NHS
Blood and Transplant

Enhanced Recovery After Surgery (ERAS) in transplantation

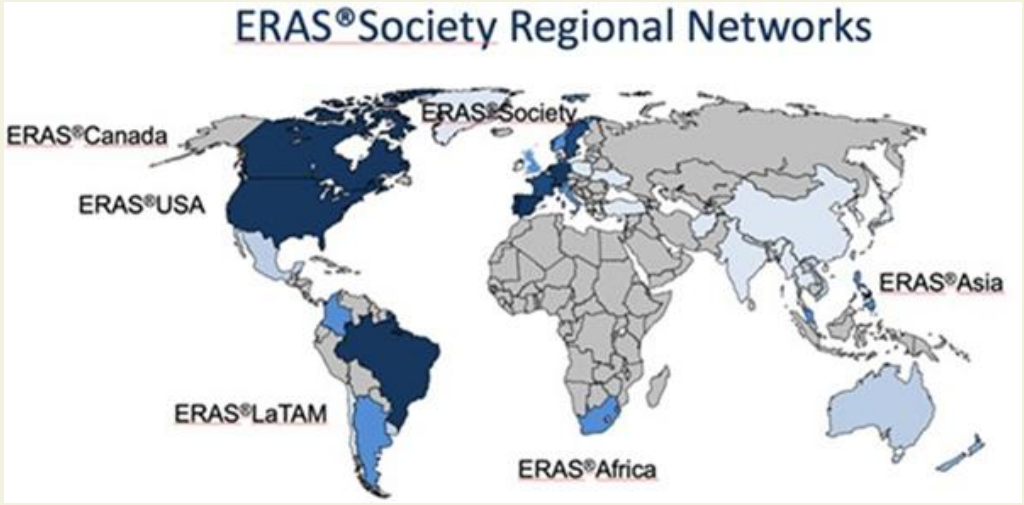
Carrie Scuffell
SME for ERAS in Transplantation,
NHS Blood and Transplant

Caring Expert Quality

What is ERAS?

- **Multimodal, pathway to help improve recovery**
  - Reduce surgical stress
  - Patent centred - encourages patient engagement and autonomy
  - Reduces the risk of complications
  - Better use of resources
  - Reduced Length of Stay (LOS)

- **‘Business as usual’ in other realms of surgery**



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ERAS in transplantation

eras Tx Enhanced Recovery After Surgery in Transplantation

NHS Blood and Transplant

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ERAS® Society

Transplantation

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ORIGINAL CLINICAL SCIENCE—LIVER

Guidelines for Perioperative Care for Liver Transplantation: Enhanced Recovery After Surgery (ERAS) Recommendations

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Clinical TRANSPLANTATION

The Journal of Clinical and Translational Research

ORIGINAL ARTICLE

Enhanced recovery after surgery programs improve short-term outcomes after liver transplantation–A systematic review and meta-analysis

Pascale Tinguely, Nolitha Morare, Alejandro Ramirez-Del Val, Marina Berenguer, Claus U. Niemann, Joerg M. Pollok, Dimitri A. Raptis, Michael Spiro

First published: 11 August 2021 | https://doi.org/10.1111/ctr.14453 | Citations: 5

Royal College of Surgeons of England

ADVANCING SURGERY

A nation... transpla... in the U...

A Amer, C Scuffell, F Dowen, CH

Freeman Hospital, UK

...versus abdominis plane block

A Hernandez-Gaytán [1], Jorge Alcacio-Mendoza [1], Jose de Jesus Cendejas-Gomez [1], Javier Gonzalez-Chavira [1], Yoztinn Bernal-Benitez [1], Humberto Zavaleta-Guraieb [1], Cassandra Dominguez-Hernández [1], Diana García-Campos [2], Rafael P Leal-Villalpando [2], Gerardo Tena-González Méndez [1], Bernardo Gabilondo-Pliego [1], Francisco Rodríguez-Covarrubias [3]

Affiliations — collapse

Enhanced recovery for liver transplantation: recommendations from the 2022 International Liver Transplantation Society consensus conference

Joerg M Pollok, Pascale Tinguely*, Marina Berenguer, Claus U Niemann, Dimitri A Raptis†, Michael Spiro†, on behalf of the ERAS4OLT.org collaborative‡*

There is much controversy regarding enhanced recovery for recipients of liver transplants from deceased and living donors. The objectives of this Review were to summarise current knowledge on individual enhanced recovery elements on short-term outcomes, identify key components for comprehensive pathways, and create internationally accepted guidelines on enhanced recovery for liver-transplant recipients. The ERAS4OLT.org collaborative partnered by the International Liver Transplantation Society performed systematic literature reviews on the effect of 32 relevant enhanced perioperative recovery elements on short-term outcomes, and global specialists prepared expert statements on deceased and living donor liver transplantation. The Grading Recommendations, Assessment, Development and Evaluations approach was used for rating of quality of evidence and grading of recommendations. A virtual international consensus conference was held in January, 2022, in which results were presented, voted on by the audience, and discussed by an independent international jury of eight members, applying the Danish model of consensus. 273 liver transplantation specialists from 30 countries prepared expert statements on elements of enhanced recovery for liver transplantation based on the systematic literature reviews. The consensus conference yielded 80 final recommendations, covering aspects of enhanced recovery for preoperative assessment and optimisation, intraoperative surgical and anaesthetic conduct, and postoperative management for the recipients of liver transplants from both deceased and living donors, and for the living donor. The recommendations represent a comprehensive overview of the relevant elements and areas of enhanced recovery for liver transplantation. These internationally established guidelines could direct the development of enhanced recovery programmes worldwide, allowing adjustments according to local resources and practices.

Lancet Gastroenterol Hepatol 2023; 8: 81-94

This online publication has been corrected. The corrected version first appeared at thelancet.com/gastrohep on Jan 5, 2023

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‡Members are listed in appendix p 19

