



Perioperative Quality Improvement Programme

Report 4 July 2021 to March 2023



Contents

The road to recovery	2	Postoperative destination	28
Letter to PQIP collaborators	3	Individualised pain management	30
PQIP top five improvement priorities 2023–2024	4	Complications – why do they matter?	33
Recruitment	5	Patient reported outcome and experience measures	36
Top tips for local engagement with PQIP recruitment	6	The QI in PQIP – embedding QI culture and change into practice	40
What do PQIP patients look like?	8	New! The PQIP Associate Principal Investigator (API) Collaborative	41
What operations are PQIP patients having?	9	Tracking postoperative morbidity and care quality using pomVLAD	42
Individualised risk assessment	12	How PQIP is using your data to improve care and support other research	44
Frailty assessment	14	Positive deviance	46
Preoperative diabetes screening and management	15	Collaborators	50
Perioperative blood management	17		
Carbohydrate loading	19		
Rethinking enhanced recovery – DrEaMing	21		
Involve patients, collaborate with patients and empower patients	25		

Cover Illustration

Top left – Members of the Southend University Hospital PQIP team. Southend have been the top recruiting site over the last six months. Photo provided by the Southend team and used with their consent.

Top right – Members of the University College Hospital London PQIP team. UCLH has been supporting and recruiting PQIP since the study began in 2017. Photo provided by the UCLH team and used with their consent.

Bottom left – Members of the Golden Jubilee University National Hospital PQIP team. The Golden Jubilee have been one of our first Scottish sites to begin recruitment to PQIP. Photo provided by the Golden Jubilee team and used with their consent.

Bottom right – Image taken at the Royal London Hospital (© 2017 Royal College of Anaesthetists).

1 Early Screening

Identify patients in need of optimisation early, and at the latest when they are added to a surgical waiting list. In England this is now NHS policy for inpatient surgery, embedded in the elective recovery plan (2022) and standard NHS contract (2023/24).

Fitter optimised patients will have less complications, a reduced length of stay and will have less on the day cancellations.



2 High Risk Patients

Use a consistent validated risk score such as SORT across your teams to assess patients' risk of postoperative complications and morbidity. A 2023 systematic review found SORT to have the best combination of accuracy and clinical usability of any published preoperative risk assessment tool worldwide [sortsurgery.com].



Act early planning, postoperative destination: for patients with - >1% 30-day mortality risk consider enhanced care; >5% requires critical care.



Frailty increases a patient's vulnerability to adverse outcomes following surgery. Consistently use a frailty scale as part of your risk assessment.



Improve risk factors that make a difference to patient outcomes such as anaemia and diabetes.



New research from PQIP can help you identify patients at risk of severe pain, who can be referred to pain services for additional support. Severe pain is more common in patients with cancer, insulin-dependent diabetes, who smoke or are on opioids preoperatively.

3 Day of Surgery

All sites are consistently performing highly on day of surgery admission, intra-operative antibiotic prophylaxis, and ensuring patients have a temperature over 36 degrees on arrival to recovery. These process metrics have generally become embedded into practice and in most places, will no longer need QI interventions to improve compliance.

The ERAS Society makes a strong recommendation for perioperative carbohydrate loading for abdominal/ colorectal, gynaecological, urological and thoracic surgery.

Where surgery has an expected blood loss of >500ml, tranexamic acid should be administered.



4 First 24 hours after Surgery

It is time to rethink enhanced recovery and focus on the core processes that can improve patient outcomes.

Drinking, Eating and Mobilising (DrEaMing) in the first 24-hours after surgery is associated with reduced length of stay and fewer late complications. The NHS England CQUIN incentive has been extended and broadened for 23/24; this is a great QI opportunity for all services.

Focus on improving process metrics that limit patients' ability to DrEaM: for example reducing use of nasogastric tubes and abdominal drains, and addressing postoperative pain.

Severe postoperative pain continues to be common, especially on day 1. Identify local structural or process issues underpinning inadequate analgesia for patients.



5 In-Patient Stay

The Bauer survey is an important tool to inform your local anaesthetic team how satisfied patients are with their provided anaesthetic care and can guide improvement initiatives. In the PQIP cohort, which is particularly high-risk, the inpatient postoperative complication rate is 25%. Complications increase LOS and predict reduced long-term survival and worse health-related quality of life.

pomVLAD is a new PQIP initiative, providing near-real time, risk-adjusted morbidity monitoring. PomVLAD can support local teams identify early both positive and concerning trends in day 7 morbidity to enable more timely investigation of care processes and support local QI. Go to the PQIP website for further information.



6 Longer Term Outcomes

Patient Reported Outcome Measures are essential to understanding patient's experience and recovery following surgery. These measures can be used to measure benefits and harms of treatments, inform the consent process and aid shared decision-making.

The EQ-5D-5L and the WHO Disability Assessment Schedule are two quality of life questionnaires requested by PQIP at 6 and 12 months postoperatively, but follow-up rates could be better in most hospitals. Consider how your PQIP team can increase capture of this quality-of-life data to help improve care for future patients.



On the road to recovery

Dear PQIP collaborators

We are delighted to bring you the fourth PQIP Cohort report. At the time of writing, over 46,000 patients have been recruited and we present here data from 44,114 patients who have completed their primary episodes of care after major non-cardiac surgery. Almost 12,000 new patients' data are analysed in our fourth Cohort, an amazing achievement given the continued difficulties faced by clinicians, researchers and patients since the pandemic.

There are three key themes running through this report. The first is our renewed focus on **reducing complications and length of stay after surgery**, not just because it is good for individual patients, but because it is essential for NHS recovery after the pandemic. To do this, we need efficient, high quality, reliable patient care delivered through individualised, but evidence-based and protocolised pathways. This leads us to the second of our themes – **simplifying enhanced recovery**. Since our last Cohort report, the publication of PQIP research on the association between Drinking, Eating and Mobilising (DrEaMing) within 24h of surgery and later outcomes, has led to changes in national policy and improvements in clinical practice. Our third, and perhaps most important theme, is to promote **teamwork, including with patients**. Improvements in care cannot be delivered by lone heroes. We advocate for using the full capacity of the Multi-Disciplinary Team (MDT), starting with communication of your own Trust's results to them, as well as this report, highlighting its recommendations.

Our **top five priorities** for the coming year reflect these themes. **Individualised risk assessment** is again highlighted as the foundation of high-quality patient care. Focusing on **DrEaMing within 24h**, and the factors which support this, is again a key priority. We now know that preoperative anaemia and severe postoperative pain are risk factors for failure to DrEaM within 24h. **Individualised pain management** and **Patient Blood Management** are therefore identified as additional priorities. Finally, **embedding PQIP** into your day-to-day MDT working provides the basis for your improvement efforts. We have showcased new PQIP initiatives to support this – including the launch of the pomVLAD (risk adjusted postoperative morbidity) dashboard in colorectal surgery, updated Quality Improvement dashboards in all other types of surgery, and top tips on patient engagement and quality improvement.

Thank you as always to our PQIP collaborators who work so hard to recruit patients, input data and use the data to improve care. Thank you too, to the tens of thousands of patients who have trusted us with their information for PQIP research. And finally, thank you for reading this report and taking action on its recommendations

Yours,



Jenny Dorey (Lay representative) and Ramani Moonesinghe (Chief Investigator)
On behalf of the PQIP Project Team

Top 5 improvement priorities 2023–2024



DrEaMing

- Drinking, Eating and Mobilising within 24-hours of surgery is associated with reduced length of stay and fewer inpatient complications.
- The [NHS England DrEaMing CQUIN](#) has been updated for 2023/24. It includes more procedures and a higher minimum threshold of 70%, to promote DrEaMing, alongside the principles of enhanced recovery, to as many patients as possible.

Top tip

- Focus on improving modifiable processes that limit a patient's ability to DrEaM: reducing use of nasogastric tubes and abdominal drains, optimising preoperative anaemia, and targeting postoperative pain

1



Patient Blood Management

- Even mild perioperative anaemia is an independent risk factor for adverse postoperative outcomes and an increased risk of morbidity and mortality.
- [NHS Blood and Transplant](#) recommends that all patients receive prophylactic tranexamic acid for surgery where expected blood loss is over 500ml.

Top tip

- Adopt a [Patient Blood Management](#) approach, developing a patient-centric multi-disciplinary local pathway. This should support early diagnosis and treatment of anaemia, minimises intraoperative blood loss and reduces perioperative blood transfusion.

2



Individualised Risk and Frailty Assessment

- Frailty increases a patient's vulnerability to adverse outcomes following surgery.

Top tips

- Incorporate and consistently use a [frailty assessment tool](#) in your teams preassessment pathway.
- Consistently use a locally agreed risk assessment tool, such as [SORT](#), for all patients.
- Plan patient's postoperative destination based on their risk score to ensure appropriate patients are admitted to critical care (>5% mortality risk), and where available, enhanced care (>1% mortality risk).

3



Individualised Pain Management

- Severe postoperative pain is common, unpleasant and avoidable. Pain is associated with increased morbidity and mortality, prolonged LOS, delayed recovery and reduced quality of life.

Top tips

- [Identify patients at higher risk of pain](#) and consider additional interventions including preoperative expectation management and acute pain team review postoperatively.
- Address modifiable factors associated with increased risk: these include smoking, diabetes treated with insulin and anxiety.

4



Embedding into Clinical Practice

- PQIP is much more than a research study! Its main aim is to support you to support local QI.

Top tips

- Focus local recruitment on a single specialty or a small number of surgical specialities to maximise opportunities for local QI.
- Collaboration is at the crux of sustainable QI. Collaborate locally by co-designing QI interventions with your local team. Collaborate nationally by joining the PQIP webinars.
- Enrol motivated trainees in the [NIHR Associate Principal Investigator scheme](#), to help lead locally with data collection, recruitment and results dissemination. Embed trainee involvement into your PQIP team

5

Recruitment

National PQIP recruitment

Since PQIP started, 168 hospitals have recruited patients to the study – more than 80% eligible hospitals across the UK. Of these, 135 hospitals have recruited patients in this report cycle (since 12 July 2021).

Since the last report, we are now delighted to be recruiting in Scotland alongside existing recruitment across sites in England and Wales. We are also very pleased to welcome our first independent sector hospital, the Cleveland Clinic, London.

