Enhanced Recovery After Surgery
(Hip and knee joint arthroplasty)
Acknowledgements

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Date of publication

This guide was published in 2011 and will be reviewed in 2013. The latest version will always be available online at www.1000livesplus.wales.nhs.uk

The purpose of this guide

This guide has been produced to enable healthcare organisations and their teams to successfully implement a series of interventions to improve the safety and quality of care that their patients receive.

This ‘How to Guide’ must be read in conjunction with the following:

- Leading the Way to Safety and Quality Improvement
- How to Improve

Further guides are also available to support you in your improvement work:

- How to Use the Extranet
- A Guide to Measuring Mortality
- Improving Clinical Communication using SBAR
- Learning to use Patient Stories
- Using Trigger Tools
- Reducing Patient Identification Errors

These are available online at www.1000livesplus.wales.nhs.uk

We are grateful to The Health Foundation for their support in the production of this guide.
Improving care, delivering quality

The improvement work in Wales in recent years has shown what is possible when we are united in the pursuit of quality and the reduction of unnecessary harm for the patients we serve. The enthusiasm, energy and commitment of teams to improve care by following a systematic, evidence-based approach has resulted in many examples of better outcomes for patients.

We know that harm and error still occurs in health systems across the world. Many of these poor outcomes are avoidable and we can make changes to improve. However, problems with care can’t be solved by using the same kind of thinking that created them in the first place. To make the changes we need, we must build on our learning and make the following commitments:

■ Acknowledge the scope of the problem and make a clear commitment to change systems
■ Recognise that poor care outcomes are often caused by inadequate systems, despite the high levels of skill, professionalism and commitment of staff.
■ Acknowledge that improving patient outcomes requires everyone on the care team to work in partnership with one another and with patients and families.

The aim of 1000 Lives Plus as a national improvement programme is to support organisations and individuals to deliver the highest quality and safest healthcare for the people of Wales. This guide will help you to take a systematic approach and implement practical interventions that can bring that about.

The guide is grounded in practical experience and builds on learning from organisations across Wales and the experience of other improvement work.
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Enhanced Recovery After Surgery (ERAS) is a patient-centred method of optimising surgical outcome by improving both patient experience and clinical outcomes. The ERAS programme was first described by Professor Henrik Kehlet in 2000.¹

The principles underlying Enhanced Recovery After Surgery are about putting patients at the centre and making sure they receive optimal care. It means reducing waste in the form of cancelled operations, reducing harm by reducing length of stay in hospitals, and reducing variation by making sure that all surgical patients everywhere receive the same high level of care and make faster recoveries as a result.

In healthcare, many things have been done in certain ways for years. And yet, there is much evidence that there are better ways of working for patients. In this ‘How to’ Guide, the evidence is convincing and clear - we can improve surgical outcomes for patients with minimal upfront cost.

ERAS aims to improve the quality of care provided to patients who undergo major surgery. By improving the quality in care, and reducing harm it is also assumed that their hospital stay will become more efficient, thereby allowing hospital services to realise the benefits of the programme through savings in bed days.

Approximately 3 million surgical operations are performed in the UK each year, with an average hospital mortality of 0.8-1%. This equates to over 2,000 patients a year who die following surgery.² In Wales, it is reported that 1 in 10 people admitted to hospital are harmed unintentionally during their stay; and there is a 1 in 300 chance of dying as a result.³

In their editorial in the British Medical Journal, Urbach and Baxter suggested that “the immediate challenge to improving the quality of surgical care is not discovering new knowledge, but rather how to integrate what we already know into practice.”⁴ In today’s NHS, effective, efficient and safe healthcare provision has never been more important.

Additionally, while public spending is limited, public expectation is increasing, and so is litigation. It is self-evident that any healthcare management plan that is proven to deliver effective and efficient patient care should be adopted and incorporated into the routine care of patients.

ERAS, sometimes referred to as ‘fast track’, ‘accelerated’ or ‘Rapid Recovery’ surgery, is transforming elective surgical patient outcomes across the UK and Europe. Its efficacy is supported by a growing base of clinical and research evidence. Some of the principles of ERAS have already been implemented in sites across England and Wales⁵ and it is hoped that the benefits to patients and hospital services associated with this programme can be introduced across all healthcare organisations in Wales as part of 1000 Lives Plus.

The effectiveness of ERAS to improve outcomes is dependent on the engagement, commitment and involvement of all members of the multi-disciplinary team at all stages of the patient’s journey, starting with effective pre-operative assessment, continuing through the hospital stay and during recuperation in the patient’s own home.
This guide has been developed from clinical evidence and is supported by consensus opinion from colleagues’ experiences in the delivery of ERAS in Wales and elsewhere. The aim of this guide is to disseminate the knowledge gained from experience with ERAS thus far and to provide a primary resource to support the implementation of ERAS across Wales.

Although experience with ERAS to date has largely centred on colorectal surgery, exemplars have been demonstrated across others types of major surgery. In Wales ERAS has been conducted in major orthopaedic surgery over recent years. Much of the protocols used in Wrexham and other sites using ERAS have been included in this Guide.

It is anticipated that with the support of this Guide, all patients in Wales undergoing other types of elective Orthopaedic Surgery will too be able to realise the benefits of ERAS.

This Guide contains:

- An overview of ERAS
- Key elements of the ERAS pathway
- Key stages to be addressed in preparation for the implementation of ERAS
- Programme measures and outcomes

Enhanced Recovery after Surgery (ERAS) aims to standardise care, but it is essential that each patient is treated as an individual and their individual needs taken into account.

References

1 Kehlet, H and Morgensen T. 1999 Hospital stay of 2 days after open sigmoidectomy with a multimodal rehabilitation programme British Journal of Surgery Feb; 86 (2):227-30.
2 Modernising Care for Patients undergoing Major Surgery: www.reducinglengthofstay.org.
ERAS is a multi-modality, evidence-based approach to improving the quality of patient care after major surgery. It embodies a selected number of individual interventions which demonstrate a greater impact on outcomes when implemented together than when implemented as individual interventions. Success requires a multi-disciplinary approach.

The basic principles of ERAS include:

■ Ensuring the patient is in the best possible condition for surgery
■ Ensuring the patient has the best possible management during and after his/her operation
■ Ensuring the patient experiences the best possible rehabilitation, enabling early recovery and discharge from hospital, allowing them to return to their normal activities quicker.

The ERAS pathway can instil a greater confidence in patients of their healthcare organisations. Additionally, by improving the quality in care and reducing harm it is assumed that hospital stay will become more efficient, and hospital services can realise the benefits.

The 1000 Lives Plus ERAS mini-collaborative will adopt a ‘Care Bundle’ approach. The key drivers or interventions, which have been clinically proven to have the greatest impact on outcome following surgery, are grouped together, to promote their delivery. To comply with a particular Bundle, all the interventions within the Bundle must be delivered.

Monitoring how the Care Bundles are delivered, allows clinical and managerial teams to gain a better insight into the progress of organisations.