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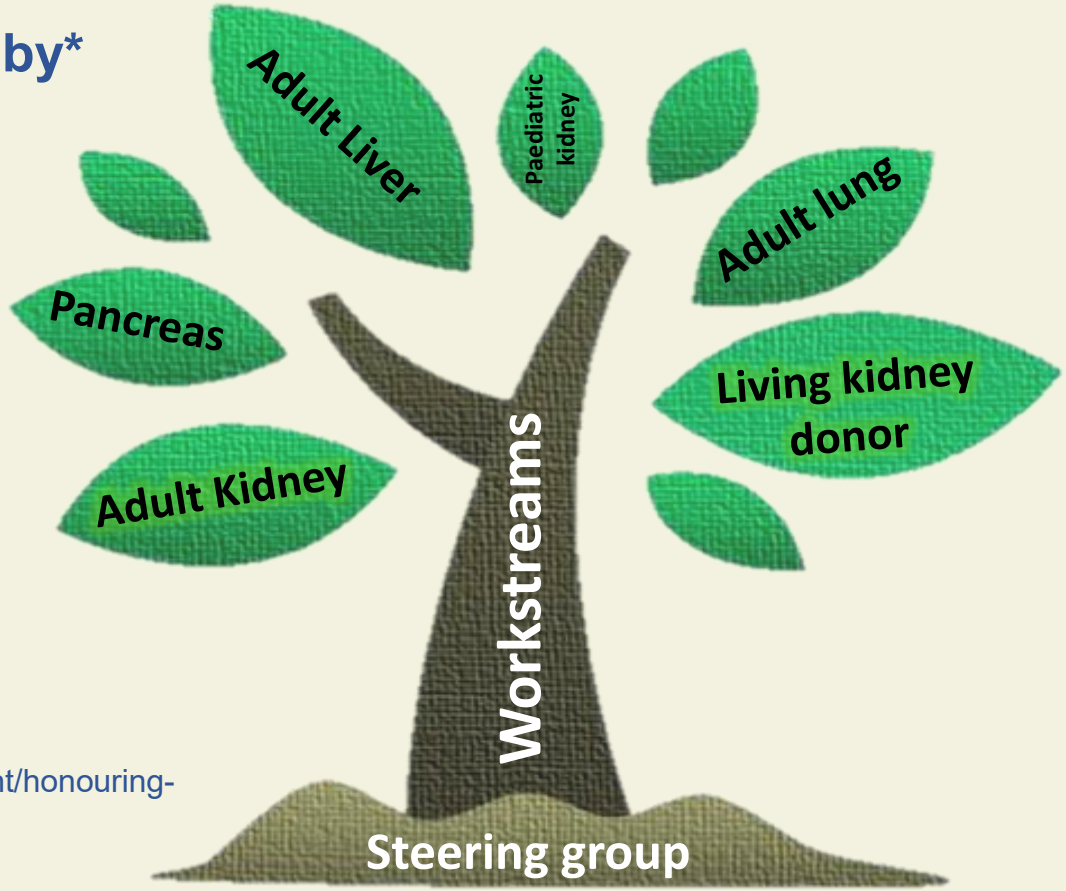
NHSBT ERAS project aims

To facilitate a UK-wide roll out of ERAS in Transplantation by*

- Drawing from evidence and existing best practice
- Providing a repository of evidence-based resources to support adoption of ERAS in centres
- Started with adult kidney transplant recipients
- Scope to include other organs and living donors

Key deliverable for the Implementation and Steering Organ Utilisation (ISOU) Group[1]



[1]https://www.gov.uk/government/publications/honouring-the-gift-of-donation-utilising-organs-for-transplant/honouring-the-gift-of-donation-utilising-organs-for-transplant-summary-report-of-the-organ-utilisation-group

*ERAS Steering Group ToR, May 2023

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NHSBT ERAS project structure

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NHS Blood and Transplant

NHSBT
Derek Manas, Medical Director
Lisa Burnapp, ERAS Programme lead
Carrie Scuffell, ERAS Subject Matter Expert

Multidisciplinary Steering group

- Interested and participated centres
- Geographically diverse
- Variety of disciplines
- Lay and recipient/donor representation

Expert by experience panels

Transplant recipients and living donors

PUBLISHED

Adult kidney transplant

COMING SOON

Adult liver transplant

Living kidney donor

Pancreas transplant

Lung transplant

? Paediatric kidney

Evaluation and measurements

- Stage 1
  - core and desirable ERAS components with supporting evidence
- Stage 2
  - Downloadable resources for centres
  - Evaluation and measurement criteria
- Stage 3
  - Circulation and communication
  - Patient facing content

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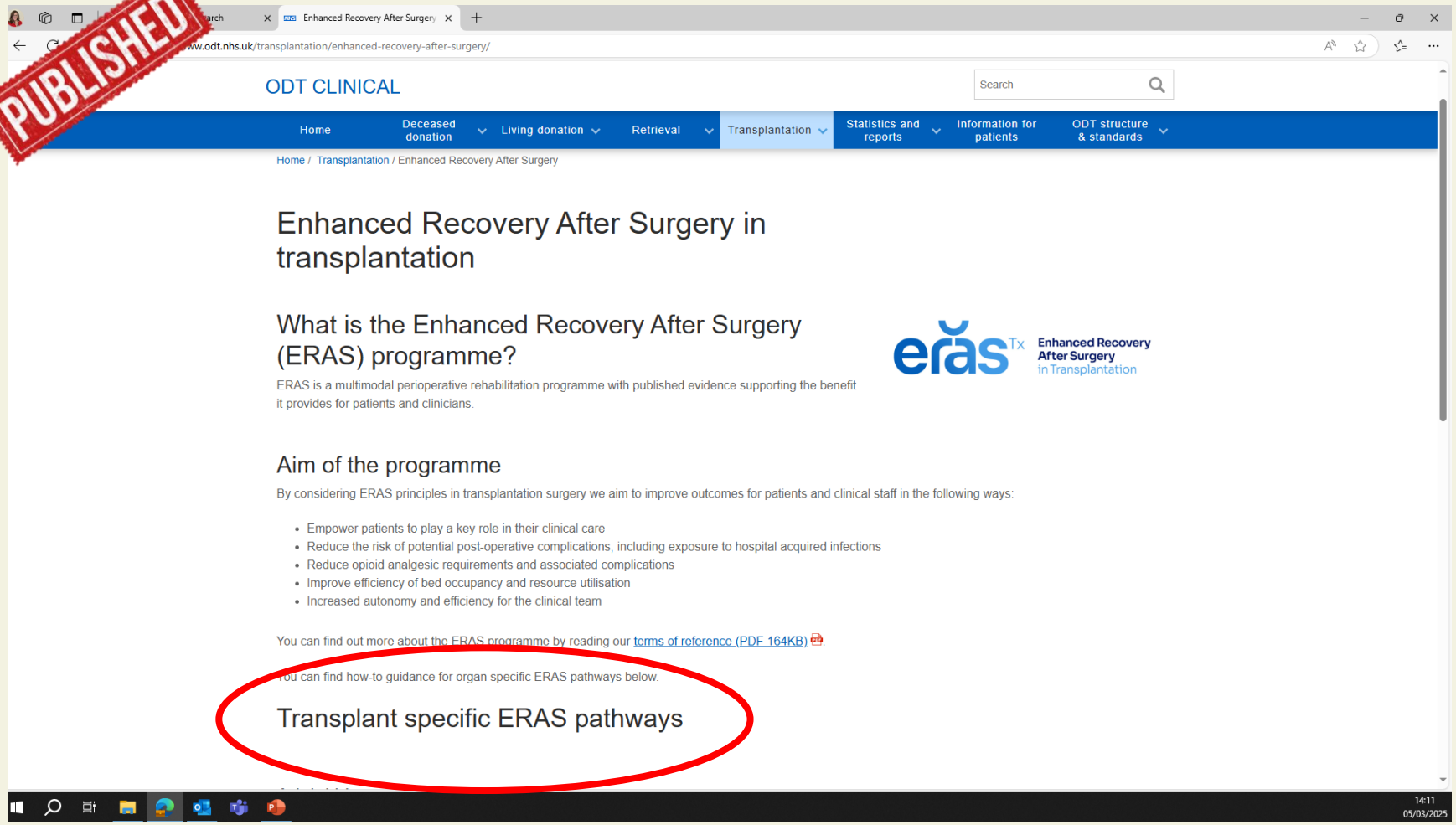