Table 1 Number of hospitals participating in PQIP

Nation	Number of hospitals (since PQIP start)	Number of Hospitals (Cohort 4 report)
England	156	124
Wales	10	9
Scotland	2	2
Total	168	135

In a change to previous reports, we are now analysing data for all patients with completed hospital episodes, rather than just those with locked records. This alteration means that the numbers of patients included in previous Cohorts are higher than previously reported.

In this report, we have categorised patients into four Cohorts (Table 2) and have analysed data on 44,114 patients who have had major surgery.

Table 2 Cohort start and end dates, with total included patients (with completed episodes of care)

	Start end	End date	Number of completed patient episodes (n)
Cohort 1	1.12.2016	27.2.2018	6,644
Cohort 2	28.2.2018	6.8.2019	14,226
Cohort 3	07.08.2019	11.07.2021	11,318
Cohort 4	12.07.2021	18.03.2023	11,926

Individual site recruitment

The top recruiting site is University College Hospital recruiting 920 patients in Cohort 4. Other top recruiting sites are The Lister Hospital, Musgrove Park Hospital, Pinderfields Hospital, University Hospital Wales, St George's Hospital, The Royal Marsden Hospital, Queen Victoria Hospital, Darent Valley Hospital, Salford Royal Hospital, Watford General Hospital. Well done on all your hard work!

We are really delighted to welcome the following new sites to PQIP since our last report was published: Chesterfield Royal; Croydon University; Golden Jubilee National; Good Hope; Huddersfield Royal; Newcastle Freeman; Newham University; North Devon District; North Middlesex University; Solihull; St Bartholomew's; University Hospital Crosshouse; University Hospital North Tees; West Cumberland; Weston General; Whipps Cross; Ysbyty Gwynedd.



Top tips for local engagement with PQIP recruitment

We appreciate all the efforts that local teams put in to recruiting patients to PQIP, and hope the data, both at local and national level can provoke interesting discussion and facilitate ongoing quality improvement. Whilst the challenges faced by each department are different, we firmly believe that it is a case of the more you put in the more you get out; here are a few top tips.

Recruitment

- PQIP is on the NIHR's research portfolio: get support for recruitment from local Clinical Research Networks through the National Institute for Health Research (NIHR)
- Develop a sampling strategy that is locally feasible. Start with a single specialty.
- Approach patients as early as possible during their surgical pathway. Consider integrating recruitment with preoperative assessment clinics.
- Regularly review the recruitment process. Be open to trialling different methods of recruitment.

People

- Use a multidisciplinary approach combining efforts from surgeons, anaesthetists, specialist nurses, research nurses and trainees.
- Engage trainees in recruitment and data collection. They may find the 6- and 12-month follow-up phone calls particularly enlightening and educational. It is an excellent opportunity to get GCP trained and use those skills!
- PQIP is on the [NIHR's Associate Principal Investigator](#) scheme. Another great way to get trainees and other colleagues involved.

Communication

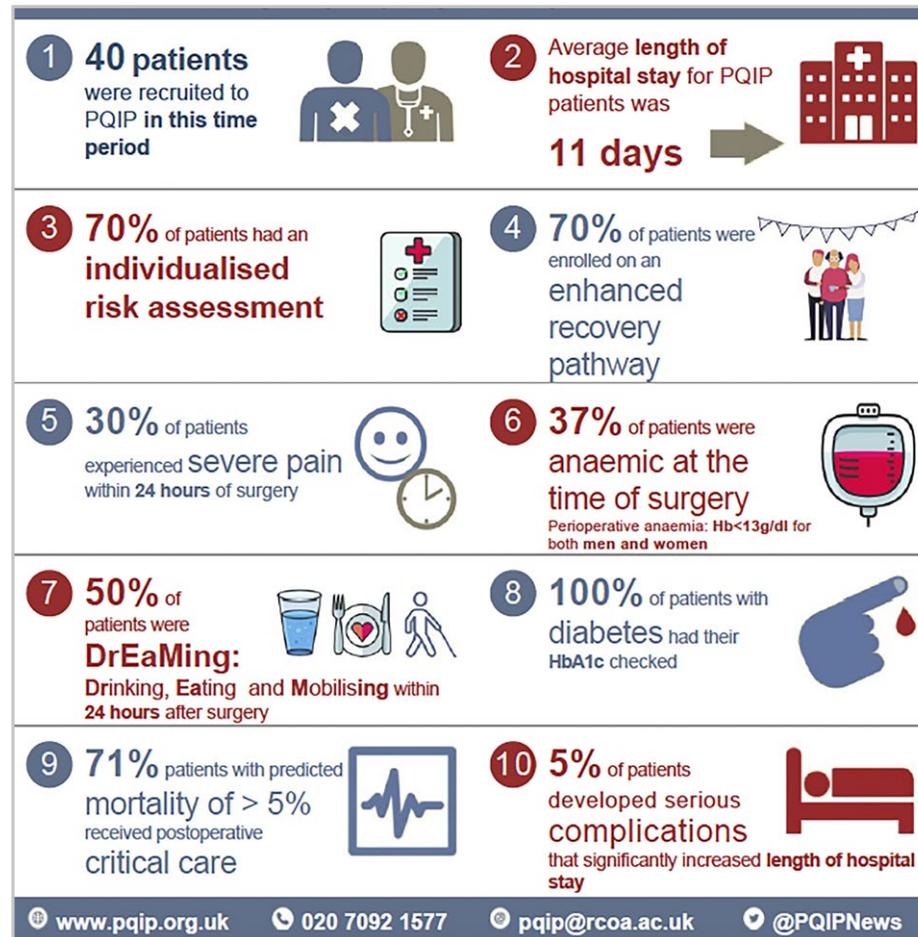
- Set-up a local PQIP communication networks to support data collection on the day of surgery and on day one. This can similarly be used to support 6- and 12-month follow-up phone calls which trainees might find a particularly educational and useful experience.
- Raise the profile of study participation locally – get a regular slot to celebrate research successes in local governance/research/audit meetings.



Did you know... sharing your PQIP results with your team is easy!

- Use our **automated poster generator** to highlight your hospital's key results. Posters can be created bespoke for your site by visiting the PQIP website: Go to the reports tab -> poster generator.
- **Regularly feedback your PQIP results:** use multiple means regularly – posters, emails, messaging, department meetings and newsletters. Multimodal and multidisciplinary communication will support your local PQIP efforts and will also help prevent siloed teams replicating local audits/data collection and duplicating work, ultimately saving time for everyone.
- **Present your data:** Stimulate discussion of PQIP results to increase the whole teams' awareness about PQIP, and also potentially help improve recruitment and data input.
- **Highlight areas of great practice:** celebrate your whole MDT's hard work and share the wealth of data available. Regular collaboration can help the team to gain insight into where QI efforts should be focused.

Figure 1 Automated poster export of local data from PQIP website

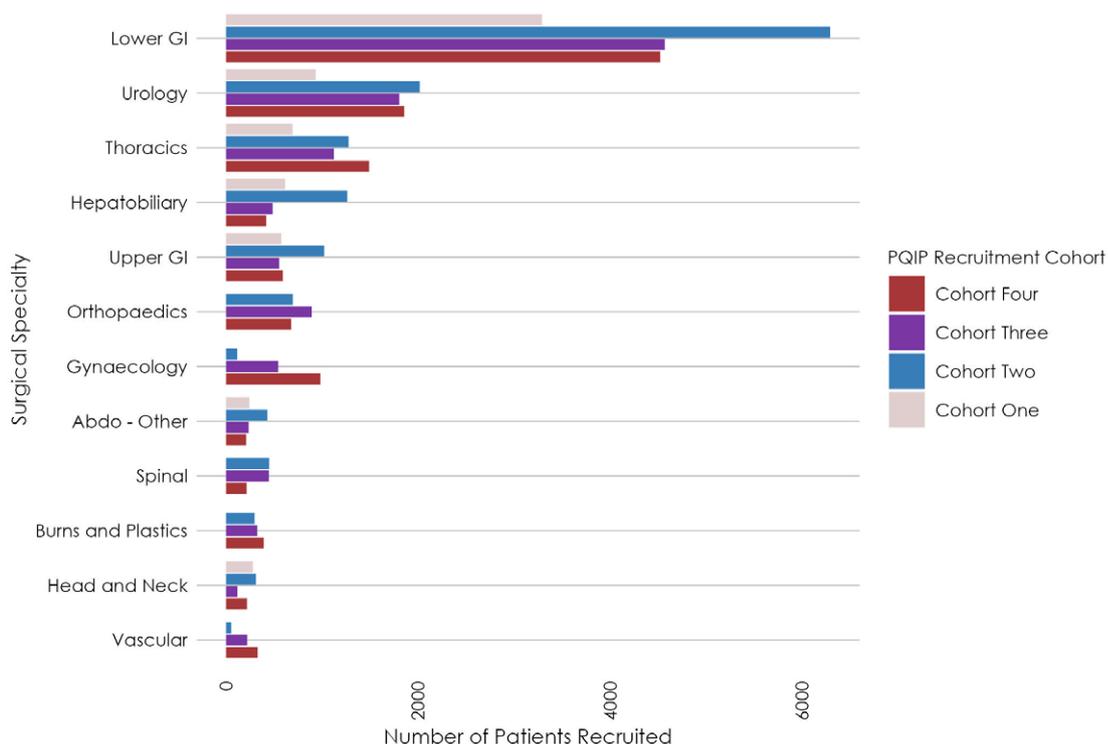


What do PQIP patients look like?