For the All Wales Orthopaedic ERAS Collaborative the drivers and interventions are grouped into the following bundles:

■ Primary Care Bundle
■ Pre-operative assessment Care Bundle
■ Peri-operative Care Bundle
■ Post-operative Care Bundle
■ Discharge and follow-up Care Bundle

Checking for signs and symptoms of anaemias with confirmation by blood test will allow the correction of haematological status prior to surgery. It is proposed that interventions are instigated by GPs to start the process of optimising the patient’s condition prior to surgery.
## Enhanced Recovery After Surgery
### Elective Orthopaedics
*(hip and knee joint arthroplasty) Driver Diagram*

**Content Area**

**Drivers**

**Interventions**

**Primary Care Bundle**
- Maximising physical and functional status

- **Pre-operative Assessment Bundle**
  - Maximising physical and functional status whilst preparing patient for surgery

- **Peri-operative Bundle (includes 1 week prior to admission and including time in theatre)**
  - Reducing the stress response to surgery and promoting homeostasis

- **Post-operative Bundle**
  - Patient-centred and goal-orientated specialist care following surgery

- **Discharge Bundle and follow-up care**
  - Timely discharge planning that supports the patient in a safe discharge and monitors care post-operatively to detected potential complications

**Improve outcomes for patients undergoing knee/hip replacement Surgery**

### Drivers Interventions

- **Healthy living advice**
- **Nutritional screening**
- **Optimisation of fitness**
- **Management and optimisation of pre-existing co-morbidities**

- **Multi-disciplinary educational session (4 to 6 weeks before surgery)**
- **MDT assessments/referrals**
- **Health screening**
- **Patient education in pre-assessment**
- **Nutritional screening completed**
- **Pre-operative patient reported outcomes (PROMS) recorded**
- **Provide patient with Predicted Date of Discharge (PDD)**
- **Discuss discharge plans/needs**

- **Review indication for antiplatelet agents**
- **Day of Surgery admission**
- **Give pre-medication analgesia as prescribed**
- **Clear fluids up to 2 hours pre-operative**
- **Carbohydrate loading pre-operative**
- **Confirm all discharge arrangements with patient including transport home**
- **Limit use of drains and catheters**
- **Maintain normothermia**
- **Effective opiate-sparing analgesia**
- **Local Infiltration Analgesia (LIA)**

- **Early planned mobilisation**
- **Effective opiate-sparing analgesia which facilitates early mobilisation**
- **Regular assessments of pain control and Post-operative nausea and vomiting (PONV)**
- **Oral nutrition as soon as patient able to tolerate or within 12 hours of surgery**

- **Follow up phone call by nominated health professional within 48 hours post-discharge**
- **Discharge needs confirmed with family/social services following surgical intervention**
- **Patient follow up post discharge**
- **Appropriate MDT follow up post discharge**
Have you set up your team?

You need to consider three different dimensions:

- Organisational level leadership
- Clinical or technical expertise
- Frontline leadership and team membership

See the ‘Leading the Way to Safety and Quality Improvement’ How to Guide and Appendix F for further information.

Do you know how you will measure outcomes?

To ascertain the effectiveness of ERAS, you should use the following outcome measures:

- Length of stay
- Patient satisfaction
- Time to weight-bearing mobilisation
- Pain scores
- Post-operative nausea and vomiting (PONV) Scores
- Re-admission rates (within 28 days of discharge)
- Oxford hip/knee scores (Appendix D)
- Mortality rates

Do you and your team understand how to apply the Model for Improvement?

The Model for Improvement is a fundamental building block for change and you need to understand how to use it to test, implement and spread the interventions in this guide.

See the ‘How to Improve’ Tools for Improvement guide and Appendix G for further information.

How are you going to measure process reliability?

In order to improve outcomes for your patients you need to demonstrate you are using these interventions reliably. This means that all the elements of the interventions are performed correctly on 95% or more of the occasions when they are appropriate. You need to do this by using the process measures in this guide.

See the ‘How to Improve’ Tools for Improvement guide and Appendix B for a summary of all process measures.

How will you share your learning?

Contact 1000 Lives Plus for details of mini-collaboratives and other ways to share your learning and to learn about the progress of other teams.
Enhanced Recovery After Orthopaedic Surgery Drivers and Interventions

This section details the interventions highlighted in the driver diagram which evidence has shown to be effective in this content area. You should use the Model for Improvement to test, implement and spread each intervention, using the listed process to monitor progress.

**Driver: Primary care bundle**

For patients to achieve the best results post-operatively, it is vital that assessment and preparation of the patient referred for possible elective surgery starts in Primary Care. This maximises the time that the intervention can benefit post-operative outcome.¹

The General Practitioner and Practice Nurse play a fundamental role in optimising patients for surgery. Performing a ‘fit for list’ health screening as an adjunct to referral should identify risks that may increase morbidity. This screen should include assessment of nutritional status, glycaemic control, blood pressure, renal function, body mass index, current lifestyle and current levels of physical fitness.²

The GP can play a role in encouraging self-management through appropriate diet and exercise while awaiting the hospital appointment and, if appropriate, referring the patient on to primary care health improvement programmes such as Stop Smoking Wales, weight reduction and exercise programmes. This is important as identifying and treating/optimising a patient’s condition may take a number of weeks.

Checking for signs and symptoms of anaemia with confirmation by blood test will allow the correction of haematological status prior to surgery. It is proposed that interventions are instigated by GPs to start the process of optimising the patient’s condition prior to surgery.

This ‘optimisation’ continues in secondary care and therefore needs to be in partnership with the anaesthetist and surgeon. It is recommended that GPs receive timely communication from pre-operative assessment in secondary care to inform them of the patient’s progress and proposed surgical intervention. This will ensure that GPs are integral to the decision making progress as patients often wish to discuss the proposed surgery with their own GP.

**Summary**

*What are we trying to accomplish in Primary Care?*

- Detection of new co-morbidities or maximising the treatment of pre-existing co-morbidities to improve physical and functional status.
Healthy Living advice if required, including weight loss, smoking cessation and optimisation of fitness.

Timely and effective communication between primary care and secondary care interfaces.

Detection of anaemia and prompt treatment if required.