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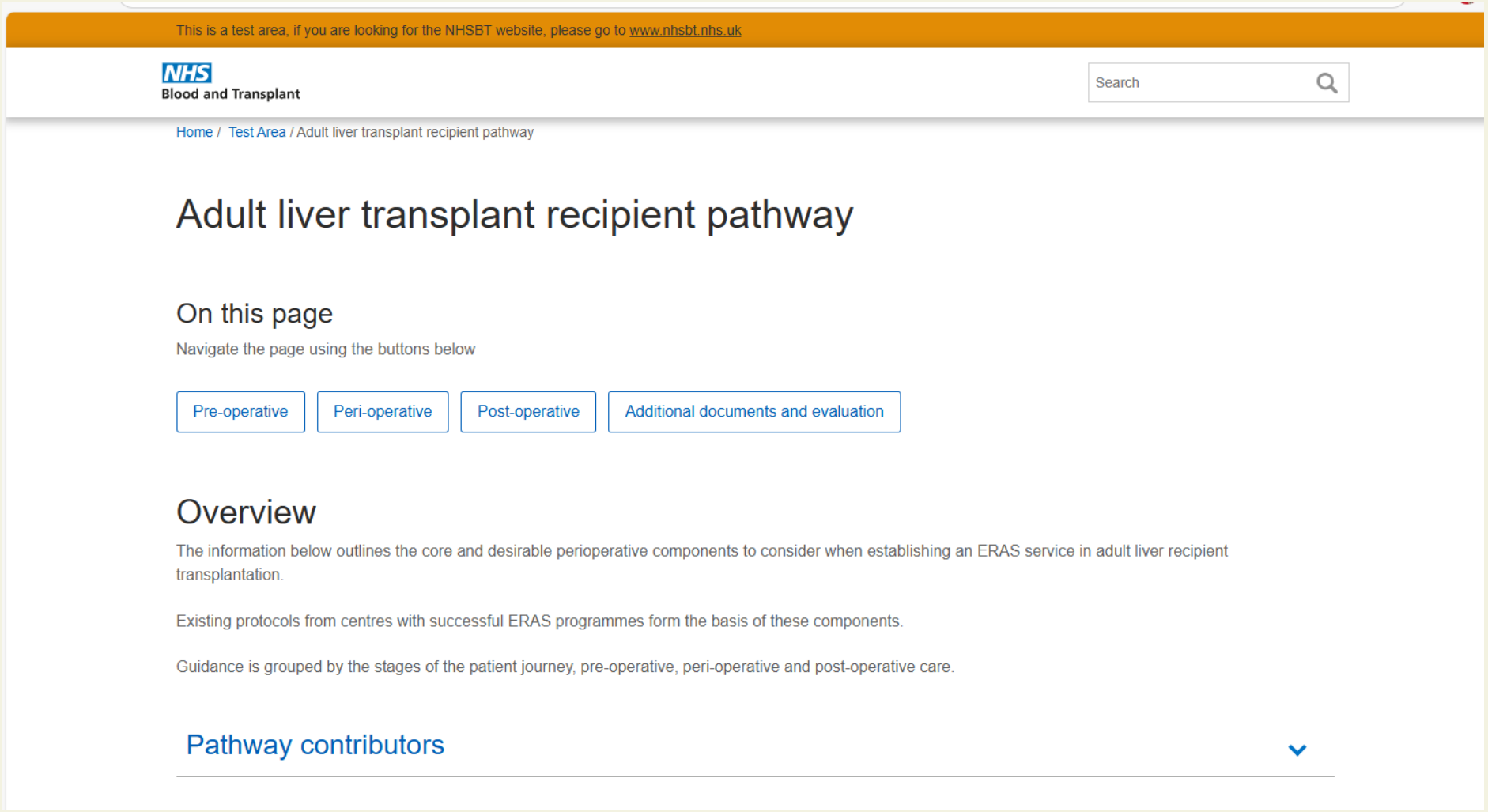