Table 3 Baseline patient characteristics

Characteristic	Cohort 1, n = 6,640	Cohort 2, n = 14,226	Cohort 3, n = 11,318	Cohort 4, n = 11,926
Age (Years, Median; IQR)	67.2 (57.4 – 73.8)	66.2 (55.8 – 73.5)	65.7 (55.7 – 73.2)	65.8 (56.4 – 73.9)
Biological Sex (%)				
Female	39	42	46	47
Male	61	58	54	53
Intersex	NA	NA	NA	<0.1
BMI (Median; IQR)	27.0 (23.9 – 30.4)	27.2 (24.0 – 30.9)	27.4 (24.2 – 31.1)	27.4 (24.2 – 31.3)
Current Smoker (%)	11	11	11	11
ASA Physical Status (%)				
1	11	11	10	7.7
2	61	61	60	58
3	27	28	29	34
4	1.1	1.0	1.0	1.1
5	<0.1	<0.1	<0.1	<0.1
Surgical Complexity (%)				
Major	14	12	12	11
Complex Major	34	33	34	37
Complex	52	55	54	53
Surgical Urgency (%)				
Elective	88	90	91	93
Expedited	12	9.7	8.9	7.2
Cancer Diagnosis Within five Years (%)				
None	23	30	36	37
Solid, No Mets	59	54	53	52
Solid, Mets	17	15	10	11
Lymphoma	0.3	0.3	0.2	0.1
Leukaemia	0.2	<0.1	<0.1	0.2
Diabetes (%)				
None	87	87	87	86
Type I	0.7	0.7	0.5	0.6
Type II – Diet Control	2.9	3.1	2.9	2.9
Type II – Oral Agents	6.7	6.6	7.3	7.8
Type II – Insulin	2.6	2.9	2.2	2.2
NYHA Heart Failure Class (%)				
I	83	83	81	85
II	14	15	16	12
III	2.6	2.4	2.9	2.7
IV	0.2	0.1	0.2	0.1
Respiratory History (%)	16	15	17	16
Respiratory Infection (Past Month) (%)	4.0	3.2	3.2	3.0
Cardiac History (%)	25	25	25	4.2
Abnormal ECG (%)	23	22	21	9.1
Cerebrovascular Disease (%)	3.9	4.1	3.8	3.6
Dementia (%)	0.6	0.9	0.7	0.3
Liver Disease (%)	1.3	1.0	0.8	1.0

Figure 2 Patient recruitment by specialty



What operations are PQIP patients having?

PQIP patients are having complex surgery, with over 60% of procedures in Cohort 4 taking longer than three hours and 20% taking over six hours. This includes a wide variety of procedures – the five most frequent procedures for each specialty are listed in Table 5.

Table 4 Duration of surgery

	Cohort 1 n = 6,640	Cohort 2 n = 14,226	Cohort 3 n = 11,318	Cohort 4 n = 11,926
Duration of Surgery				
Less than 2hrs	498 (7.5%)	1,094 (7.7%)	1,222 (11%)	1,254 (11%)
2 to 3hrs	1,597 (24%)	3,463 (24%)	3,035 (27%)	2,849 (25%)
Greater than 3hrs	4,527 (68%)	9,579 (68%)	6,634 (59%)	NA
3 to 4hrs	NA	NA	122 (1.1%)	2,784 (24%)
4 to 6hrs	NA	NA	97 (0.9%)	2,639 (23%)
Greater than 6hrs	NA	NA	53 (0.5%)	2,078 (18%)

The categories for duration of surgery were updated in mid-2021.

Table 5 Top five procedures by number for all PQIP specialties

Abdo – Other	n	Burns and Plastics	n	Gynaecology	n	Head and Neck	n
Complex abdominal wall reconstruction	288	Mastectomy with soft tissue reconstruction (to include pedicled reconstructions)	432	Vaginal hysterectomy with salpingo-oophorectomy	683	Selective dissection of cervical lymph nodes	188
Adrenalectomy (unilateral)	216	Breast reconstruction using flap	337	Hysterectomy with both excision/biopsy/ removal of omentum + excision/biopsy/ removal of uterine adnexa	459	Extensive excision of mandible (+/- reconstruction)	102
Complex restoration of intestinal continuity	122	Delayed reconstruction of breast using pedicled TRAM	164	Vaginal hysterectomy with anterior (+/- posterior) repair (colporrhaphy)	281	Laryngectomy (total)	95
Pelvic exenteration	110	Breast reconstruction (Partial) using pedicled perforator flap	48	Radical hysterectomy	153	Maxillectomy (partial/hemi) +/- reconstruction	85
Laparotomy + excision of sarcoma tumour	104	Microvascular free tissue transfer	16	Radical vulvectomy (including block dissection of inguinal gland)	16	Radical dissection of cervical lymph nodes	71
Laparotomy + restoration of intestinal continuity	93	Lumpectomy and immediate partial reconstruction of breast using pedicled perforator flap	11	Anterior exenteration of pelvis	13	Mediastinal thyroidectomy/ parathyroidectomy with sternotomy	54
Hepatobiliary	n	Lower GI	n	Orthopaedics	n	Spinal	n
Resection of lesion(s) of liver	911	Anterior resection	5,622	Revision of total replacement of knee joint	827	Anterior discectomy, decompression and fusion (including bone grafting/multiple levels) (cervical region)	250
Pancreatoduodenectomy and excision of surrounding tissue (Whipple's procedure)	762	Right hemicolectomy (with anastomosis)	5,157	Revision of total hip replacement including insertion of reconstruction rings, plates, screws, etc, and/or impaction bone grafting to acetabulum and/or femur	542	Primary posterior fusion +/- decompression +/- discectomy (lumbar region)	180
Hemihepatectomy (right)	310	Sigmoid colectomy	1,170	Revision of uncemented or cemented total hip replacement without adjunctive procedures	451	Combined anterior approach discectomy, decompression and fusion and posterior fusion (lumbar re-gion)	116
Pancreatectomy (partial/distal)	247	Reversal of Hartmann's procedure	834	Removal of total hip replacement	87	Anterior discectomy (cervical region)	72
Hemihepatectomy (left)	171	Abdominoperineal (AP) resection with end colostomy	721	2 stage revision of total knee replacement – first stage	54	Posterior correction of scoliosis with instrumentation +/- fusion	61
Partial Hepatectomy	144	Right hemicolectomy (with ileostomy)	659	Distal Femoral Replacement	52	Primary posterior fusion with instrumentation +/- decompression +/- discectomy (including graf stabilisation and all fusion approaches) (lumbar region)	58

Thoracics	n	Upper GI	n	Urology	n	Vascular	n
VATS lobectomy	1,665	Oesophagectomy (total)/ Oesophagogastrectomy	964	Radical prostatectomy	2,267	Endarterectomy of femoral artery	170
VATS wedge resection of lung	814	Gastrectomy (Total or Partial) with excision of surrounding tissue	560	Total nephrectomy (non-transplant)	1,262	Femoro-popliteal bypass using vein	84
Pulmonary lobectomy including segmental resection	461	Oesophagectomy (partial)	356	Cystectomy	1,048	Open infrarenal abdominal aortic aneurysm tube graft	73
VATS pleurodesis/pleurectomy	377	Pancreaticoduodenectomy (Whipple procedure)	130	Radical nephrectomy	745	Femoro-femoral bypass	36
VATS bullectomy (unilateral)	190	Partial gastrectomy (+/- excision of surrounding tissue)	118	Nephroureterectomy	470	Aorto-iliac, aorto-femoral, ilio-femoral bypass	33
VATS excision of mediastinal tumour (including thymectomy)	171	Total or Partial gastrectomy and excision of surrounding tissue	79	Percutaenous nephrolithotomy (PCNL)	210	Open infrarenal abdominal aortic aneurysm bifurcation graft	30

Individualised risk assessment

Where are we now?

Compliance with the standard of ensuring that a formal individualised risk assessment is recorded remains a challenge. Over 35% of PQIP patients have no documented individualised risk assessment prior to major surgery. Given the magnitude of the surgery included in PQIP, this is a real opportunity for improvement which should benefit patients.

Figure 3 Trend in individualised risk assessment over the course of PQIP

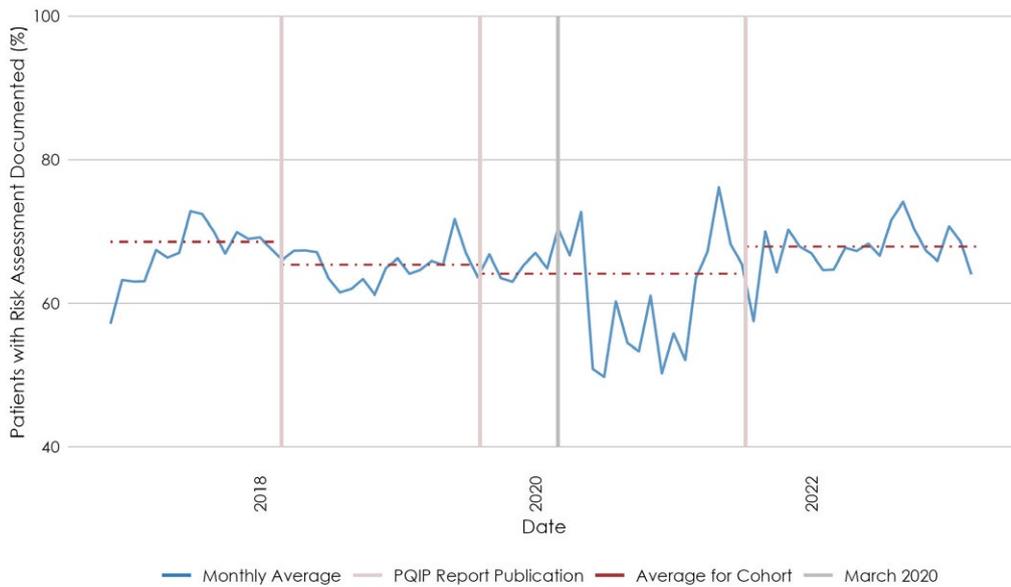
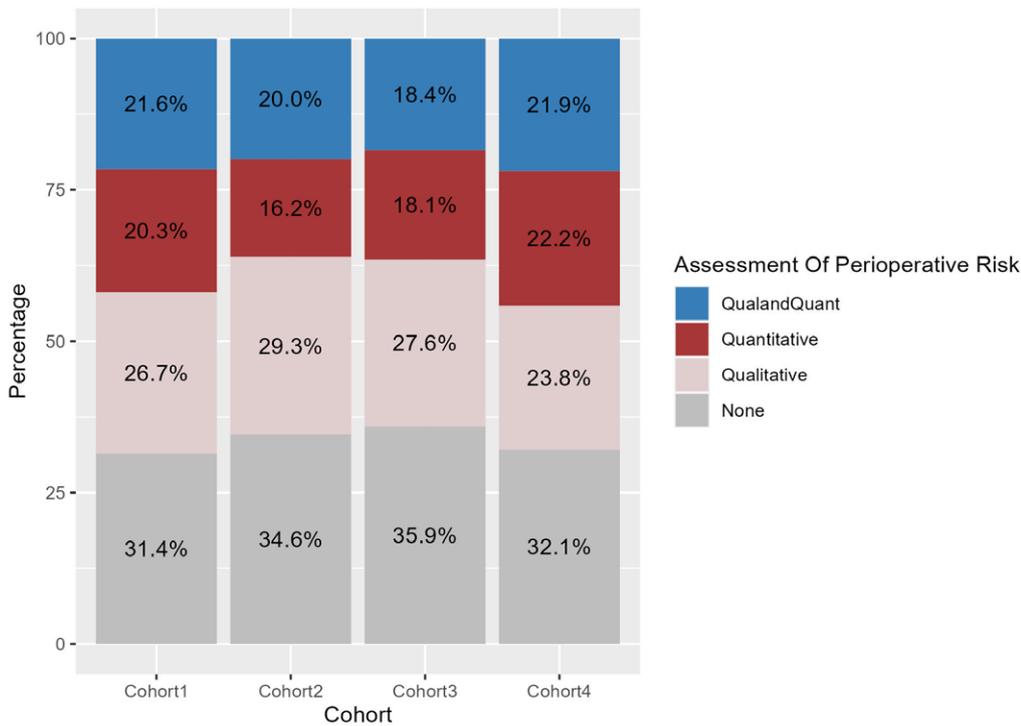


Figure 4 Methods of preoperative risk assessment (all Cohorts)



Why is individualised risk assessment important?