**How will we know if a change is an improvement?**

By collecting the following data points for every patient:

- Date of onset of symptoms that may require surgical intervention
- Date of first contact by GP
- Date of discussion regarding healthy living advice
- Date of review of co-morbidities and interventions made
- Date of referral and communication from GP to secondary care
- Date of communication from secondary care to GP to outcome after diagnosis and pre-operative assessment
- Date of biochemical and haematological assays (and date of actions if needed)

**Summary of Interventions:**

<table>
<thead>
<tr>
<th>Element</th>
<th>Yes</th>
<th>No</th>
<th>Variance</th>
</tr>
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<tbody>
<tr>
<td>Patient advised on improving fitness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient assessed for hypertension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutritional screen completed</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Patient given health improvement advice for smoking and weight loss including necessary referrals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient assessed for anaemia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment of patient’s existing co-morbidities completed</td>
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Evidence for the effectiveness of Primary Care Interventions

Anaemia

Anaemia is a common condition in surgical patients and is independently associated with increased mortality. Anaemia carries increased mortality risk, and additionally is associated with increased requirement for transfusion, which is also associated with increased mortality. Treatment of pre-operative anaemia should be the focus of investigations for the reduction of peri-operative risk.1

It is now recognised that correcting even minor degrees of anaemia significantly reduces the need for transfusion and the resultant increase in morbidity and mortality following major surgery. The thresholds are:

- Females = Hb <12g/l
- Males = Hb <13g/l

It is essential that the clinical team (primary and secondary care) are aware of these thresholds and treat accordingly.3

Hypertension

Pre-existing hypertension is common in patients undergoing surgery; approximately 30% of adults and 60% of those with known coronary heart disease (CHD) report a pre-operative diagnosis of hypertension.4

In a case-control study of 76 patients who died of a cardiovascular cause within 30 days of elective surgery, a pre-operative history of hypertension was four times more likely than among 76 matched controls.5

Pre-existing co-morbidities

Patients who have diabetes are a high-risk group for surgery with the likelihood of increased late cancellation at pre-operative assessment or upon admission as well as increased length of stay, morbidity, mortality, use of HDU/ITU, and re-admissions.6

Reducing these risks by improving control of diabetes,7 and blood pressure and cholesterol,8,9 is known to improve outcomes and help to ensure diabetic patients can benefit from enhanced recovery pathways.

Healthy Living advice

Healthy Living advice is vital to support the patient in recovery post-operatively. Patients who smoke are more likely to:

- Have pulmonary, circulatory and infectious complications
- Experience reduced bone fusion and impaired wound healing
- Be re-admitted to an ICU
- Face increased risk of in-hospital mortality
Due to this increase in risks, smokers are more likely to stay in hospital longer. It is recommended that patients cease smoking at least eight weeks prior to surgical intervention for the risk of complications to return to similar levels of non-smokers. This can be supported by referrals to local smoking cessation teams and/or the Stop Smoking Wales Campaign.

Screening patients as to their alcohol consumption will provide sufficient time to surgery for successful intervention. The role of the referring General Practitioner in providing advice and support is recommended, but does require evaluation as to its efficacy.

**Improving fitness**

Maintaining and increasing physical activity can bring many important benefits to patients undergoing Orthopaedic Surgery. Exercise can improve strength, balance and flexibility. It can also lower the risk of heart disease and stroke, reduce blood pressure and obesity levels.

**Nutritional Status**

Nutritional screening is now mandatory for all patients admitted to hospital in Wales. By promoting nutritional screening in primary care, this would allow patients who are either malnourished or at risk of malnutrition to be started on the appropriate nutritional intervention before being referred into secondary care. This may allow adequate time for promotion of nutritional status and wellbeing before the patient undergoes surgery.

Patients with a Body Mass Index in the overweight or obese category should be referred for the appropriate dietary advice and fitness intervention alongside referral to secondary care for surgical opinion. Evidence suggests that obese patients have a more complicated operative recovery compared to patients with a BMI in the normal weight range.
References


2. AAGBI Safety Guideline 2010, Pre-operative assessment and patient preparation, the role of the anaesthetist. The Association of Anaesthetists of Great Britain and Ireland


4. www.transfusionguidelines.org.uk/

5. www.nhs.uk/Conditions/Anaemia-Iron-deficiency/-Pages/MapofMedicinepage.aspx

6. UKPDS UK prospective diabetes study, DCCT (Diabetes Control and Complications Trial)


All patients planned to undergo an elective hip or knee replacement should be included in the ERAS programme. A coherent pre-operative service is fundamental to the delivery of Orthopaedic ERAS. Even patients who have multiple pre-existing medical or social problems and are perceived unlikely to achieve the predicted length of stay, will benefit from comprehensive pre-admission interventions.

The patient’s pre-operative assessment appointment plays an essential role in how the patient understands, considers and ultimately participates in the ERAS pathway. The structure for the pre-operative assessment service should be designed to provide both a generic and procedure-specific service. Ideally, the location and physical place of pre-operative assessment will be convenient for the patient and will appropriately accommodate all relevant assessments and services.

Pre-assessment clinic should be carried out on the same day the decision for surgery is made and a date for admission agreed with the patient. The optimal time is considered up to six weeks between pre-operative assessment and day of surgery. This allows adequate time to maximise the benefit of the interventions required and for the patient to attend a multi disciplinary educational session, often termed ‘Joint school’.

What are we trying to accomplish at pre-operative assessment and pre-habilitation?

Pre-operative assessment and pre-habilitation should:

- Ensure every patient is fully informed about their proposed procedure and the interventions that will need to be undertaken
- Estimate the level of risk for every patient
- Ensure every patient understands their own individual risk so that they can make an informed decision about whether to proceed to surgery
- Identify co-existing medical illnesses and optimally prepare patients whilst taking into account the urgency of the operation
- Identify patients with a high risk of complications in the peri-operative period and define the appropriate post-operative level of care (day stay, in-patient, ward, HDU, critical care)
- Discuss predicted length of stay and date of discharge
- Ensure a nutritional assessment is performed on every patient and an appropriate treatment plan is formulated if required
- Refer to appropriate members of the MDT as needed
- Discuss and plan discharge needs (support, equipment or adaptations) to facilitate a timely discharge
How will we know if a change is an improvement?

Collecting the compliance to the following data points for every patient will show improvements.

<table>
<thead>
<tr>
<th>Element</th>
<th>Yes</th>
<th>No</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritional tool completed¹</td>
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<td></td>
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<tr>
<td>Multidisciplinary educational session (4 to 6 weeks before surgery)</td>
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<tr>
<td>Thromboprophylaxis screening tool completed²</td>
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<tr>
<td>Co-morbidities assessed before surgery³,⁴</td>
<td></td>
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<tr>
<td>Discharge plans/needs assessed and referrals made</td>
<td></td>
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<tr>
<td>Advice given on improving co-morbidities before surgery</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Enhanced recovery care explained to patient⁵</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Health and risk assessment completed</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ERAS pathway commenced</td>
<td></td>
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<tr>
<td>Referrals made to MDT as appropriate</td>
<td></td>
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<tr>
<td>Pre-operative Oxford hip/knee score documented</td>
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<tr>
<td>Predicted date of discharge given to patient</td>
<td></td>
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<tr>
<td>Patient referred for appropriate investigations/tests</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Patient information booklets given⁶</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pre-operative patient reported outcomes (PROMS) recorded</td>
<td></td>
<td></td>
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<tr>
<td>Patient given pre-operative carbohydrate loading drinks and advised when to drink them</td>
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Evidence supporting the pre-operative interventions

**Pre-operative assessment**

These clinics should be nurse-delivered, anaesthetic-led and patient-centred. Anaesthetists should assume a central role in the organisation of pre-operative services that encompass much more than preparing the delivery of anaesthesia.

Pre-operative anaesthetic assessment should minimise risk for all patients as well as identify patients at particularly high risk. The Association of Anaesthetists of Great Britain and Ireland, outlined several recommendations in their paper, “Preoperative Assessment and Patient Preparation - the role of the Anaesthetist”. These recommendations have been adopted by the 1000 Lives Plus ERAS collaborative.

