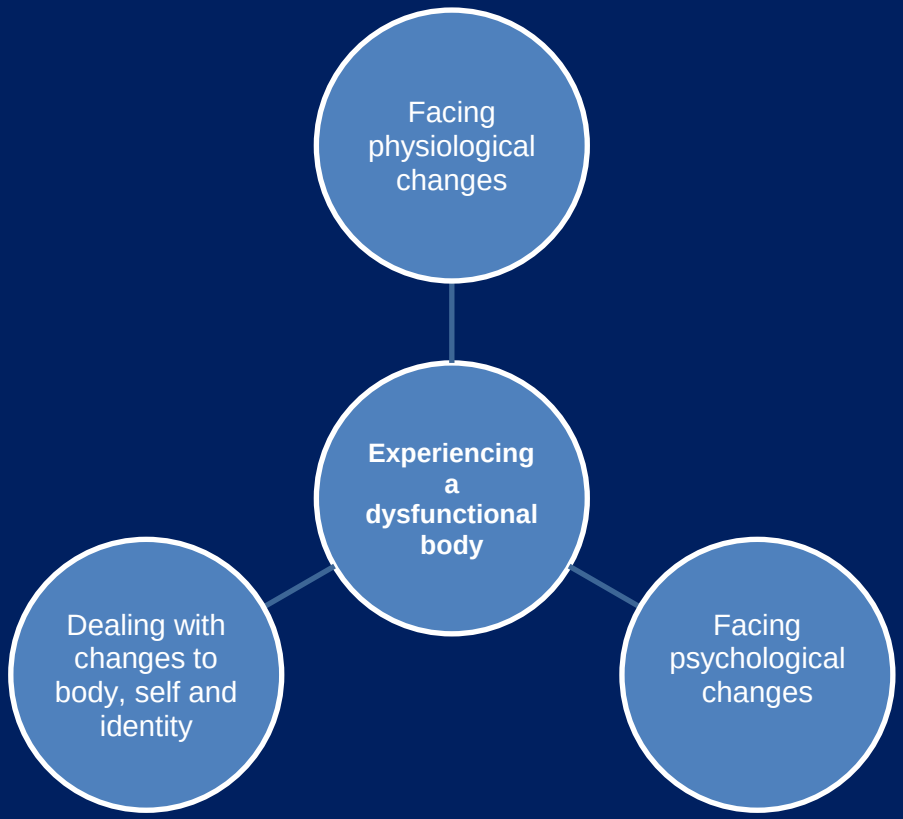
	Group A n=6		Group C n=5	
	Median (IQR)	Min Max	Median (IQR)	Min Max
Mean calorie intake (% of req)	87 (69.5-91.29	65 101	94 (69-106)	52 116
Mean protein intake (% of req)	76.5 (63.25-90.5)	49 107	79 (69.5-102.5)	63 108

- Universal failure to meet nutritional requirements

Findings

Core Category	Interrelated system breakdowns during the nutritional recovery process		
Category	Experiencing a dysfunctional body	Experiencing socio-cultural changes in relation to eating	Encountering organisational nutritional care delivery failures
Properties	Facing physiological changes	Experiencing social isolation	Experiencing system-centred failures
	Facing psychological changes	Struggling to adapt to an unfamiliar culture	Struggling with an inflexible hospital routine
	Dealing with changes to body, self and identity	Importance of food habits and routine	Communication failures
			Staff knowledge gap