Risk assessment facilitates shared decision making, open communication and discussion of risk with patients and colleagues. Shared decision making and effective communication of risk is a core component of patient centred care and informed consent and may help to improve patients' adherence to treatment.

Case law ([Montgomery ruling, 2015](#)) and [GMC guidance](#) state that specific risks of medical interventions must be communicated to patients clearly and following a recent independent inquiry it is recommended that patients are afforded time to reflect on their diagnosis and treatment options. ([Independent Inquiry into Issues Raised by Paterson, 2020](#)). Informed consent is a process, and risk assessment is a vital part of this.

Quantitative risk assessment is also key to help ensure appropriate resource allocation, for example the need for preoperative optimisation or postoperative enhanced care. [Multidisciplinary guidelines](#) support its use in this way.

How can we quantitatively assess risk?

Numerous risk prediction models are available to support clinical decision making and have the potential to be integrated into electronic health records to reduce the burden of data collection. In a [recent systematic review of perioperative risk prediction models](#) which evaluated clinical usability, calibration and discrimination (accuracy), the SORT was highlighted as the best available tool.

Big News!

New NHSE policy on early screening and optimisation for surgery

The Perioperative Care Programme at NHS England has developed [policy](#) based on [previously published professional guidance](#) to support better care for patients undergoing major surgery.

Embedded in the standard NHS contract which took effect on 1 April 2023, is the requirement for all Trusts in England to implement systems to ensure that patients waiting for inpatient surgery are screened for important health issues as early as possible, and then if required, set on a pathway to optimise their health.

There are five core requirements for preoperative assessment teams:

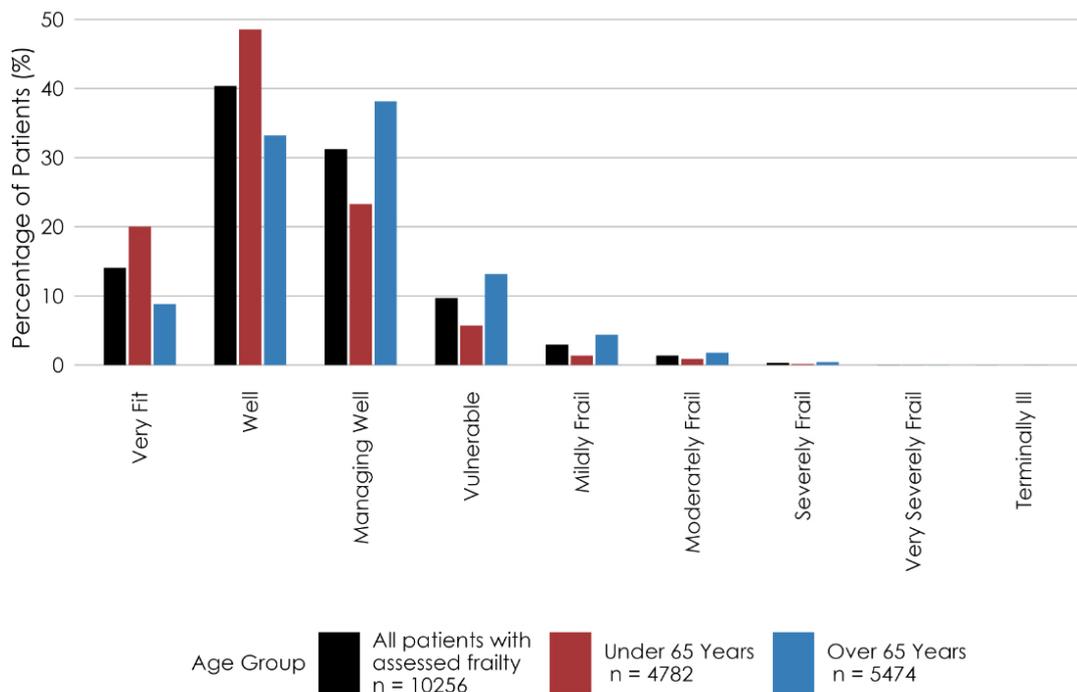
- 1 Screening:** all patients, at the latest when they are added to a waiting list, should be screened for health conditions which might benefit from optimisation prior to surgery
- 2 Optimisation:** if required, a personalised optimisation programme should be developed for and with the patient
- 3 Keeping in touch:** all patients should be contacted by their care provider at least every three months while they wait for surgery, to ensure that nothing in their condition has changed, and that surgery is still the right plan for them
- 4 TCI Date:** no patient should be given a TCI date until cleared as ready to proceed with surgery
- 5 Shared Decision Making:** shared decision making should be embedded throughout the perioperative pathway. The Paterson report also suggests at least two-stage decision making to give patients sufficient time to consider their options and reflect before consenting to treatment.



Frailty assessment

Frailty is an age-related syndrome that reduces a patient’s reserve to cope with stressors such as major surgery, thereby increasing their vulnerability to adverse outcomes. PQIP started collecting data on frailty using the Rockwood Clinical Frailty Scale in March 2018. In Cohort 4 10,256 patients had a recorded frailty assessment (86%), of which 5,474 were over 65 years of age. The majority of patients are not frail at baseline and are assessed as ‘Managing Well’ or better (80% of patients over 65 and 92% of patients under 65 for whom a frailty assessment was recorded). However, this still leaves 6.6% of >65 year olds and 2.4% of under 65s as frail, with a further 13% of those over 65 and 5.7% of those under 65 as vulnerable (Figure 5).

Figure 5 Rockwood Clinical Frailty Assessment by age group



The importance of preoperative frailty assessments

Frailty has an impact on peoples’ ability to recover from major operations and those living with frailty are at higher risk of complications and staying in hospital for longer. It is therefore important to identify frail patients to allow shared decision making and inform the consideration of targeted interventions. In September 2021 the Centre for Perioperative Care (CPOC) published [comprehensive guidance](#) on perioperative care for people living with frailty. This guidance outlines that all patients aged over 65 years, and younger patients at risk of frailty, should have frailty status assessed and documented upon referral for elective surgery. This should be done using the Rockwood Clinical Frailty Scale. Patients living with frailty should then receive more in-depth frailty and cognitive assessments and be under the care of a hospital’s perioperative frailty team.

Preoperative diabetes screening and management

Diabetes is the commonest metabolic disorder; by 2025, 5.3 million people in the UK are expected to have a diagnosis of diabetes (source: Diabetes UK). From this PQIP Cohort, 14% of recruited patients undergoing major surgery have diabetes. Diabetic patients are at risk of longer lengths of hospital stay and higher rates of adverse postoperative outcomes.

NHS England's National Perioperative Care Programme brings together multiple stakeholders including NHSE's elective recovery programme and the Getting It Right First Time team, to standardise and improve perioperative care in England. One of their key recommendations is to use the perioperative period as an opportunity to optimise health in advance of surgery. Diabetes is an example of one of the long-term conditions which needs to be optimally controlled preoperatively, to reduce cancellations, major complications and length of stay.

In Cohort 4 1,260 of 1,607 (78%) of all patients with diabetes had an HbA1c measured prior to surgery – a little worse than the previous Cohort (Figure 6). Compliance with recording of HbA1c is lowest in the lower GI cohort, our largest patient group in PQIP (only 60% in Cohort 4; Table 6). The numbers are small, but diabetes control appears to be worst in hepatobiliary patients, with almost half of those presenting for surgery in Cohort 4 having HbA1c>8.5%, where the measurement had been taken (Table 8).

Measuring the HbA1c within three months of surgery and acting on results greater than 8.5% (69mmol/mol) is the cornerstone of preoperative diabetes management. The Centre for Perioperative Care (CPOC) has issued [guidelines](#) which provide a clear road map for the perioperative team to screen and optimise the management of patients with diabetes. Waiting list time can be used to measure and act on HbA1c readings. Optimising diabetes preoperatively can also ensure an individualised diabetes plan has been devised for each patient on their admission so the whole perioperative pathway can run more smoothly.