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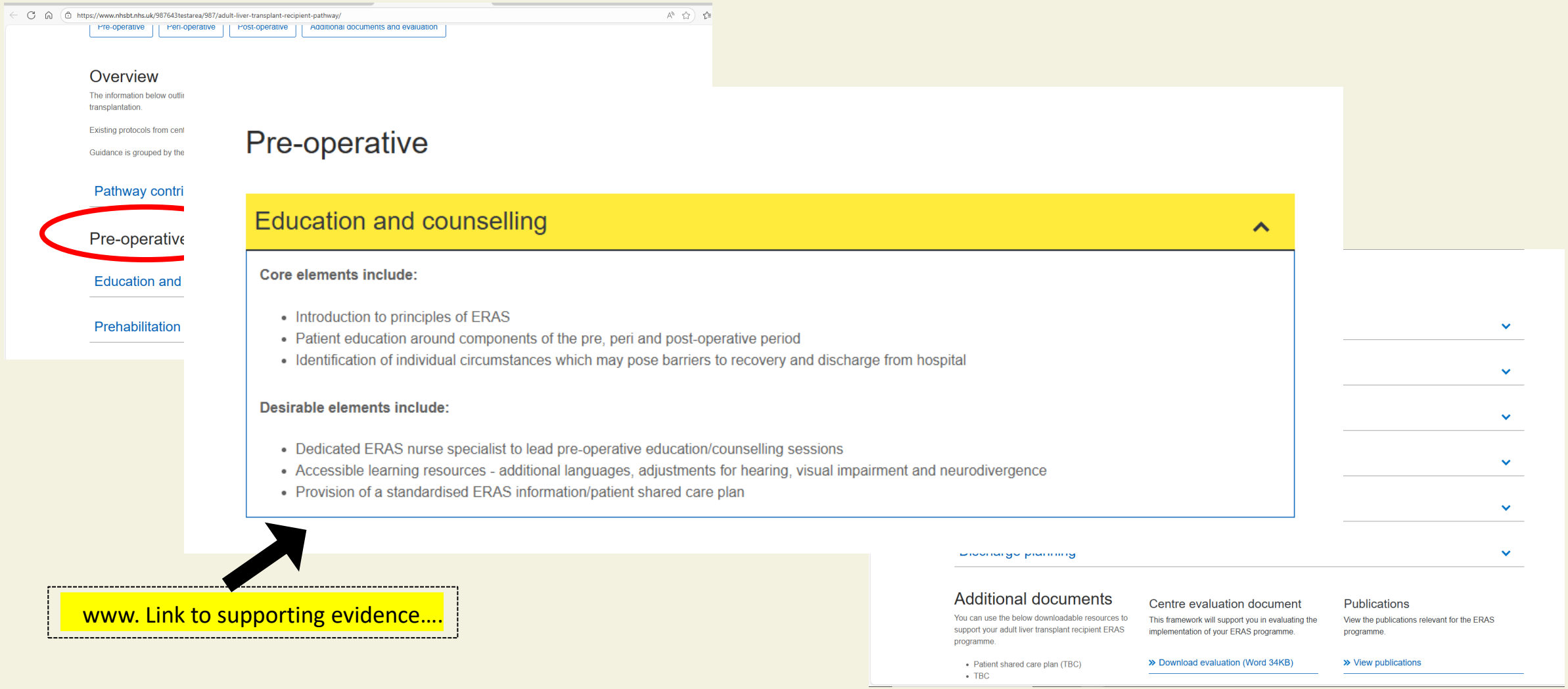

www. Link to supporting evidence….

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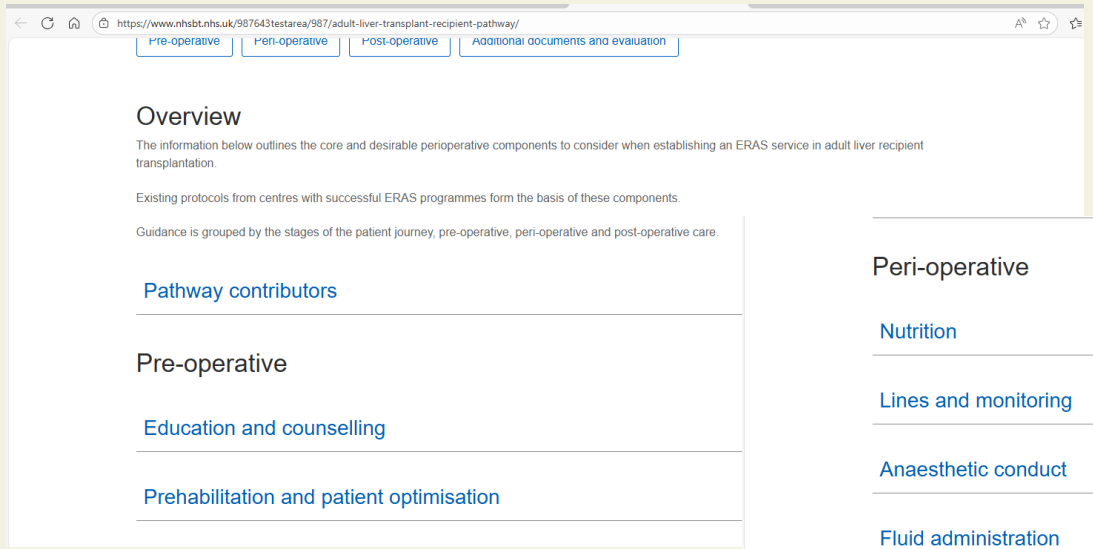