All Wales Standards for patient assessment have been agreed and can be accessed at http://nliah.com/preop

**Nutrition**

Optimal nutritional intervention is essential in all patients undergoing major surgery. It is recommended that patients who are either malnourished or at risk of malnutrition are assessed by a qualified dietitian and nutritional intervention instigated to optimise the patient’s nutritional status. This can either be by recommending food fortification advice or prescribing oral sip feeds. In some cases it may be necessary to use artificial nutritional support.

**Physiotherapy, occupational therapy and social services**

Timely referrals to therapy services are essential to optimise physical and functional status in order to achieve optimal long-term recovery. Providing strength and respiratory exercises may benefit post-operative recovery. Patients require pre-operative physiotherapy and occupational therapy assessment. For patients requiring specialised adaptive equipment on discharge from hospital, early occupational therapy intervention is vital to ensure that the patient’s home environment is adapted in a timely manner to facilitate a safe discharge.

Early engagement with physiotherapy, occupational therapy and social services should help to prevent any delays in patient discharges from hospital and facilitate discharges back into Primary Care.

**Patient education sessions**

Effective education improves the patient’s experience pre and post orthopaedic surgery. Optimal education manages the patients’ and relatives expectations, and has been demonstrated to reduce pain by reducing stress and anxiety. Educational sessions should be scheduled 4 to 6 weeks prior to surgery. For optimal recovery, patients should be strongly advised and encouraged to attend these sessions.
Key elements of a patient education session:

- **Multi-disciplinary team approach**
- Patient invited to bring a friend or relative to act as a ‘personal coach’
- Comprehensive and easy-to-understand written patient information guide
- Baseline assessment of patient satisfaction and experience\(^{10, 11}\)

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**Thromboprophylaxis**

Thromboprophylaxis reduces the risk of developing a venous thromboembolism (VTE)\(^{12}\), which is now recognised as a significant problem after joint replacement surgery.

Deep vein thrombosis (DVT) occurs in 40-80% of cases in knee replacement surgery without prophylaxis and Pulmonary Embolism (PE) in 1-10%.\(^{13}\) The incidence of DVT without prophylaxis is 50% in hip surgery.

Health boards should assess all patients on admission to identify those who are at increased risk of VTE\(^{15}\) (this is set out in the NICE CG 92).

Surgical patients and patients with trauma are at increased risk of VTE if they meet the following criteria:

- Surgical procedure with a total anaesthetic and surgical time of more than 90 minutes, or 60 minutes if the surgery involves the pelvis or lower limb
- Patients with one or more risk factors\(^{15}\)

Further guidance around VTE in Wales can be found on [www.1000livesplus.wales.nhs.uk](http://www.1000livesplus.wales.nhs.uk), including the all-Wales thromboprophylaxis screening tool.
References

2 www.bmj.com/content/308/6923/235.full or http://web.jbjs.org.uk/cgi/reprint/86-B/6/788.pdf
4 UKPDS UK prospective diabetes study, DCCT (Diabetes Control and Complications Trial)
5 www.dtu.ox.ac.uk/index.php?maindoc=/ukpds_trial/faq.php
6 www.dh.gov.uk/consent
16 www.wales.nhs.uk/sitesplus/829/opendoc/172088
Driver: Peri-operative bundle

Optimal management peri-operatively is a key aspect of the ERAS Programme. It is essential that all interventions are adopted to maximise benefit.

What are we trying to accomplish 1 week before surgery and immediately post-operative?

- Day of surgery admission (DOSA)
- Anaesthesia with quick onset and rapid recovery
- Reduction of complications and harm associated with anti-coagulation therapy
- A fully informed and prepared patient who has been given all knowledge required before surgery commences
- Effective opiate-sparing analgesia management which facilitates early mobilisation
- Routine nausea and vomiting prophylaxis

How will we know if a change is an improvement?

Collecting the compliance to the following data points for every patient will show improvements.
<table>
<thead>
<tr>
<th>Element</th>
<th>Yes</th>
<th>No</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient admitted on day of surgery¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient weighed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thromboprophylaxis screening tool reviewed and required treatment given²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review indications for anti-platelet agents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-medication analgesia given as prescribed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutritional screen completed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Re-confirm all discharge arrangements with patient including transport home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient orientated to ward and pathway discussed with patient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear fluids received 2 hours pre-operatively³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbohydrate drinks given pre-operatively</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normothermia maintained pre-operatively⁴</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normothermia maintained intra-operatively⁴</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance of drains and limited use of urinary catheters⁸</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal directed fluid therapy if indicated (ASA 3 or above)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance/minimal use of opiates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local infiltration analgesia used⁹-¹⁴</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Evidence supporting the peri-operative interventions

Day of Surgery Admission (DOSA)
Moving to same day admission has several benefits; namely reducing surgical site infections and reducing post-operative complications. This will have ramifications for improved patient experience with patients spending less time in hospital ultimately providing improved capacity within secondary care settings.1

DOSA is dependent on rigorous pre-operative assessment, and robust bed management processes.

Nutrition
Carbohydrate loading is one of the key elements in ERAS.17 Studies support the use of oral carbohydrate loading pre-operatively in orthopaedic surgery. Post-operative insulin resistance was reduced and patients had improved immune response post-operatively.15,16 Carbohydrate loading promotes an anabolic response leading to improved muscle strength and maintenance of lean body tissue.

Carbohydrate loading improves patients experience by reducing anxiety peri-operatively, but also reduces thirst, and hunger.15 Carbohydrate should be administered 12 hours and 2-4 hours prior to surgery. Caution is needed for patients with known diabetes.

Anaesthetic and Analgesia Management
Where possible, regional anaesthetic techniques should be used. Regular paracetamol and non-steroidal anti-inflammatory agents (NSAID’s) will reduce opiate requirements. Peri-operative Gabapentinoids (gabapentin/pregabalin) have also demonstrated reduced post-operative opioid consumption and incidence of chronic neuropathic pain.

Local Infiltration Analgesia (LIA) has been shown to provide adequate postoperative pain control without limiting mobilisation and reduces post-operative opiate consumption.9-14 Research outside the United Kingdom has shown that an intravenous magnesium sulphate infusion during surgery can improve post-operative analgesia9 (NB: refer to British National Formulary for UK licensing).

Effective post-operative analgesia is essential to facilitate early mobilisation.
Minimising the risk of post-operative nausea and vomiting (PONV)

Patients often report that postoperative nausea and vomiting can be more stressful than pain. Appropriate anti-emetics should be prescribed, either for prevention or to be given at the first sign of symptoms.

Surgical interventions

To reduce the risk of surgical site infection, antibiotics should be given 60 minutes or less before ‘knife to skin’, as per the WHO Safer Surgery checklist. The routine use of drains and lines should be avoided where possible to reduce the risk of infection and ease problems with early mobilisation. Similarly, urinary catheters should be removed as soon as possible after surgery, but this is dependent on patient need and the type of surgery performed.
References


2. www.bmj.com/content/308/6923/235.full or http://web.jbjs.org.uk/cgi/reprint/86-B/6/788.pdf


7. Patient management guidelines elective total knee replacements Wrexham Maelor Hospital 2010


Enhanced Recovery After Surgery - Elective Orthopaedics


# Driver: Post-operative Bundle

The aim of post-operative rehabilitation in ERAS is to ensure the recovery period is optimised and that the patient remains empowered to follow the care plan defined pre-operatively.