Experiencing a dysfunctional body



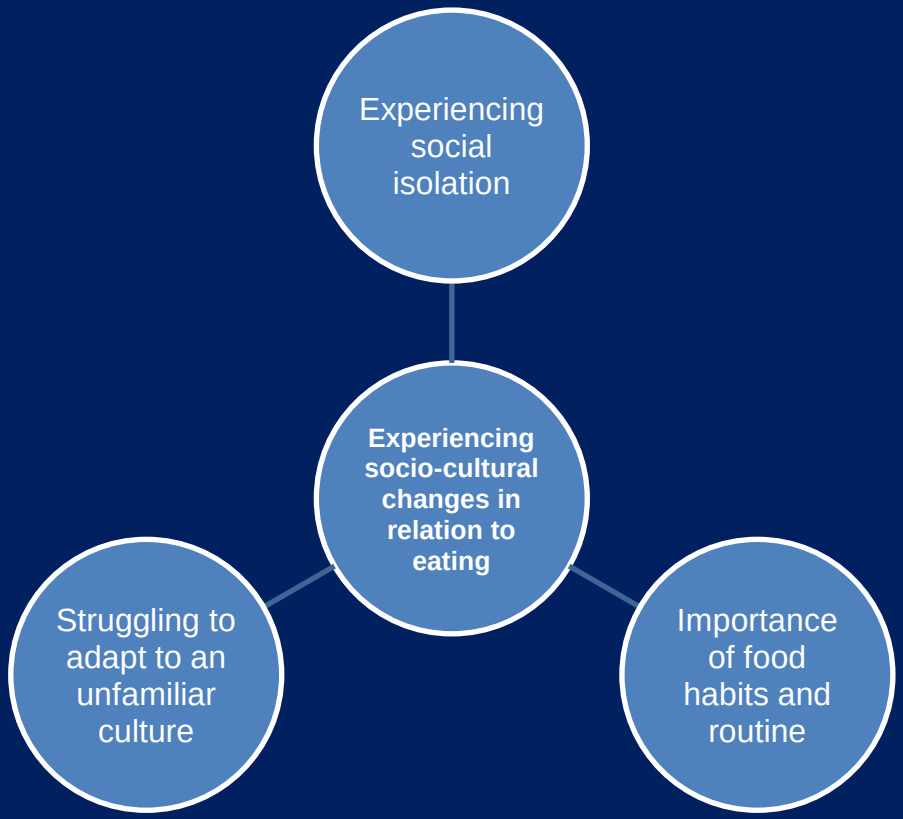
"*I don't have any appetite. I'm sort of force feeding myself.*" (Patient 5)

"*I order it, it looks nice on paper, I order it, it comes up, I sit and think that looks nice. One spoonful and I've had enough*" (Patient 15)

"*(My mood) is up and down, it's up and down..... it's a mixture of frustration but also selfish and that's because I feel frustrated that I should be in so many ways, you know, counting my blessings.*" (Patient 4)

"*I wouldn't believe I could be so weak when I came out (of ICU). I really didn't believe it and yet you know, phew, it really was quite startling.*" (Patient 12)

Experiencing socio-cultural changes in relation to eating



"*I think being alone you don't eat as well as if you've got somebody with you.*" (Patient 11)

"I suppose you get used to a certain type of food that you have at home and how it was done. I mean something like an egg, some people like it hard boiled and some soft and ken it's just your own habits." (Patient 3 wife)

"I think that's 'cause it's home food you know and times as well.....you know I had said this to you before, that you know having my lunch at 12 o' clock and my dinner at 5.....I've had too many years of psyche where that hasn't applied, you couldn't just change that around." (Patient 4)

Encountering organisational nutritional care delivery failures

"*I'm meant to be taking one a day..... but it's a case of you know you've got to ask the nurses and of course they are so busy doing..... if they remember to , you know you've got to keep saying are you remembering so they're probably thinking what a pain.*" (Patient 5)