Figure 6 HbA1c Assessment – Proportion of diabetic patients with HbA1c measured prior to surgery

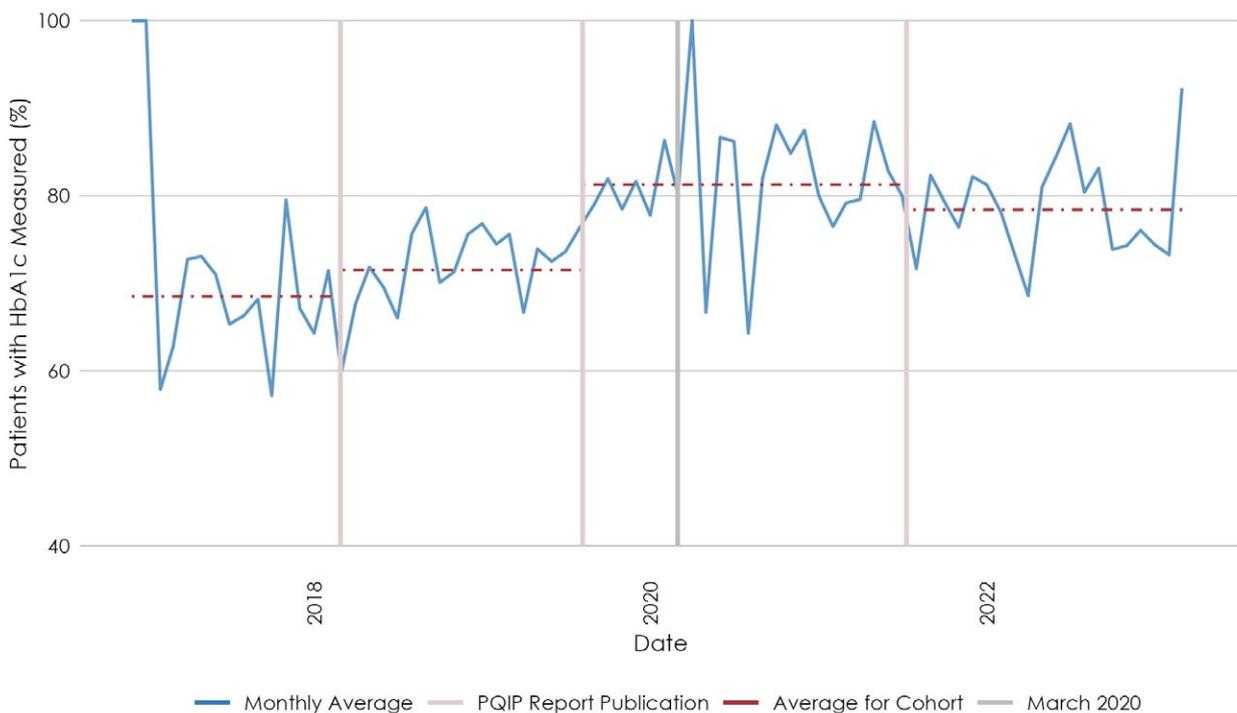


Table 6 Number and proportion of diabetic patients with HbA1c measurement taken in each surgical speciality

Surgical Speciality	Cohort 1 (n=580)	Cohort 2 (n=1,345)	Cohort 3 (n=1,187)	Cohort 4 (n=1,256)
Abdo - Other	23 (74%)	53 (84%)	25 (89%)	20 (83%)
Head and Neck	27 (61%)	18 (58%)	11 (79%)	22 (88%)
Hepatobiliary	53 (54%)	158 (65%)	84 (80%)	67 (81%)
Lower GI	292 (72%)	606 (74%)	503 (83%)	509 (81%)
Thoracics	61 (73%)	94 (63%)	87 (70%)	131 (60%)
Upper GI	46 (61%)	113 (73%)	71 (81%)	70 (84%)
Urology	83 (72%)	200 (72%)	189 (85%)	200 (85%)
Burns and Plastics	–	8 (73%)	7 (70%)	4 (67%)
Gynaecology	–	6 (75%)	33 (79%)	85 (83%)
Orthopaedics	–	49 (80%)	104 (87%)	74 (79%)
Spinal	–	29 (62%)	33 (73%)	26 (87%)
Vascular	–	14 (82%)	42 (71%)	52 (67%)

Table 7 Diabetes Control prior to surgery – all Cohorts

Cohort	HbA1C <8.5% [n (%)]	HbA1C >8.5% [n (%)]
Cohort 1 (n = 580)	445 (77%)	135 (23%)
Cohort 2 (n=1,345)	1,030 (77%)	315 (23%)
Cohort 3 (n=1,187)	944 (80%)	243 (20%)
Cohort 4 (n=1,256)	940 (75%)	316 (25%)

Table 8 Diabetes control in Cohort 4 PQIP patients by speciality

Specialty	HbA1C <8.5% [n (%)]	HbA1C >8.5% [n (%)]
Abdo – Other	14 (70%)	6 (30%)
Burns and Plastics	4 (100%)	0 (0%)
Gynaecology	68 (80%)	17 (20%)
Head and Neck	16 (73%)	6 (27%)
Hepatobiliary	37 (55%)	30 (45%)
Lower GI	389 (77%)	118 (23%)
Orthopaedics	69 (93%)	5 (6.8%)
Spinal	19 (73%)	7 (27%)
Thoracics	96 (73%)	35 (27%)
Upper GI	51 (73%)	19 (27%)
Urology	144 (72%)	55 (28%)
Vascular	33 (65%)	18 (35%)

Perioperative blood management

Anaemia management has been high on PQIP priorities in all annual reports to date. Despite some improvements, a large proportion of anaemic patients still receive no treatment for their anaemia in the months before surgery.

Great work! Over time the proportion of patients who are presenting for surgery with moderate to severe anaemia (Last measured haemoglobin prior to surgery <100g/L) is decreasing from 11.3% in Cohort 1 to 7.9% in our current Cohort.

We want to strive for even better compliance. Even mild anaemia is an independent risk factor for increased adverse outcomes following surgery, including higher morbidity and mortality rates. Patients with preoperative anaemia are [less likely to DrEaM](#) within 24-hours after surgery, which in turn is associated with complications and an extended hospital length of stay (LOS).

Table 9 Proportion (%) of patients with mild, moderate, and severe preoperative anaemia

Anaemia category	Cohort 1 n = 6,577	Cohort 2 n = 14,047	Cohort 3 n = 11,144	Cohort 4 n = 11,538
Severe	23 (0.3%)	67 (0.5%)	47 (0.4%)	45 (0.4%)
Moderate	735 (11%)	1,420 (10%)	977 (8.8%)	864 (7.5%)
Mild	1,901 (29%)	4,175 (30%)	3,065 (28%)	3,121 (27%)
Not Anaemic	3,918 (60%)	8,385 (60%)	7,055 (63%)	7,508 (65%)

WHO anaemia thresholds used (<130 – Mild, <110 Moderate, <80 Severe)

PQIP collects data on how preoperative anaemia is (or isn't) managed – this is a modifiable process where QI efforts can be focussed. Although fewer patients are presenting to surgery anaemic, there are still a significant proportion of anaemic patients who receive no anaemia treatment prior to surgery. Similar to previous Cohorts, 70% of anaemic patients had no anaemia management perioperatively, including 31% of patients with severe anaemia.

How can we improve our perioperative anaemia management?

The [Centre for Perioperative Care \(CPOC\) perioperative anaemia guidance](#) and [GIRFT](#) recommend all trusts apply a [Patient Blood Management](#) (PBM) approach to optimising anaemia before surgery, to improve patient outcomes while simultaneously saving healthcare resources and costs. PBM is a patient-centric approach endorsed by [WHO](#) and [NHS Blood and Transplant](#). The three core pillars of PBM are:

- timely and appropriate management of anaemia
- prevention of blood loss, and
- optimising the patient's physiological tolerance of anaemia.

Giving fewer blood transfusions confers multiple benefits

- Avoids risk of adverse reactions associated with blood and blood component transfusion such incompatibility, infection, immunomodulation and difficulty with future cross-matching.
- Supports sustainability of blood supplies, especially given recurrent concerns over blood shortages.
- Reduces cost to NHS.

Spotlight on Tranexamic Acid

Antifibrinolytics reduce intraoperative bleeding and the need for blood transfusion in patients undergoing major surgery by 25%. All patients undergoing surgery where **expected blood loss is >500ml** should receive prophylactic tranexamic acid prior to skin incision as part of the PBM approach to **reduce intraoperative blood loss and need for blood transfusion**. Tranexamic acid was administered to only 54% of patients undergoing surgery where blood loss was between 500 and 1000ml, and only 61% of patients where blood loss was >1000ml. What was your hospital's TXA administration rate? Aim to improve this to 100% of appropriate patients to reduce their risk of anaemia and blood transfusion.

Develop a local perioperative anaemia pathway with a Patient Blood Management (PBM) approach

Diagnose anaemia early FBC should be performed as part of the "fit for referral" assessment for patients fulfilling [NICE preoperative testing criteria](#).

Investigate the cause of anaemia Add further diagnostic tests in patients found to be anaemic eg. Ferritin and transferrin, vitamin B12. Collaborate to formalise inter-specialist pathways to facilitate diagnosis

Shared decision making, risk assessment and empowering patients Discuss with patients the balance of risks in delaying surgery and the options for treating anaemia

Treat Anaemia by a standardised local pathway with an individualised patient care plan Give clear nutritional advice. Oral iron takes four weeks to improve haemoglobin and 3-6 months to replenish iron stores. Intravenous iron should be considered if less than four weeks until surgery or oral iron ineffective/not tolerated.



Minimise intraoperative blood loss and optimise coagulation Document clear plans for pre-, intra- and postoperative management of anaemia for all patients undergoing surgery with expected blood loss >500ml or 10% blood volume, including **prophylactic tranexamic acid** administration and use of cell salvage

Optimise patients' physiology during surgery Consider blood transfusion Hb <70g/L with haemoglobin assessment after each unit

Postoperative follow-up and discharge plan Many patients are anaemic postoperatively, ensure follow-up with primary care is in place prior to discharge

Collect data and audit Essential to measure how your local pathway is performing and to iteratively improve your service

Carbohydrate loading

Preoperative carbohydrate loading is recommended in non-diabetic patients undergoing certain types of major surgery. There are [well documented benefits](#), including improved patient well-being and satisfaction, reduction in surgical stress response and insulin resistance and minimised protein catabolism. A [Cochrane systematic review](#) which is now almost 10 years old, found that although carbohydrate loading has not been shown to decrease postoperative complication rates, it can be associated with a small reduction in length of stay when compared to ‘normal fasting’.