## Interventions

*What are we trying to accomplish post-operatively?*

- Appropriate effective analgesia
- Early oral nutrition within 12 hours of leaving the operating theatre or as soon as patient able to tolerate
- Optimal fluid balance
- Early post-operative mobilisation
- Improved Oxford knee/hip score ref 11 (Appendix D)
- Monitoring of post-operative morbidity scores (see Appendix E)

<table>
<thead>
<tr>
<th>Element</th>
<th>Yes</th>
<th>No</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee flexion in recovery (knee arthroplasty only)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobilise from bed to chair on the day of surgery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-operative nausea and vomiting monitored regularly (at least 3 times daily) and managed appropriately</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catheter removal achieved 24 hours post-operation&lt;sup&gt;10&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight bear and mobilise four times daily from day 1 post-operatively</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain control assessed regularly (at least 3 times daily) and managed appropriately</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral nutrition within 12 hours of surgery or as soon as patient able to tolerate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily POMS performed</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Evidence supporting the post-operative interventions

**Early nutrition**

Early oral or enteral feeding is associated with an improved clinical outcome. Oral and enteral feeding has been shown to be safe and well tolerated but is dependent on using appropriate anaesthesia and analgesia, nausea and vomiting prophylaxis and optimal fluid balance as already highlighted.

For patients who are malnourished or at risk of becoming malnourished, nutritional supplementation has been shown to improve nutritional status and quality of life.

The delivery of oral or enteral nutrition has been demonstrated to be maximal if commenced immediately, within 12 hours after surgery. If patients are unable to achieve adequate nutrition post-operatively, artificial nutrition is recommended by the NICE guidelines on nutritional support.

**Optimal Fluid Balance**

Fluid balance is central to the return of normal function post-operatively. Sub-optimal fluid balance can impair wound healing, affecting tissue oxygenation, leading to prolonged hospitalisation. It has been standard practice in recent years to infuse volumes of intravenous fluids substantially in excess of actual peri-operative losses.

The best way to limit post-operative intravenous fluid administration is to stop intravenous infusions and return to enteral oral fluids early. The issues surrounding the challenges of post-operative fluid management were highlighted in a survey by Lobo (2002), which concluded that current peri-operative fluid and electrolyte management in the UK is sub-optimal.

The GIFTASUP guidelines provide a consensus for the recommendations for peri-operative fluid management. These guidelines will be adopted as part of the ERAS programme in Wales.

**Early Rehabilitation**

Bed rest is not recommended post-operatively. Early mobilisation maintains muscle mass and promotes muscle strength, whilst maximising respiratory function. Limited mobility is associated with increased risk of thromboembolism.

The plan for post-operative mobilisation will depend upon the nature of the surgery and the condition of the patient. A comprehensive patient assessment is essential to identify appropriate rehabilitation goals and aims. All expectations should be discussed fully with the patient pre-operatively. To enable early mobilisation adequate analgesia is vital.

All post-operative rehabilitation interventions should be performed within relevant orthopaedic precautions (if applicable).
An example of early rehabilitation:

Day 0 Recovery Room
- Circulatory exercises - ankle/foot exercises
- Active knee flexion (knee arthroplasty only) - within pain limits

On return to ward
- Circulatory exercises - ankle/foot exercises
- Check respiratory function - breathing exercises
- Active knee or hip flexion/extension - ensure adequate analgesia
- Static quadriceps exercises
- Mobilise from bed to chair with frame (if cardiovascular system and other vital signs stable)

Day 1 Post-operative
- Circulatory exercises - ankle/foot exercises
- Check respiratory function - breathing exercises
- Appropriate active range of motion and strengthening exercises - ensure adequate analgesia
- Static quadriceps exercises
- Mobilise from bed to chair with frame (check all vital signs before mobilisation)
- Request patient to walk only with supervision if needed
- Mobilise patient four times daily (aim for 20m - 40m each walk, or individually adapted goal)
- Discuss and confirm aftercare (step-down/social service/family/ neighbours)
- Progress onto crutches/sticks if confident/safe on frame
- Gait re-education

Day 2 Post-operative
- Continue all exercises
- Appropriate active range of motion and strengthening exercises - ensure adequate analgesia
- Progress to crutches/sticks if confident/safe on the frame
- Mobilise 4 times daily with appropriate walking aid
- Gait re-education
- Stairs can be done if confident safe on crutches/sticks (if appropriate)
- Confirm discharge plan
Day 3 post-operative and onwards

- Continue all exercises
- Continue mobilising with crutches (or appropriate walking aid)
- Gait re-education
- Stairs (if appropriate)
- Ensure patient is independent in all transfers and activities of daily living (or has achieved adapted transfer/ADL rehabilitation goals identified for discharge)
- Issue and reiterate post-discharge home exercise program
- Referral letter for post-operative physiotherapy if required
- Discharge (when all discharge criteria met)

Post-operative Morbidity Score (POMS)

This is a validated 18-item survey which addresses nine domains of post-operative morbidity. It aims to identify morbidity of a type and severity that could delay discharge from hospital.14

References


9 http://www.bapen.org.uk/pdfs/bapen_pubs/giftasup.pdf

Driver: Discharge and follow-up bundle

The predicted date of discharge and length of stay should be discussed with patients and their families and/or carers, and documented at pre-operative assessment clinic. If required, referral to occupational therapy and/or social services at pre-operative assessment should have allowed any specific needs to be pro-actively planned and managed, leading to the avoidance of unnecessary delays in discharge. The use of acute response teams and re-enablement teams may be required to facilitate discharge of patients requiring extra support at home.

Adherence to agreed patient-focused discharge criteria, discussed with the patient prior to surgery, should facilitate discharge. It is essential that the patient shares in the decision for discharge and is only discharged when ready. Criteria may vary slightly between hospital sites but, in general, it is expected that patients would:

- tolerate diet and oral fluids
- be able to mobilise safely
- be confident and agree to go home

The primary care team (GP, district and community nurses) responsible for referring the patient for surgery should be informed of the discharge date and needs prior to discharge. This ensures primary care colleagues are aware of who to contact for advice and guidance to prevent the need for unnecessary readmission. If further rehabilitation and/or follow-up is required following hospital discharge, the relevant services should be informed in a timely manner and appropriate appointments/referrals should be made as necessary. The patient should be informed of all follow-up arrangements to avoid any confusion or anxiety.