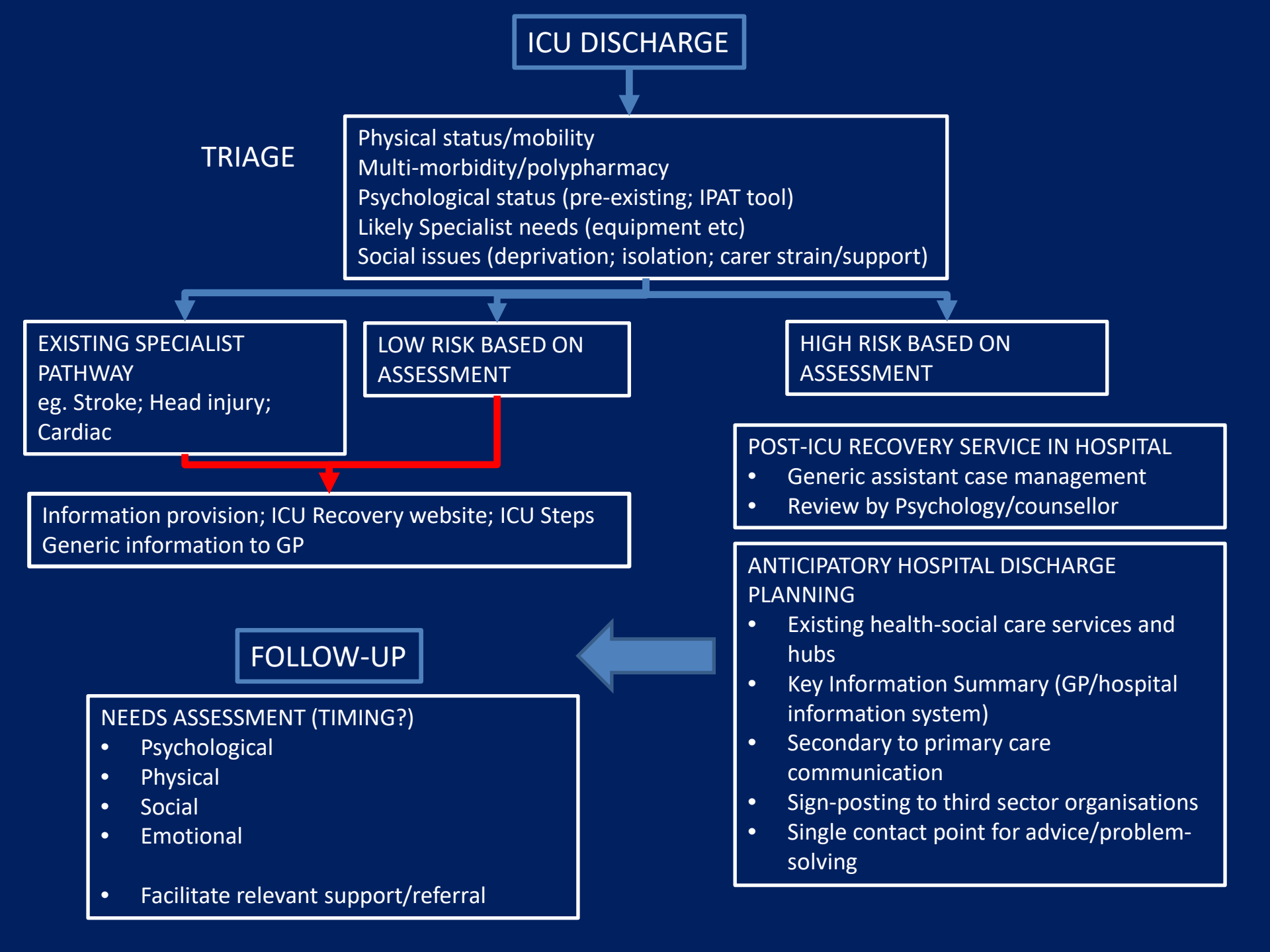
"(My wife goes to the canteen) and I have my main meal at 6ish so I pushed it back and I found that a lot better..... (hospital meals are) the wrong time, you know I can't get my head around that you have your main meal at 5 o'clock. Now I understand the reasons why. I'm not stupid. They can't base their meal regimen around me. But it is a main part, it has a big impact on me." (Patient 4)