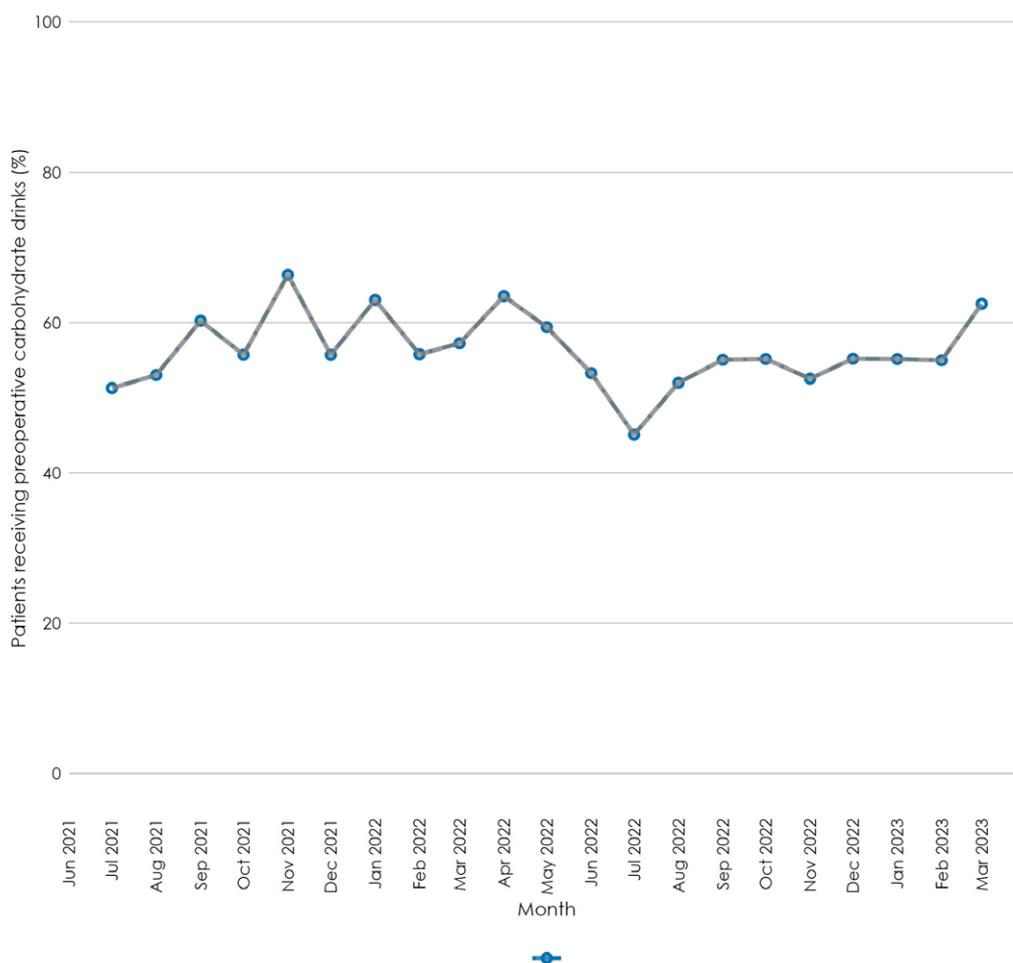
The [Enhanced Recovery After Surgery \(ERAS\) society guidelines](#) vary on their recommendations for carbohydrate loading by specialty (Table 10). In all PQIP surgical specialties, ERAS guidelines give a strong recommendation for clear fluids up to two hours preoperatively unless contraindicated (eg known delayed gastric emptying) to minimise fasting and patient discomfort.

Table 10 ERAS recommendations for Carbohydrate loading for PQIP surgical specialties

Strong recommendation	Moderate recommendation	Consider	Not recommended	No ERAS guidance
Colorectal	Vascular (non-diabetic)	Hepatobiliary	Orthopaedics	Upper GI
Gynaecology		Head and Neck	Spinal	Burns and Plastics
Thoracics			Oesophagectomy	
Urology				

We still have room from improvement to deliver carbohydrate loading to eligible patients, with 57% of non-diabetic patients receiving preoperative carbohydrate loading for surgical procedures in ERAS recommended specialties. Figure 7 shows the percentage of patients who received preoperative carbohydrate drinks by month of surgery.

Figure 7 Proportion of PQIP patients receiving carbohydrate loading preoperatively per month



PQIP recommends, that in specialties where there is a strong ERAS recommendation and no contraindications, 80% or more of patients should be receiving carbohydrate preoperatively. Although generally compliance in lower GI and hepatobiliary is reasonable, further focused QI in this area could help these teams reach 80% compliance!

Table 11 Proportion of non-diabetic patients in the whole PQIP Cohort receiving preoperative carbohydrate loading in surgical specialties where the ERAS society has recommended carbohydrate loading (specialties with strong recommendations are highlighted in blue)

Surgical specialty	Yes N = 14,058	No N = 5,565	Not known N = 2,851
Lower GI	9,899 (71%)	2,279 (16%)	1,669 (12%)
Hepatobiliary	928 (64%)	329 (23%)	194 (13%)
Urology	1,951 (54%)	1,137 (31%)	557 (15%)
Gynaecology	315 (46%)	266 (39%)	100 (15%)
Head and Neck	140 (44%)	121 (38%)	59 (18%)
Thoracics	800 (33%)	1,362 (56%)	257 (11%)
Vascular	25 (23%)	71 (64%)	15 (14%)

Rethinking enhanced recovery – DrEaMing

DrEaMing within 24-hours of surgery is a care bundle containing the core elements of more complex enhanced recovery pathways aiming to revitalise efforts to improve patient’s recovery after surgery. DrEaMing has been a PQIP priority since the first Cohort report was published in 2018 and is supported by Getting It Right First Time and RCoA. The number of patients DrEaMing increases year on year, thanks to the fantastic efforts made by your local teams. Since the last PQIP Cohort report, [DrEaMing has been evidenced](#) to be associated with a reduced length of hospital stay and is entering into the second year of being an NHS England Commissioning for Quality and Innovation (CQUIN) Indicator!

Where are we now with DrEaMing

DrEaMing compliance has nudged up again a little – now 67% overall, compared with 66% last year. Variation in DrEaMing compliance remains between surgical specialties and hospital trusts.

Table 12 DrEaMing within 24h of surgery, and key related processes (overall, by Cohort)

	Cohort 1	Cohort 2	Cohort 3	Cohort 4
Drinking	5,218 (79%)	12,341 (87%)	10,284 (91%)	10,888 (92%)
Eating	4,037 (61%)	9,742 (69%)	8,538 (76%)	9,191 (78%)
Mobilising	5,058 (76%)	10,996 (78%)	9,030 (80%)	9,507 (80%)
Dreaming	3,548 (54%)	8,462 (60%)	7,396 (66%)	7,981 (67%)
No Drain Present*	–	–	–	5,544 (47%)
No Nasogastric Tube	5,309 (80%)	11,846 (84%)	9,874 (88%)	10,512 (89%)

*note we have changed how we record the presence of surgical drains, so comparison with previous years’ compliance is not valid, except in abdominal surgery.

DrEaMing: The Evidence

Analysis of 22,218 patients in the PQIP cohort between December 2016- November 2020 found overall DrEaMing compliance was around 60%.

DrEaMing within 24 hours of surgery was associated with a reduced length of hospital stay (LOS), independent of confounders including patient and hospital level factors

Only the development of a major postoperative complication carried a higher risk of increased LOS than failing to DrEaM.

In a subgroup of 7230 colorectal patients undergoing four commonest colorectal procedures DrEaMing compliance was 60% (range 0-100%).

The risk of postoperative complications was reduced in patients that DrEaMed from 32% to 17%.

Hospitals with high DrEaMing delivery (>80%) had a 2-day shorter LOS than hospitals with the lowest compliance (<33%) despite similar complication rates

Suggests that postoperative complications are not the primary determinant of an extended LOS.

Case-mix and process factors that predicted whether patients DrEaM or not, ALL except surgical speciality are modifiable

Modifiable care processes evidenced to limit a patient's ability to DrEaM

Focus QI efforts on these modifiable processes to ensure more patients DrEaM after surgery



Optimise preoperative Anaemia



Reduce nasogastric tubes in recovery



Reduce abdominal drains in recovery



Prevent moderate to severe pain postoperatively

Oliver et al. BJA, 129 (1): 114-126 (2022)

Table 13 Proportion of Patients DrEaMING on Day One Post-Operatively (by Cohort and specialty)

	Cohort 1	Cohort 2	Cohort 3	Cohort 4
Abdo – Other				
Drinking	74%	91%	89%	93%
Eating	55%	67%	63%	65%
Mobilising	74%	84%	78%	70%
Dreaming	48%	61%	53%	52%
No Drain Present	52%	53%	49%	39%
No Nasogastric Tube	82%	88%	83%	83%
Burns and Plastics				
Drinking	NA%	100%	99%	99%
Eating	NA%	97%	97%	99%
Mobilising	NA%	86%	87%	96%
Dreaming	NA%	86%	86%	95%
No Drain Present	NA%	–	–	8.2%
No Nasogastric Tube	NA%	100%	99%	100%
Gynaecology				
Drinking	NA%	95%	98%	97%
Eating	NA%	91%	90%	90%
Mobilising	NA%	89%	88%	86%
Dreaming	NA%	85%	83%	82%
No Drain Present	NA%	87%	83%	83%
No Nasogastric Tube	NA%	91%	92%	95%
Head and Neck				
Drinking	72%	63%	70%	63%
Eating	63%	61%	66%	58%
Mobilising	84%	79%	91%	79%
Dreaming	61%	56%	64%	54%
No Drain Present	–	–	–	12%
No Nasogastric Tube	62%	66%	72%	68%
Hepato-pancreatico-biliary				
Drinking	79%	87%	89%	93%
Eating	62%	68%	73%	68%
Mobilising	69%	71%	71%	71%
Dreaming	49%	57%	59%	53%
No Drain Present	33%	25%	28%	26%
No Nasogastric Tube	64%	65%	72%	73%
Lower gastrointestinal				
Drinking	85%	92%	93%	94%
Eating	64%	66%	67%	69%
Mobilising	79%	79%	80%	78%
Dreaming	56%	58%	59%	59%

No Drain Present	57%	57%	58%	57%
No Nasogastric Tube	91%	91%	90%	90%
Orthopaedics				
Drinking	NA%	99%	99%	99%
Eating	NA%	97%	99%	99%
Mobilising	NA%	65%	68%	60%
Dreaming	NA%	–	–	60%
No Drain Present	NA%	99%	98%	79%
No Nasogastric Tube	NA%	99%	99%	100%
Spinal				
Drinking	NA%	98%	96%	100%
Eating	NA%	95%	92%	96%
Mobilising	NA%	71%	70%	84%
Dreaming	NA%	70%	67%	82%
No Drain Present	NA%	–	–	61%
No Nasogastric Tube	NA%	96%	96%	98%
Thoracics				
Drinking	94%	98%	98%	99%
Eating	93%	96%	97%	98%
Mobilising	90%	95%	96%	95%
Dreaming	86%	92%	94%	95%
No Drain Present	-	-	-	1.8%
No Nasogastric Tube	99%	99%	97%	99%
Upper GI				
Drinking	31%	35%	31%	31%
Eating	14%	16%	13%	15%
Mobilising	54%	59%	63%	63%
Dreaming	12%	14%	12%	12%
No Drain Present	–	–	–	16%
No Nasogastric Tube	23%	29%	25%	25%
Urology				
Drinking	92%	95%	97%	98%
Eating	75%	81%	87%	90%
Mobilising	81%	84%	88%	88%
Dreaming	66%	74%	81%	83%
No Drain Present	46%	52%	48%	51%
No Nasogastric Tube	94%	96%	95%	97%
Vascular				
Drinking	NA%	98%	92%	93%
Eating	NA%	91%	80%	83%
Mobilising	NA%	74%	69%	65%
Dreaming	NA%	70%	63%	61%
No Drain Present	NA%	–	–	53%
No Nasogastric Tube	NA%	96%	89%	88%



The DrEaMing CQUIN – why add a financial incentive?