All patients should be telephoned by a member of the Orthopaedic ERAS team at 24 hours, 3 days and 7 days after discharge to offer support and reassurance. This should help maintain patient confidence and improve the patient experience.
<table>
<thead>
<tr>
<th>Element</th>
<th>Yes</th>
<th>No</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge needs confirmed with family/social services following surgical intervention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TTO’s ordered and dispensed for patient, day before discharge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate MDT follow-up post-discharge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow-up Oxford hip/knee score obtained and documented</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix A - Process Measures

<table>
<thead>
<tr>
<th>Process Measures</th>
<th>Outcome Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance with Assessment Care Bundle</td>
<td>Length of stay</td>
</tr>
<tr>
<td>Compliance with Immediate Care Bundle</td>
<td>Patient satisfaction</td>
</tr>
<tr>
<td>Compliance with Intra-operative Bundle</td>
<td>Time to weight-bearing mobilisation</td>
</tr>
<tr>
<td>Compliance with Post-op Bundle</td>
<td>Pain scores</td>
</tr>
<tr>
<td>Compliance with Discharge and Follow-Up</td>
<td>Post-operative complications</td>
</tr>
<tr>
<td>Bundle</td>
<td>PONV Scores</td>
</tr>
<tr>
<td></td>
<td>Re-admission rates (within 28 days of discharge)</td>
</tr>
<tr>
<td></td>
<td>Oxford scores (6 weeks, 6 months and 2 years)</td>
</tr>
<tr>
<td></td>
<td>Mortality (in hospital and 30 day)</td>
</tr>
</tbody>
</table>
Appendix B - Derivation and Prospective Validation of a Simple Index for Prediction of Cardiac Risk of Major Non-cardiac Surgery

Criteria: Assign 1 point for each of the following, and total:

- High Risk Surgery: 1 Point
- Coronary Artery Failure: 1 Point
- Cerebrovascular disease: 1 Point
- Diabetes Mellitus on insulin: 1 Point
- Serum Creatinine >177μmol/L: 1 Point
- Congestive Heart Failure: 1 point

<table>
<thead>
<tr>
<th>Points</th>
<th>Risk of major Cardiac event</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Very Low (0.4% complications)</td>
</tr>
<tr>
<td>1</td>
<td>(0.9% complications)</td>
</tr>
<tr>
<td>2</td>
<td>(6.6% complications)</td>
</tr>
<tr>
<td>3</td>
<td>(&gt;11% complications)</td>
</tr>
</tbody>
</table>

Reference

Appendix C - Definitions of post-operative complications

1. Acute Myocardial infarction - at least two of:
   • New onset or worsening of ischaemic symptoms
     (eg. Chest pain, shortness of breath) lasting longer than 20 minutes;
   • Changes on the electrocardiogram consistent with ischaemia, including:
     □ Acute ST elevation followed by the appearance of Q waves or loss of R waves
     □ New left bundle branch block
     □ New persistent T wave inversion for at least 24 hours
     □ New ST segment depression which persists for at least 24 hours
   • A raised Troponin level or a peak Creatinine Kinase MB fraction >4% of an elevated total Creatinine Kinase level, with characteristic rise and fall

2. Cardiac arrest - documented sudden cessation of Cardiac output maintaining effective circulation

3. Reintubation

4. Acute Pulmonary oedema - respiratory compromise with chest X-ray showing extravascular fluid in lung tissues and alveoli

5. Pulmonary embolus - high probability of embolus on V/Q scan or pulmonary angiogram

6. Stroke - confirmed by computerised tomography scan, and clinical symptoms such as paralysis, weakness or speech difficulties, first documented after operation

7. Sepsis (Systemic inflammatory response syndrome) - new finding of at least two of:
   □ Temperature, >38.3 degrees centigrade, or, <36 degrees centigrade
   □ White cell count, >12 x 10^9L
   □ Respiratory rate, >20 breaths/minute
   □ Heart rate, >90 beats/minute or
   □ A positive result of a blood culture alone

8. Wound infection - purulent discharge or redness, or serous discharge and positive result of a culture or having antibiotic treatment

9. Unplanned return to operating room - related to the surgery (e.g. bleeding)

10. Acute renal impairment - increase in serum creatinine level >20% of preoperative value, or admission to intensive care unit for renal replacement therapy

11. Unplanned admission - to intensive care unit, coronary care unit or high dependency unit

12. Death

McNicol L et al. Postoperative complications and mortality in older patients having non-cardiac surgery at three Melbourne teaching hospitals MJA 2007; 186: 447-452
# Problems with Your Knee

Tick (√) one box for every question.

<table>
<thead>
<tr>
<th>1. During the past 4 weeks...</th>
<th>How would you describe the pain you usually have from your knee?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. During the past 4 weeks...</th>
<th>Have you had any trouble with washing and drying yourself (all over) because of your knee?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No trouble at all</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. During the past 4 weeks...</th>
<th>Have you had any trouble getting in and out of a car or using public transport because of your knee? (whichever you would tend to use)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No trouble at all</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. During the past 4 weeks...</th>
<th>For how long have you been able to walk before pain from your knee becomes severe? (with or without a stick)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No pain/More than 30 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. During the past 4 weeks...</th>
<th>After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your knee?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all painful</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. During the past 4 weeks...</th>
<th>Have you been limping when walking, because of your knee?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rarely/never</td>
</tr>
</tbody>
</table>
7. **During the past 4 weeks...**
   Could you kneel down and get up again afterwards?
   
<table>
<thead>
<tr>
<th></th>
<th>Yes, easily</th>
<th>With little difficulty</th>
<th>With moderate difficulty</th>
<th>With extreme difficulty</th>
<th>No, impossible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. **During the past 4 weeks...**
   Have you been troubled by **pain from your knee** in bed at night?
   
<table>
<thead>
<tr>
<th></th>
<th>No nights</th>
<th>Only 1 or 2 nights</th>
<th>Some nights</th>
<th>Most nights</th>
<th>Every night</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. **During the past 4 weeks...**
   How much has **pain from your knee** interfered with your usual work (including housework)?
   
<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>A little bit</th>
<th>Moderately</th>
<th>Greatly</th>
<th>Totally</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. **During the past 4 weeks...**
    Have you felt that your knee might suddenly 'give way' or let you down?
    
    |     | Rarely/never | Sometimes, or just at first | Often, not just at first | Most of the time | All of the time |
    |-----|--------------|-------------------------------|--------------------------|------------------|-----------------|
    |     |              |                               |                          |                   |                  |

11. **During the past 4 weeks...**
    Could you do the household shopping **on your own**?
    
    |     | Yes, easily | With little difficulty | With moderate difficulty | With extreme difficulty | No, impossible |
    |-----|-------------|------------------------|--------------------------|------------------------|----------------|
    |     |             |                        |                          |                        |                |

12. **During the past 4 weeks...**
    Could you walk down one flight of stairs?
    
    |     | Yes, easily | With little difficulty | With moderate difficulty | With extreme difficulty | No, impossible |
    |-----|-------------|------------------------|--------------------------|------------------------|----------------|
    |     |             |                        |                          |                        |                |

Finally, please check back that you have answered each question.

Thank you very much.

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## PROBLEMS WITH YOUR HIP

Tick (✔) one box for every question.