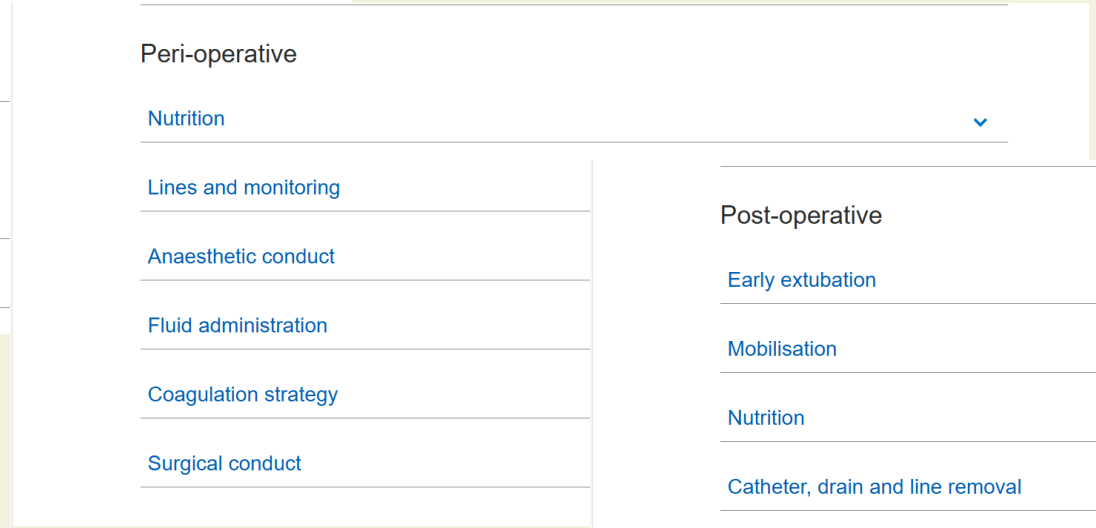

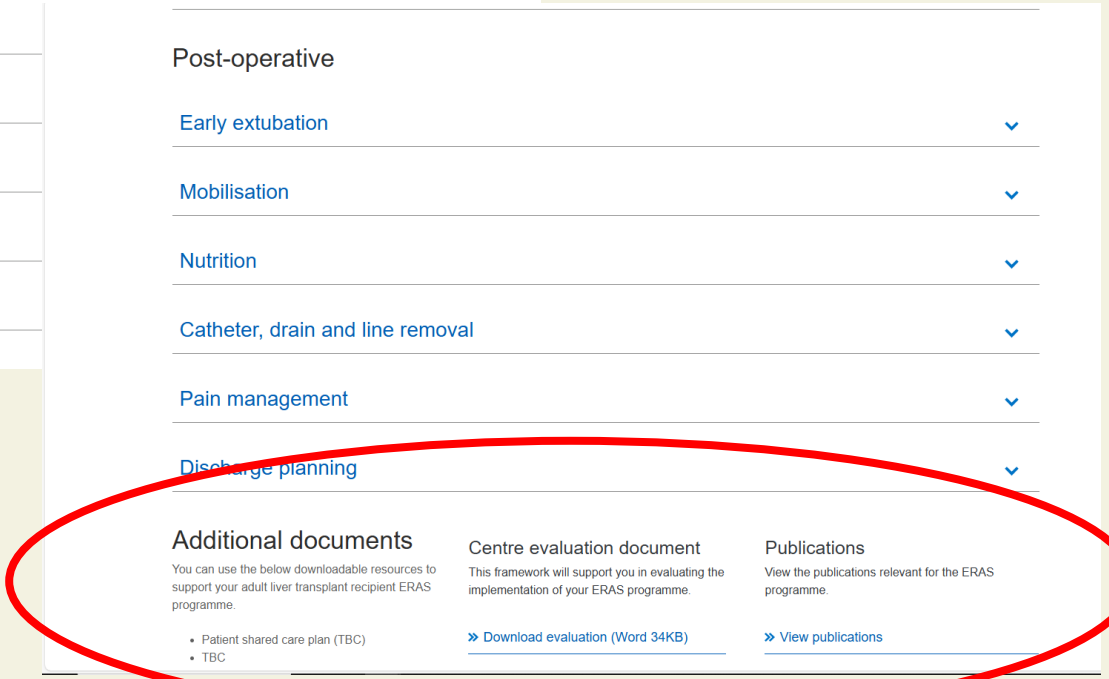

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ERAS and liver transplant
Getting ready to leave hospital

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Preparing to look after yourself and your new liver

It is important to think about how you will manage being at home and if you will need extra support. Discuss this with your friends, family and nursing staff at an early stage (before the transplant if you can).

Understanding your medicati
important to take medications
The team will support you with
As you prepare to leave hospi
yourself and your new liver. R
transplant. It is important to k
guide you on the best way to

When you do leave hospital, r
appointments and your team v
day or night. Leaving the hosp
along the way. Having a transp
affect your mood. There are su
support including from local a
near you. If you are worried ab

eras Tx

Enhanced recovery afte
your tra

The programme ke
improve your overa
active part, so that
yourself when you

An enhanced recov
experiences. If you wish, a friend, relative or carer can also be involved and

Aiming for certain targets can reduce the likelihood of complications, for e
of bed, star
infections,
improved h

Aiming for
to plan for
'bumps in t
adapt the p
hospital un

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Tubes and lines are necessary b
move around, and can increase
by asking about when the tubes
proactive and remove them as s

- Drains – tube coming from n
  Where possible, the surgeons will a
  drains they use. If you need drains,
- Urinary catheter – tube into y
  The team will try to remove your uri
  needs to stay in longer, the team will explain this to you. They may be able to offer you a di
  bag to make it easier for you to move around (ask your team about this).
- Nasogastric tube – tube going through the nose down to the stomach
  This is put in to empty the stomach. The team may remove it at the end of surgery if possib
- Other lines – tubes in the neck, wrist and groin
  It is necessary to insert lines into your neck or groin to give some types of medicine and int
  blood pressure and take blood samples. They will explain the need for any lines to you and
  soon as it is safe.

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ERAS and liver transplant
What are the main components?

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Eating the right foods to give your body what it needs.

Helping to get ready for surgery and to heal afterwards.

Keeping well on the waiting list
Early and regular mobility
Building strength and fitness after discharge

Good pain control with fewer side effects

Fewer tubes and lines, and removing them sooner

Being better informed about what to expect and how you can help own your recovery

Helping you to prepare for discharge and how to manage at home

- After your transplant operation, the team will air
  possible. This can often be within the first 24 ho
  ward. As you progress, you will be given some i
  (such as walking and sitting out in your chair). I
  worry, this will be tailored to meet your needs. All patients are different, and some days may be harder than others as you recover. Don't worry if you don't meet all your targets. Every little helps and each step is important. Just do what you can and keep a record of your progress in your enhanced recovery shared care plan.
- As you continue to recover, the team can give you some simple and safe ways to keep moving and build strength. It is important for you and the health of your liver that you try to begin to rebuild your strength and movement.

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ERAS and liver transplant
Keeping you comfortable and moving

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The way we manage pain to keep you comfortable and to minimise side effects from drugs.

- After a liver transplant operation, it is expected that you will have some discomfort, particularly around your wound as you recover. There are lots of ways the team can support you to make sure this is as manageable as possible.
- You can use these three questions to guide you;
  - Can you cough?

, suggests that your pain is not well
n slow your recovery. Let the transplant
body may feel different, especially around
you to keep comfortable, including hot

relief, but over time they can build up,
ness, constipation and drowsiness). We
ave a PCA (patient-controlled analgesia
nd offer you other pain relief, with fewer

ERAS and liver transplant
Fewer tubes and lines and removing them sooner

NHS Blood and Transplant

y but can be uncomfortable, make it more difficult for you to
se the chance of infections. You can play a role in your recovery
es may be removed each day, encouraging the team to be
s soon as it is safe to do so.

near your scar that drains fluid from the operation

ill aim to avoid drains altogether. If drains are needed, they will try to limit how many
ns, the team will monitor them closely and aim to remove them as soon as possible.

your bladder, to pass urine into

urinary catheter as soon as possible after the transplant operation. If your catheter
will explain this to you. They may be able to offer you a different type of drainage
move around (ask your team about this).

ing through the nose down to the stomach

ach. The team may remove it at the end of surgery if possible.

eck, wrist and groin

It is necessary to insert lines into your neck or groin to give some types of medicine and into your wrist to monitor blood pressure and take blood samples. They will explain the need for any lines to you and aim to remove these as soon as it is safe.