Financial incentive schemes align evidenced-based quality metrics, processes, and pathways with a financial payment to incentivise trusts to improve both the quality and efficiency of their delivered care. Within perioperative medicine, both NELA and NHFD have best practice tariffs financial incentive, which has led to reduced variation of care across hospitals resulting in improved patient outcomes!

The updated [CQUIN for 2023/2024](#) includes a wider range of surgical specialties and procedures, and those discharged without an overnight stay in hospital with a higher compliance threshold of 80% for payment. Documented evidence of DrEaMing provision is now only required. An updated exemption and exclusion criteria have been applied to support local trusts achieve the CQUIN, including jejunostomy feeding for certain surgeries. The total financial value of the CQUIN scheme is 1.25% of total provider contract value, with each of the five adopted CQUINs assigned a value of 0.25% – this can be a large pot of money!



Top tips for DrEaMing Quality Improvement

- **Focus on improving the modifiable process that limit a patient's ability to DrEaM** after surgery: optimise preoperative anaemia, reduce use of abdominal drains, nasogastric tubes and epidurals, and prevent postoperative pain.
- **Collaborate and co-design** a DrEaMing intervention plan including all relevant health care professionals involved in a patients' perioperative care.
- **Use your data to drive change** – the new postoperative morbidity dashboards on the PQIP website incorporate ten dials focusing on ER metrics including DrEaMing. Use your own data dial to monitor and evaluate your DrEaMing QI initiatives!
- **Celebrate success and nurture your change champions** by sharing your data regularly.
- Develop a **cohesive team that delivers a consistent message** to patients regarding their enhanced recovery journey and DrEaMing.
- Join and be an active participant in the **PQIP Collaborative Webinar series** by sharing your DrEaMing successes and challenges.

Useful resources

- [DrEaMing BJA paper](#).
- [CQUIN guidance](#)
- [PQIP Collaborative Webinars \(see the webinar tab\)](#).

Involve patients, collaborate with patients and empower patients

Feedback from a focus group with Patient Voices @RCoA on Drinking, Eating and Mobilising at 24 hours post major surgery (DrEaMing)

Implementing evidence-based quality care and initiating meaningful quality improvement are key principles of PQIP. However, this can only be done effectively if the patient is placed at the centre of everything we do. It is invaluable to look at QI metrics, such as DrEaMing, through a patient lens.

What do patients think about DrEaMing?

Once DrEaMing is explained, patients can see it is a simple concept that makes perfect sense. DrEaMing is humanising and will help patients feel 'on the road to recovery' post-surgery. Patients will also do anything to reduce complications and prolonged hospital stays and so they will recognise that it just makes good sense to DrEaM.

How do patients want to be helped to DrEaM? 'Engage, Educate and Empower patients'

Patients want to be involved in their perioperative journey, but they need to be empowered to do this through education from the perioperative multidisciplinary team.

Engage patients in DrEaMing right from the start of their perioperative journey when surgery is first discussed

Educate and explain: Many patients will not have heard about DrEaMing and so the concept should be explained clearly. Explanations should be reinforced with written information and verbally at every patient contact with those involved in their care.

Empowering patients through education will enable them to ask postoperatively: 'when am I getting out of bed?', 'when is breakfast coming?' and to challenge traditional bed rest and nil by mouth preconceptions. Empowered patients are a powerful resource to help embed DrEaMing into practice, perhaps challenging clinicians who may not be fully aware of up-to-date evidence.

What do patients think about the DrEaMing CQUIN and DrEaMing as a QI metric?

Patients want evidence-based care to be embedded into practice as soon as possible and see QI and CQUINs as beneficial.

Patients need to be shown that QI initiatives are truly for patients benefit, not a tick box exercise.

Patients want a patient centred approach to QI with early education, clear communication and shared decision making. They understand the pressure on hospital beds and waiting lists and so want improved care and efficiency overall, but at an individual level, do not want to feel like these initiatives are to rush them out of hospital.

What else can clinicians do?

Communication is key: Not only communication to the patients but also between the MDT. Patients see and hear everything when in hospital, and so a cohesive perioperative team that communicate with each other and deliver a unified message to patients is going to have greater success in collaborating with patients for their recovery.

Listen to patients: Some patients may still have reservations or preconceived ideas of what recovery looks like after surgery. Listen to their ideas, concerns and expectations and work with them to help present up to date evidence in a patient centred way.

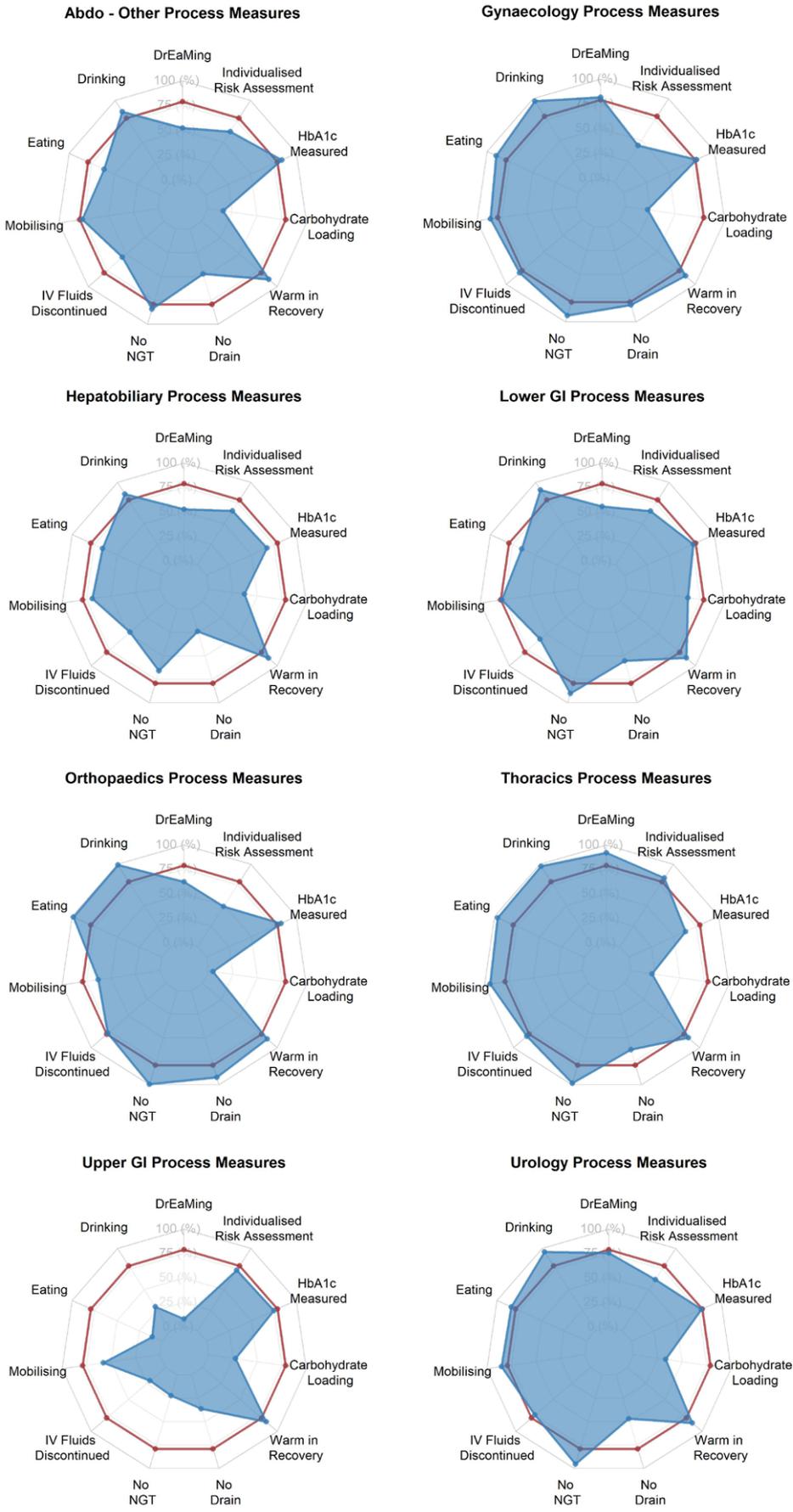
Key processes of perioperative care

The evidence from enhanced recovery and the PQIP Cohorts to date show that there are key processes of perioperative care which, if embedded into practice, can improve patient outcomes and satisfaction. These processes of perioperative care are depicted below in the radar plots. These processes of care are an excellent place to start when thinking about local QI based on PQIP data. Many of the metrics are also interlinked and so an improvement in one may lead to improvements in others, eg the absence of an NG tube and removal of IV fluids can promote drinking, eating and mobilising (DrEaMing). The red line on the radar plots indicates 80% which is considered the minimum level of achievement which is associated with reliable processes being in place to consistently achieve these metrics.

There is significant variation between some specialties in achieving the metrics, however one area which looks to be embedded in practice across all surgical specialties depicted, is keeping patients warm intraoperatively. Perioperative hypothermia is a common adverse sequela of anaesthesia and surgery, and is associated with increased infective complications, increased perioperative blood loss, and reduction in patient comfort and satisfaction, amongst other adverse physiological effects. NICE guidelines define this as a temperature below 36°C and recommend routine measurement in the perioperative period. There is consistently good practice in this domain – with 88% of patients arriving warm in recovery.

A top tip for starting a quality improvement project based on reviewing these radar plots would be to choose one specialty to start with and start to look at processes that can be implemented or adapted for your chosen metric. Every hospital will receive radar plots for their own site if more than ten patients have been recruited, so share the data to get full buy in from the whole perioperative MDT.