Individualised model of nutritional care for ICU survivors

In the Intensive Care Unit	
Goal 1: The patient's nutritional issues are identified early	☐ pre-existing malnutrition prior to ICU admission (BMI<18kgm^2, history of weight loss and/or history of poor nutritional intake) ☐ long ICU stay (>7 days) ☐ swallowing problems Patient experiencing physiological factors influencing nutritional intake. ☐ loss of appetite ☐ early satiety ☐ taste changes ☐ pain ☐ nausea/vomiting ☐ diarrhoea ☐ fatigue ☐ breathlessness ☐ changes to sleep patterns Patient experiencing psychological factors influencing nutritional intake ☐ delirium ☐ low mood ☐ cognitive changes ☐ depression
Goal 2: The patient's identified nutritional issues are communicated to ward staff	Handover to ward staff to include: ☐ current route for nutrition ☐ identified factors influencing nutritional intake ☐ nutritional plan

During ward stay	
Goal 3: The patient is receiving the appropriate amount and type of nutrition	☐ weekly completion of MUST screening tool (Appendix 1) ☐ review by dietitian ☐ referral to speech and language therapy (if necessary) ☐ food record charts
Goal 4: The patient's on-going physiological issues are identified	☐ loss of appetite ☐ early satiety ☐ taste changes ☐ pain ☐ nausea/vomiting ☐ diarrhoea ☐ fatigue ☐ breathlessness ☐ changes to sleep patterns Issues are discussed with multidisciplinary team
Goal 5: The patient's on-going psychological issues are identified	☐ delirium ☐ low mood ☐ cognitive changes ☐ depression Issues are discussed with multidisciplinary team
Goal 6: The patient has the appropriate provision of food	☐ meals served one course at a time ☐ meals provided at suitable times ☐ family encouraged to bring in favourite foods ☐ provision of meals from canteen where necessary ☐ additional snacks are provided between meals ☐ assistance with eating is provided where necessary ☐ eating with others is encouraged
Goal 7: The patient is aware of the importance of good nutrition	☐ emphasising the need to eat more for physical recovery ☐ discussion of factors affecting nutritional intake ☐ regular feedback to patient about adequacy of oral intake ☐ involvement of family in discussions
Goal 8: The patient's nutritional needs are discussed regularly by the multidisciplinary team (MDT)	☐ weekly multidisciplinary meetings ☐ dietitian highlights any nutritional issues ☐ the need for nutritional support is reviewed by the MDT

On discharge from hospital	
Goal 9 The patient is provided with appropriate nutritional information	☐ written dietary information ☐ supply of nutritional supplements ☐ contact details ☐ regular follow-up
Goal 10 The patient has the necessary nutritional after care	☐ GRA will contact patient by telephone within the first week of hospital discharge to discuss nutrition ☐ Any problems are fed back to ICU team ☐ GRA will co-ordinate outpatient follow-up with existing specialist clinic appointments within the first three months of hospital discharge


ICU DISCHARGE
TRIAGE
Physical status/mobility
Multi-morbidity/polypharmacy
Psychological status (pre-existing; IPAT tool)
Likely Specialist needs (equipment etc)
Social issues (deprivation; isolation; carer strain/support)
EXISTING SPECIALIST PATHWAY
eg. Stroke; Head injury; Cardiac
LOW RISK BASED ON ASSESSMENT
HIGH RISK BASED ON ASSESSMENT
Information provision; ICU Recovery website; ICU Steps
Generic information to GP
POST-ICU RECOVERY SERVICE IN HOSPITAL
• Generic assistant case management
• Review by Psychology/counsellor
ANTICIPATORY HOSPITAL DISCHARGE PLANNING
• Existing health-social care services and hubs
• Key Information Summary (GP/hospital information system)
• Secondary to primary care communication
• Sign-posting to third sector organisations
• Single contact point for advice/problem-solving
FOLLOW-UP
NEEDS ASSESSMENT (TIMING?)
• Psychological
• Physical
• Social
• Emotional
• Facilitate relevant support/referral

Summary

- Nutritional recovery is a slow process
- ICU survivors fail to meet their nutritional requirements, particularly during early ward stay
- Nutritional intake in ICU survivors is influenced by a wide range of factors - patient related and organisational factors
- Role of targeted nutrition and exercise in the recovery process