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Shared care plan

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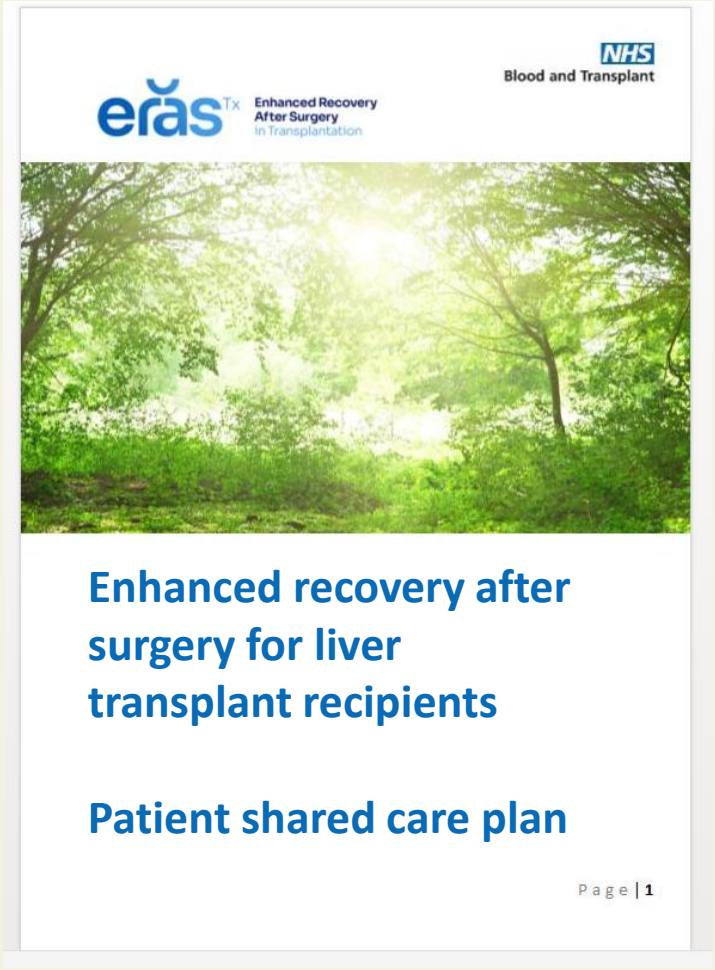