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. During the past 4 weeks...</strong> How would you describe the pain you usually have from your hip?</td>
<td>None, Very mild, Mild, Moderate, Severe</td>
</tr>
<tr>
<td><strong>2. During the past 4 weeks...</strong> Have you had any trouble with washing and drying yourself (all over) because of your hip?</td>
<td>No trouble at all, Very little trouble, Moderate trouble, Extreme difficulty, Impossible to do</td>
</tr>
<tr>
<td><strong>3. During the past 4 weeks...</strong> Have you had any trouble getting in and out of a car or using public transport because of your hip? (whichever you tend to use)</td>
<td>No trouble at all, Very little trouble, Moderate trouble, Extreme difficulty, Impossible to do</td>
</tr>
<tr>
<td><strong>4. During the past 4 weeks...</strong> Have you been able to put on a pair of socks, stockings or tights?</td>
<td>Yes, easily, With little difficulty, With moderate difficulty, With extreme difficulty, No, impossible</td>
</tr>
<tr>
<td><strong>5. During the past 4 weeks...</strong> Could you do the household shopping on your own?</td>
<td>Yes, easily, With little difficulty, With moderate difficulty, With extreme difficulty, No, impossible</td>
</tr>
<tr>
<td><strong>6. During the past 4 weeks...</strong> For how long have you been able to walk before pain from your hip becomes severe? (with or without a stick)</td>
<td>No pain/More than 30 minutes, 16 to 30 minutes, 5 to 15 minutes, Around the house only, Not at all/pain severe on walking</td>
</tr>
</tbody>
</table>
7. During the past 4 weeks...
Have you been able to climb a flight of stairs?

<table>
<thead>
<tr>
<th>Yes, easily</th>
<th>With little difficulty</th>
<th>With moderate difficulty</th>
<th>With extreme difficulty</th>
<th>No, impossible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. During the past 4 weeks...
After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your hip?

<table>
<thead>
<tr>
<th>Not at all painful</th>
<th>Slightly painful</th>
<th>Moderately painful</th>
<th>Very painful</th>
<th>Unbearable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. During the past 4 weeks...
Have you been limping when walking, because of your hip?

<table>
<thead>
<tr>
<th>Rarely/never</th>
<th>Sometimes, or just at first</th>
<th>Often, not just at first</th>
<th>Most of the time</th>
<th>All of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. During the past 4 weeks...
Have you had any sudden, severe pain - 'shooting', 'stabbing' or 'spasms' - from the affected hip?

<table>
<thead>
<tr>
<th>No days</th>
<th>Only 1 or 2 days</th>
<th>Some days</th>
<th>Most days</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. During the past 4 weeks...
How much has pain from your hip interfered with your usual work (including housework)?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little bit</th>
<th>Moderately</th>
<th>Greatly</th>
<th>Totally</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. During the past 4 weeks...
Have you been troubled by pain from your hip in bed at night?

<table>
<thead>
<tr>
<th>No nights</th>
<th>Only 1 or 2 nights</th>
<th>Some nights</th>
<th>Most nights</th>
<th>Every night</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Finally, please check back that you have answered each question.

Thank you very much.
### Appendix E - Post-operative morbidity survey (POMS)

<table>
<thead>
<tr>
<th>Morbidity type</th>
<th>Criteria</th>
<th>Tick if present*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary</td>
<td>Has the patient developed a new requirement for oxygen or respiratory support.</td>
<td></td>
</tr>
<tr>
<td>Infectious</td>
<td>Currently on antibiotics and/or has had a temperature of &gt;38°C in the last 24hr.</td>
<td></td>
</tr>
<tr>
<td>Renal</td>
<td>Presence of oliguria &lt;500mL/24 hr; Increased serum creatinine (&gt;30% from preoperative level); Urinary catheter in situ.</td>
<td></td>
</tr>
</tbody>
</table>
| Gastrointestinal | Unable to tolerate an oral diet for any reason including nausea, vomiting and abdominal distension.  
Use of antiemetic.                                                                                                                                                                                                                                                                               |                  |
| Cardiovascular | Diagnostic tests or therapy within the last 24 hr for any of the following: new myocardial infarction or ischemia, hypotension (requiring fluid therapy >200mL/hr or pharmacological therapy), atrial or ventricular arrhythmias, cardiogenic pulmonary oedema, thrombotic event (requiring anticoagulation).                                                                                                        |                  |
| Neurological   | New focal neurological deficit, confusion, delirium, or coma.                                                                                                                                                                                                                                                                                    |                  |
| Haematological | Requirement for any of the following within the last 24 hr: packed erythrocytes, platelets, fresh-frozen plasma, or cryoprecipitate.                                                                                                                                                                                                                 |                  |
| Wound          | Wound dehiscence requiring surgical exploration or drainage of pus from the operation wound with or without isolation or organisms.                                                                                                                                                                                                           |                  |
| Pain           | New postoperative pain significant enough to require IV or IM opioids or regional analgesia.                                                                                                                                                                                                                                                  |                  |

*If no scores above then please state reason why patient still in hospital

1. Grocott at al. The Postoperative Morbidity Survey was validated and used to describe morbidity after surgery, Journal of Clinical Epidemiology 60 (2007) 919e928.
Appendix F - Setting up your team

Achieving improvements that reduce harm, waste and variation at a whole organisation level needs a team approach: one person working alone, or groups of individuals working in an uncoordinated way will not achieve it and this applies equally at all organisational levels.

Whether your improvement priorities relate to 1000 Lives Plus content areas, national intelligent targets or other local priorities, you need to consider three different dimensions in putting your team together:

- Organisation level leadership
- Clinical or technical expertise
- Frontline leadership

There may be one or more individuals on the team working in each dimension, and one individual may fill more than one role, but each component should be represented in order to achieve sustainable improvement.

**Organisation level leadership**

An Executive, or equivalent level Director, should always be given delegated accountability from the Chief Executive for a specific content area; and all staff working on the changes should know who this is. This individual needs sufficient influence and authority to allocate the time and resources necessary for the work to be undertaken. It is likely that accountability will be further delegated to Divisions, Clinical Programme Groups or Directorates and this can help to build ownership and engagement at a more local level. However, it is essential that the leader has full authority over the areas involved in achieving the improvement aim. As changes spread more widely, crossing organisational boundaries, appropriate levels of delegation will need to be reviewed.

When working with frontline teams, it is essential for organisational level leaders to have an understanding of the improvement methodology and to base conversations around the interpretation of improvement data. Reporting of progress to higher organisational levels should also use a consistent data format so that the Executive level leader can report to the Board on progress.

**Clinical/Technical Expertise**

A clinical or technical expert is someone who has a full professional understanding of the processes in the content area. It is critical to have at least one such champion on the team who is intimately familiar with the roles, functions, and operations of the content area. This person should have a good working relationship with colleagues and with the frontline leaders, and be interested in driving change in the system. It is important to look for clinicians or technical professionals who are opinion leaders in the organisation (individuals sought out for advice who are not afraid to try changes).
Patients can provide expert advice to the improvement team, based on their experience of the system and the needs and wishes of patients. A patient with an interest in the improvement of the system can be a useful member of the team.

Additional technical expertise may be provided by an expert on improvement methodology, who can help the team to determine what to measure, assist in the design of simple, effective measurement tools, and provide guidance on the design of tests.