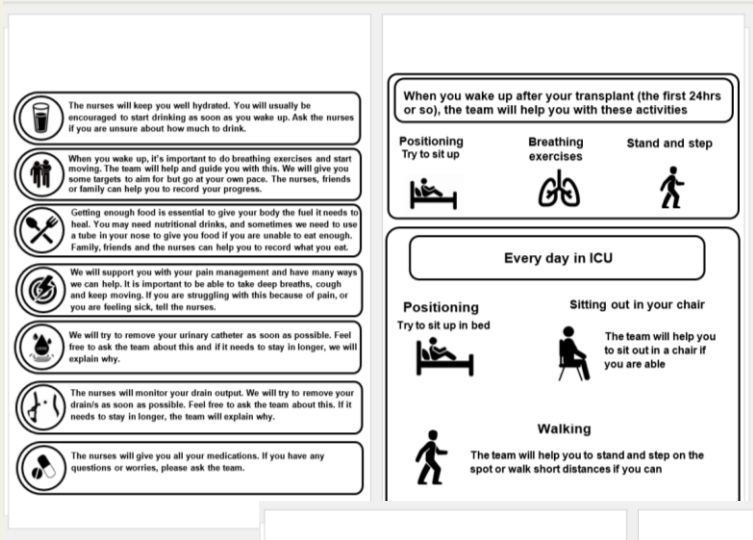

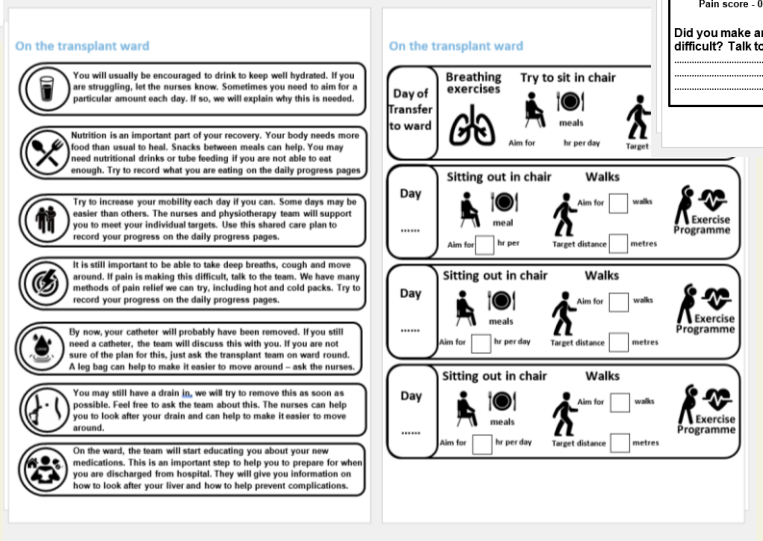

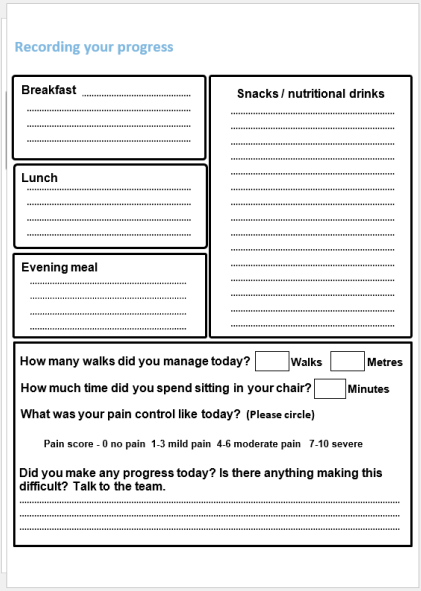

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Prehab and Rehab documents

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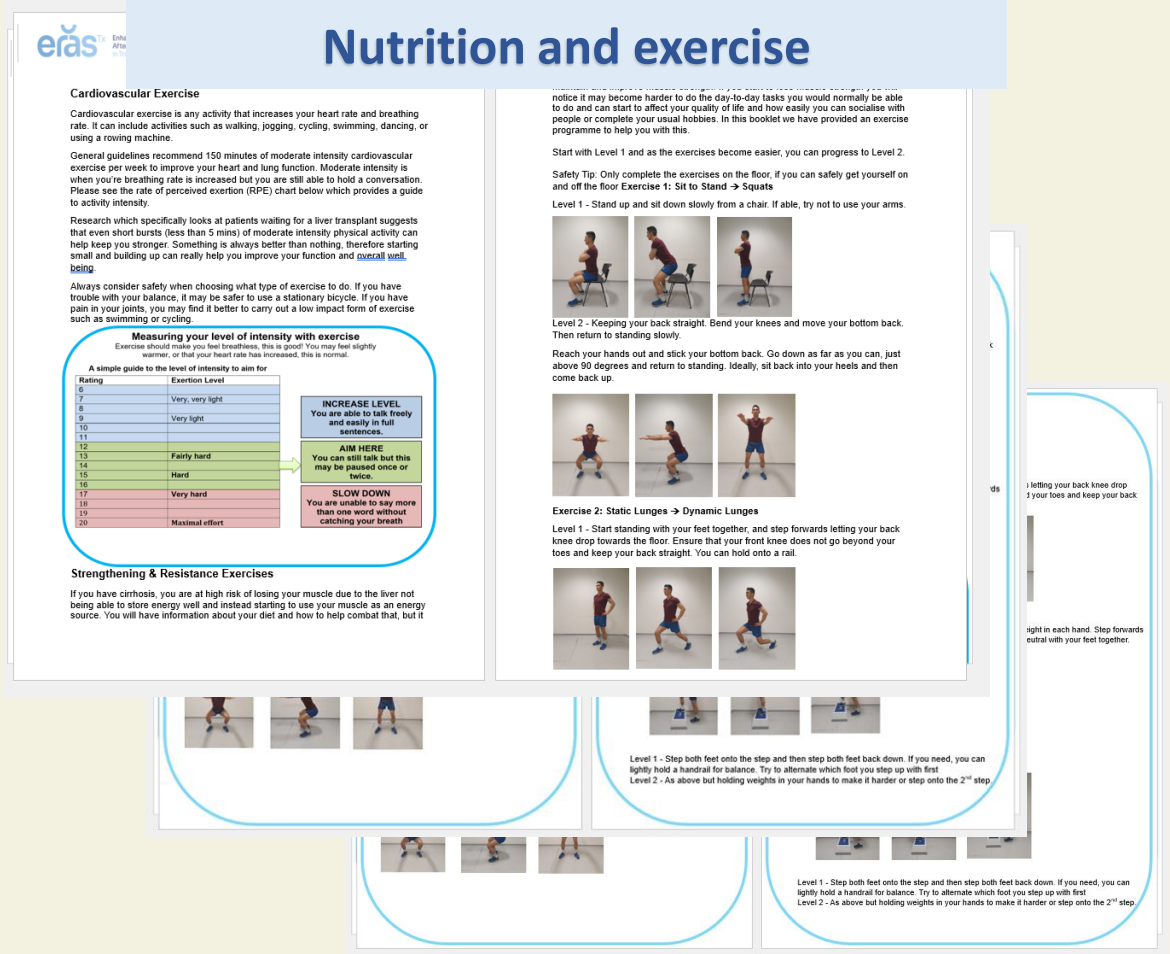
Prehab

Nutrition and exercise



Cardiovascular Exercise

Cardiovascular exercise is any activity that increases your heart rate and breathing rate. It can include activities such as walking, jogging, cycling, swimming, dancing, or using a rowing machine.

General guidelines recommend 150 minutes of moderate intensity cardiovascular exercise per week to improve your heart and lung function. Moderate intensity is when you're breathing rate is increased but you are still able to hold a conversation. Please see the rate of perceived exertion (RPE) chart below which provides a guide to activity intensity.

Research which specifically looks at patients waiting for a liver transplant suggests that even short bursts (less than 5 mins) of moderate intensity physical activity can help keep you stronger. Something is always better than nothing, therefore starting small and building up can really help you improve your function and overall well being.

Always consider safety when choosing what type of exercise to do. If you have trouble with your balance, it may be safer to use a stationary bicycle. If you have pain in your joints, you may find it better to carry out a low impact form of exercise such as swimming or cycling.

Measuring your level of intensity with exercise

Exercise should make you feel breathless, this is good! You may feel slightly warmer, or that your heart rate has increased, this is normal.

A simple guide to the level of intensity to aim for

Rating	Exertion Level
6	
7	Very, very light
8	
9	Very light
10	
11	
12	
13	Fairly hard
14	
15	Hard
16	
17	Very hard
18	
19	
20	Maximal effort

INCREASE LEVEL You are able to talk freely and easily in full sentences.

AIM HERE You can still talk but this may be paused once or twice.

SLOW DOWN You are unable to say more than one word without catching your breath

Strengthening & Resistance Exercises

If you have cirrhosis, you are at high risk of losing your muscle due to the liver not being able to store energy well and instead starting to use your muscle as an energy source. You will have information about your diet and how to help combat that, but it notice it may become harder to do the day-to-day tasks you would normally be able to do and can start to affect your quality of life and how easily you can socialise with people or complete your usual hobbies. In this booklet we have provided an exercise programme to help you with this.

Start with Level 1 and as the exercises become easier, you can progress to Level 2.

Safety Tip: Only complete the exercises on the floor, if you can safely get yourself on and off the floor **Exercise 1: Sit to Stand → Squats**

Level 1 - Stand up and sit down slowly from a chair. If able, try not to use your arms.

Level 2 - Keeping your back straight. Bend your knees and move your bottom back. Then return to standing slowly.

Reach your hands out and stick your bottom back. Go down as far as you can, just above 90 degrees and return to standing. Ideally, sit back into your heels and then come back up.

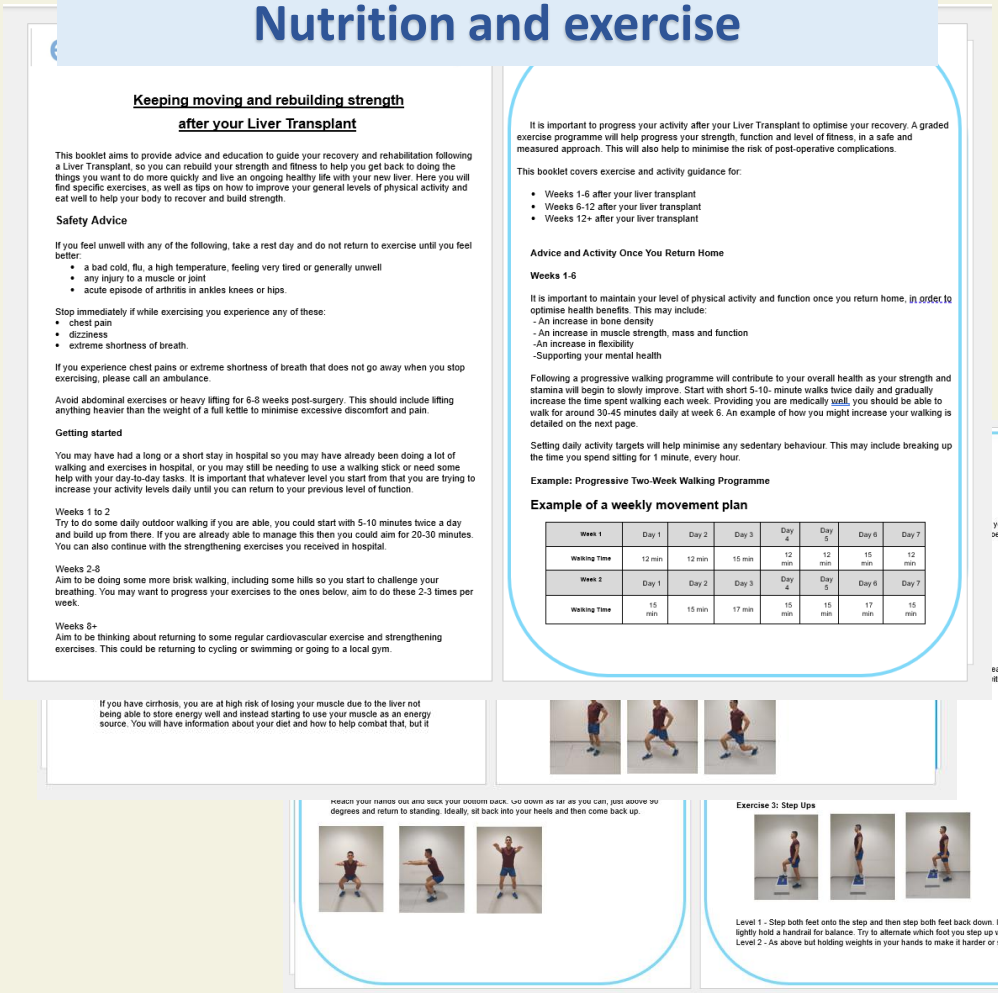
Exercise 2: Static Lunges → Dynamic Lunges

Level 1 - Start standing with your feet together, and step forwards letting your back knee drop towards the floor. Ensure that your front knee does not go beyond your toes and keep your back straight. You can hold onto a rail.

Level 1 - Step both feet onto the step and then step both feet back down. If you need, you can lightly hold a handrail for balance. Try to alternate which foot you step up with first
Level 2 - As above but holding weights in your hands to make it harder or step onto the 2nd step

Rehab

Nutrition and exercise



Keeping moving and rebuilding strength after your Liver Transplant

This booklet aims to provide advice and education to guide your recovery and rehabilitation following a Liver Transplant, so you can rebuild your strength and fitness to help you get back to doing the things you want to do more quickly and live an ongoing healthy life with your new liver. Here you will find specific exercises, as well as tips on how to improve your general levels of physical activity and eat well to help your body to recover and build strength.

Safety Advice

If you feel unwell with any of the following, take a rest day and do not return to exercise until you feel better:

- a bad cold, flu, a high temperature, feeling very tired or generally unwell
- any injury to a muscle or joint
- acute episode of arthritis in ankles knees or hips.

Stop immediately if while exercising you experience any of these:

- chest pain
- dizziness
- extreme shortness of breath.

If you experience chest pains or extreme shortness of breath that does not go away when you stop exercising, please call an ambulance.

Avoid abdominal exercises or heavy lifting for 6-8 weeks post-surgery. This should include lifting anything heavier than the weight of a full kettle to minimise excessive discomfort and pain.

Getting started

You may have had a long or a short stay in hospital so you may have already been doing a lot of walking and exercises in hospital, or you may still be needing to use a walking stick or need some help with your day-to-day tasks. It is important that whatever level you start from that you are trying to increase your activity levels daily until you can return to your previous level of function.

Weeks 1 to 2
Try to do some daily outdoor walking if you are able, you could start with 5-10 minutes twice a day and build up from there. If you are already able to manage this then you could aim for 20-30 minutes. You can also continue with the strengthening exercises you received in hospital.

Weeks 2-8
Aim to be doing some more brisk walking, including some hills so you start to challenge your breathing. You may want to progress your exercises to the ones below, aim to do these 2-3 times per week.

Weeks 8+
Aim to be thinking about returning to some regular cardiovascular exercise and strengthening exercises. This could be returning to cycling or swimming or going to a local gym.

It is important to progress your activity after your Liver Transplant to optimise your recovery. A graded exercise programme will help progress your strength, function and level of fitness, in a safe and measured approach. This will also help to minimise the risk of post-operative complications.

This booklet covers exercise and activity guidance for:

- Weeks 1-6 after your liver transplant
- Weeks 6-12 after your liver transplant
- Weeks 12+ after your liver transplant

Advice and Activity Once You Return Home

Weeks 1-6

It is important to maintain your level of physical activity and function once you return home, in order to optimise health benefits. This may include:
- An increase in bone density
- An increase in muscle strength, mass and function
-An increase in flexibility
-Supporting your mental health

Following a progressive walking programme will contribute to your overall health as your strength and stamina will begin to slowly improve. Start with short 5-10- minute walks twice daily and gradually increase the time spent walking each week. Providing you are medically well, you should be able to walk for around 30-45 minutes daily at week 6. An example of how you might increase your walking is detailed on the next page.

Setting daily activity targets will help minimise any sedentary behaviour. This may include breaking up the time you spend sitting for 1 minute, every hour.

Example: Progressive Two-Week Walking Programme

Example of a weekly movement plan

Week 1	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Walking Time	12 min	12 min	15 min	12 min	12 min	15 min	12 min
Week 2	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Walking Time	15 min	15 min	17 min	15 min	15 min	17 min	15 min

If you have cirrhosis, you are at high risk of losing your muscle due to the liver not being able to store energy well and instead starting to use your muscle as an energy source. You will have information about your diet and how to help combat that, but it

Reach your hands out and stick your bottom back. Go down as far as you can, just above 90 degrees and return to standing. Ideally, sit back into your heels and then come back up.

Exercise 3: Step Ups

Level 1 - Step both feet onto the step and then step both feet back down. If you need, you can lightly hold a handrail for balance. Try to alternate which foot you step up with first
Level 2 - As above but holding weights in your hands to make it harder or step onto the 2nd step

NHSBT ERAS project next steps

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NHSBT
Derek Manas, Medical Director
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Multidisciplinary Steering group

Expert by experience panels

Adult kidney transplant

Adult liver transplant COMING SOON

Living kidney donor

Pancreas transplant

Lung transplant

?Paediatric kidney transplant

Evaluation and measurements

- Stage 1
  - core and desirable ERAS components with supporting evidence
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  - Circulation and communication
  - Patient facing content
  - Additional resources

? Heart transplant

? Living donor liver

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Jess Hollingsworth
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Freeman Hospital, Newcastle

Jane Chappell
Addenbrookes, Cambridge

Ben Stutchfield, Aubrey McCallum, Catherine McAnenny
Royal Infirmary of Edinburgh

Liver NORTH LIVER PATIENT SUPPORT

BRITISH LIVER TRUST

Experts by experience panel

Erica Fairburn

Jayne Pilkington

Nathen Raffle

Sarah Barker

Katherine Walcot

Felicity Williams, Mathew Armstrong
QEH, Birmingham

Michael Spiro, Ilya Kantsedikas, Gemma Wells, Bryon O'Farrell, Abigail Greenwell, Rebecca Bateman
The Royal Free, London

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