**Frontline leadership**

Frontline leaders will be the critical driving component of the team, assuring that changes are tested and overseeing data collection. It is important that this person understands not only the details of the system, but also the various effects of making changes in the system. They should have skills in improvement methods. This individual must also work effectively with the technical experts and system leader. They will be seen as a bridge between the organisation leadership and the day-to-day work. Frontline leaders are likely to devote a significant amount of their time to the improvement work, ensuring accurate and timely data collection for process and outcome measures related to the frontline team.

**Characteristics of a good team member**

In selecting team members, you should always consider those who want to work on the project rather than trying to convince those that do not. Some useful questions to consider are the following:

- Is the person respected for their judgment by a range of staff?
- Do they enjoy a reputation as a team player?
- What is the person’s area of skill or technical proficiency?
- Are they an excellent listener?
- Is this person a good verbal communicator within, and in front of, groups?
- Is this person a problem-solver?
- Is this person disappointed with the current system and processes and do they passionately want to improve things?
- Is this person creative, innovative, and enthusiastic?
- Are they excited about change and new technology?
Appendix G - The Model for Improvement

Successful improvement initiatives don’t just happen - they need careful planning and execution. There are many things to consider and techniques to employ, which are captured in the driver diagram on page 41. The rest of this section explains the primary drivers and where to get more help in using them.

In any improvement initiative you need to succeed in three areas. You need to generate the Will to pursue the changes, despite difficulties and competing demands on time and resources. You need the good Ideas that will transform your service. Finally you need to Execute those ideas effectively to get the change required.

Will

The interventions you need to build Will are explained in the ‘Leading the Way to Safety and Quality Improvement’ and ‘How to Improve’ guides. They concentrate on raising the commitment levels for change and then providing the project structure to underpin improvement approaches. Spreading changes to achieve transformative change across the whole health system requires strong leadership. We need to create an environment where there is an unstoppable will for improvement and a commitment to challenge and support teams to remove any obstacles to progress.

Ideas

The interventions in this guide describe ideas which evidence shows to be effective for achieving changes that result in improvements. It gives examples from organisations that have achieved them and also advice based on their experience. Methods and techniques for generating new ideas or innovative ways to implement the evidence can be found in the ‘How to Improve’ guide and other improvement literature.

Execution

However, to bring these ideas into routine practice in your organisation, it is essential that you test the interventions and ensure that you have achieved a reliable change in your processes before attempting to spread the change more widely.

1000 Lives Plus uses the Model for Improvement (MFI) which is a proven methodology as the basis for all its improvement programmes. It requires you to address three key questions and then use Plan-Do-Study-Act (PDSA) cycles to test a change idea. By doing repeated small-scale tests, you will be able to adapt change ideas until they result in the reliable process improvement you require. Only then are you ready to implement and spread the change more widely.
Model for Improvement

Driver Diagram

Aim

Primary drivers

Secondary drivers

Interventions

Will

To deliver patient safety and quality initiatives for Health Boards and Trusts

Ideas

Evidence Base (The what to)

Use the relevant content area ‘How to Guide’ to assess the latest evidence of best practice

Execution

Improvement Methodology (The how to)

The Model for Improvement

What are you trying to accomplish?

How will you know that a change is an improvement?

What change can you make that will result in improvement?

Establish reliable process

Use reliability model

PDSA cycles:

Test - implement - spread - sustain

Set SMART aims

Communicate aims

Use project charter to provide structure

Understand what to measure

Use 7 step measurement process

Map the process

Use creative thinking

Engage senior Leadership

Make links to organisation goals

Form teams

Build skills

Raise awareness

Appoint clinical champions

Consult Faculty members to agree standards to be achieved

Use critical sub sets of key content areas to improve the outcome
What are we trying to accomplish?  
How will we know that a change is an improvement?  
What change can we make that will result in improvement?

Model for Improvement - PDSA Cycle

ACT  PLAN
STUDY  DO

For more guidance on using the Model for Improvement, see the ‘How to Improve’ guide.

Seven Steps to Measurement

1 Decide aim
2 Choose measures
3 Define measures
4 Collect data
5 Analyse & present
6 Review measures
7 Repeat steps 4-6

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One area that bears extra attention is measurement because we have found that this is often the Achilles heel of improvement projects. When measuring your progress, follow the Seven Steps to Measurement shown on page 42 and covered in more detail in the ‘How to Improve’ Guide.

The key is to go round the Collect-Analyse-Review cycle frequently:

- **Collect** your data
- **Analyse** - turn it into something useful like a run chart
- **Review** - meet to decide what your data is telling you and then take action

Successful improvement projects all have clear aims, robust measurement and well-tested ideas. Use the ‘How to Improve’ guide to ensure your projects have all three.

**What are we trying to accomplish?**

You will need to set an aim that is Specific, Measurable, Achievable, Realistic and Time-bound (SMART). Everyone involved in the change needs to understand what this is and be able to communicate it to others.

**How will we know that change is an improvement?**

It is essential to identify what data you need to answer this question and how to interpret what the data is telling you. The improvement methodology ‘How to Guide’ provides detailed information on the tools, tips and information you need to achieve this, and includes the following advice:

<table>
<thead>
<tr>
<th>Plot data over time</th>
<th>Tracking a few key measures over time is the single most powerful tool a team can use.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seek usefulness, not perfection</td>
<td>Remember, measurement is not the goal; improvement is the goal. In order to move forward to the next step, a team needs just enough data to know whether changes are leading to improvement.</td>
</tr>
<tr>
<td>Use sampling</td>
<td>Sampling is a simple, efficient way to help a team understand how a system is performing.</td>
</tr>
<tr>
<td>Integrate measurement into the daily routine</td>
<td>Useful data is often easy to obtain without relying on information systems.</td>
</tr>
<tr>
<td>Use qualitative and quantitative data</td>
<td>In addition to collecting quantitative data, be sure to collect qualitative data, which is often easier to access and highly informative.</td>
</tr>
<tr>
<td>Understand the variation that lives within your data</td>
<td>Don’t over-react to a special cause and don’t think that random movement of your data up and down is a signal of improvement.</td>
</tr>
</tbody>
</table>
What change can we make that will result in improvement?

The interventions in this guide describe a range of change ideas that are known to be effective. However, you need to think about your current local systems and processes and use the guide as a starting point to think creatively about ideas to test. The improvement methodology guide gives more advice to support you in generating ideas.

Spreading changes to achieve transformative change across the whole health system requires strong leadership. We need to create an environment where there is an unstoppable will for improvement and a commitment to challenge and support teams to remove any obstacles to progress. The guide on ‘Leading the Way to Safety and Quality Improvement’ gives detailed information on interventions that will support this. However, the Model for Improvement, PDSA cycles and process measurement lie at the heart of the transformative change we seek.
Improving care, delivering quality

If we can improve care for one person, then we can do it for ten.

If we can do it for ten, then we can do it for a 100.

If we can do it for a 100, we can do it for a 1000.

And if we can do it for a 1000, we can do it for everyone in Wales.

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