Figure 8 Radar plots of compliance with key processes, by speciality (all years)



Postoperative destination

Higher levels of postoperative care: getting the right patients in the right place

Research has repeatedly shown us that it is a small subset of patient that are responsible for a large majority of the adverse perioperative outcomes, and as such a targeted approach of a finite resource, such as postoperative critical care beds, is necessary in an effort to minimise perioperative morbidity. Enhanced perioperative care facilities sit on the continuum between ward-based care and critical care, and deliver an environment with increased nursing ratios and more intensive monitoring in the immediate postoperative period.

A joint publication on [Enhanced Perioperative Care](#) from the Faculty of Intensive Care Medicine and the Centre for Perioperative Care and the [Raising the Standard from the Royal College of Surgeons](#) provides guidance for levels of postoperative care, based on mortality risk.

ENHANCED PERIOPERATIVE CARE

Who might benefit?



INDIVIDUALISED RISK ASSESSMENT

Predicted perioperative mortality of 1% - 5%



ENHANCED MONITORING & TREATMENT

Advanced haemodynamic monitoring



SURGICAL FACTORS

Procedure specific; eg free flap surgery



PATIENT FACTORS

Management of existing co-morbidities



ORGANISATIONAL BENEFITS

Critical Care Capacity
Cancellation Reduction
Flexible Skilled Workforce

Lack of critical care capacity is recognised as a [major contributor to short notice cancellation](#) and effective utilisation of enhanced care facilities may help reduce cancellation rates and release critical care capacity to support other patients.

Do PQIP patients receive the recommended level of postoperative care?

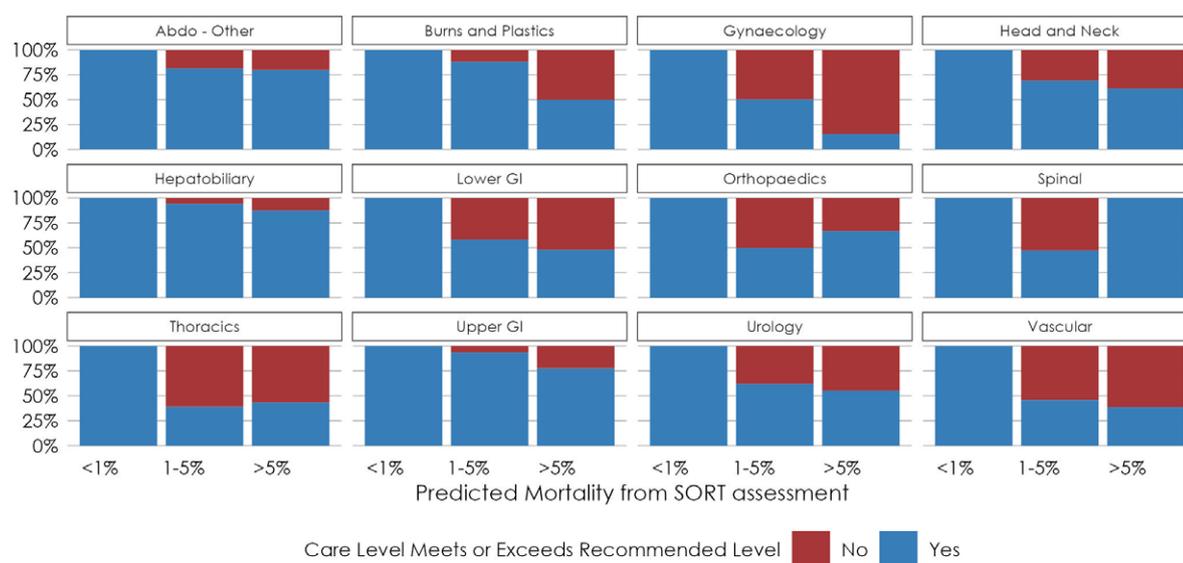
Table 14 Postoperative destination according to SORT-defined preoperative risk profile

	Predicted Mortality – SORT Risk Assessment Tool			
	<1% (n = 30,506, 69.4%)	1–5% (n = 11,188, 25.5%)	5–10% (n = 1,560, 4%)	>10% (n = 678, 2%)
Ward Care	16,962 (56%)	4,454 (40%)	553 (36%)	210 (31%)
Enhanced Care	4,790 (16%)	1,763 (16%)	248 (16%)	90 (13%)
ITU	8,601 (28%)	4,938 (44%)	755 (49%)	375 (56%)

The data submitted to PQIP allows us to calculate a SORT predicted mortality score, which we have stratified into four levels across all Cohorts of the PQIP report (Table 14). We can see that nationally, across all specialties, over 49% of patients with predicted 30-day mortality risk $\geq 5\%$ are not admitted to a critical care environment. Interpreting and understanding these statistics at a local level, in conjunction with individualised risk assessment metrics, may help to strengthen the argument for developing local processes and capacity.

Looking only at the patients who have a $>5\%$ 30-day mortality risk, there are stark specialty-related differences in the proportion of patients who are appropriately admitted to critical care (Figure 9). Compliance with ideal postoperative destination is markedly better in hepatobiliary, upper GI, abdominal ‘other’ and head and neck surgery. Compliance with this best practice metric is particularly low in gynaecology, burns and plastics, thoracics and vascular. This might indicate differences in resourcing between specialist and non-specialist centres, more effective pathways or some other structural or process related issue. Postoperative care destination has long been known to be subject to significant unwarranted variation and acknowledged in a [previous survey of the postoperative critical care landscape](#). These data, particularly when reviewed locally, may support business cases for critical care expansion and/or enhanced care services.

Figure 9 Percentage of patients where postoperative destination meets recommended minimum standard, by surgical specialty – all Cohorts



Individualised pain management

Pain management plays a crucial role in facilitating postoperative mobilisation, rehabilitation and return to normal function. Poorly controlled pain is not only associated with increased cardiorespiratory stress and higher rates of PONV but is also a strong predictor of poor longer-term outcome and the development of persistent post-surgical pain.

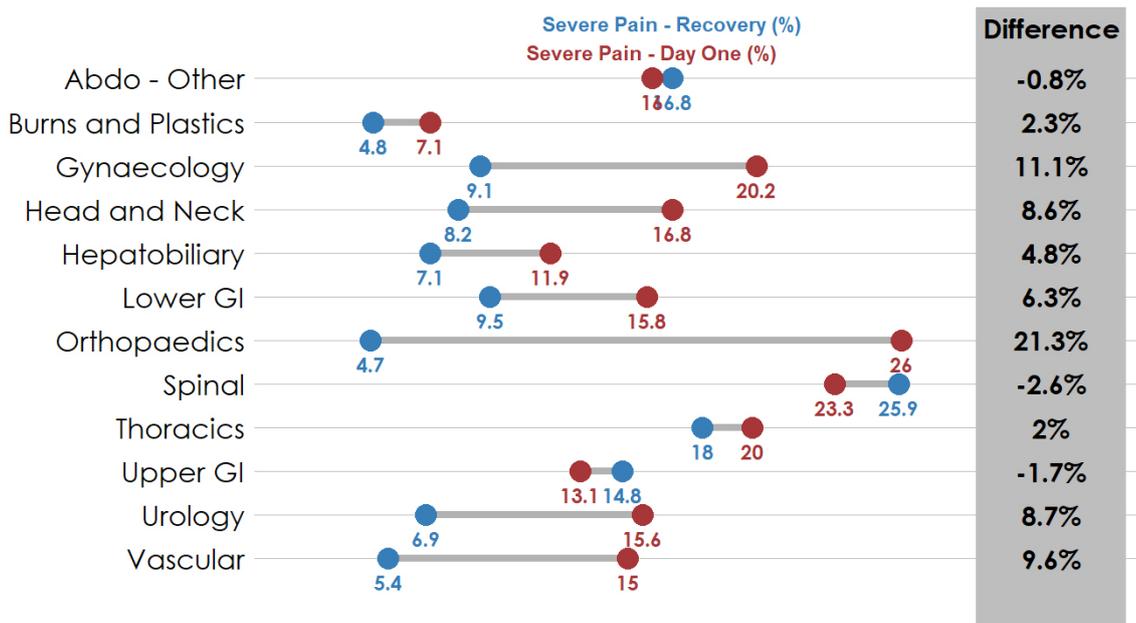
Where are we now?

Unfortunately, a high proportion of patients continue to report severe pain in the postoperative period. Severe pain also continues to be a more prevalent problem at 24 hours postoperatively relative to pain scores reported in recovery (Figure 10). This finding should re-iterate the importance of having a multi-modal analgesic plan in place, postoperative acute pain team follow-up for at risk patients, and processes to ensure the transition of this plan to the postoperative care destination.

This pattern is particularly evident in the Orthopaedic & Vascular groups – which **could** represent the phenomena of rebound pain that may occur following the resolution of peripheral nerve blocks (see box).

Despite this however, the overall rates of dissatisfaction with pain management remain reassuringly low, with 95% reporting being either satisfied or very satisfied with the perioperative pain therapy.

Figure 10 Percentage reporting severe pain on D1 postop by specialty – Cohort 4



Focus on: rebound pain



Rebound pain after regional anaesthesia is clinically significant transient acute postoperative pain following a sensory block wearing off. It can be clinically significant, in terms of pain intensity, patient-quality life and satisfaction, as well as potentially affecting the ability to mobilise or resume other activities of daily living.



Current thinking suggests that [‘it represents an unmasking of the expected nociceptive response in the absence of adequate systemic analgesia, rather than an exaggerated hyperalgesic phenomenon induced by local anesthetic neural blockade.’](#)



[Risk factors for rebound pain](#) include surgery involving bone, female sex and younger age.



PQIP cohort data would agree that this phenomenon is more common in orthopaedic and vascular surgery. As always, the best plan is having a plan! Identify patients at risk of rebound pain, ensure that they are followed up, and use your PQIP and other local data to monitor progress.

Table 15 Patient Perception of Quality of Pain Management (Bauer questionnaire asked on Day 1 postop)

Patient's Satisfaction Level	Cohort 1 n = 6,640	Cohort 2 n = 14,228	Cohort 3 n = 11,318	Cohort 4 n = 11,926
Very Satisfied	3,180 (65%)	6,322 (64%)	5,367 (67%)	5,942 (67%)
Satisfied	1,438 (29%)	2,891 (29%)	2,239 (28%)	2,510 (28%)
Dissatisfied	240 (4.9%)	495 (5.0%)	310 (3.9%)	366 (4.1%)
Very Dissatisfied	44 (0.9%)	107 (1.1%)	77 (1.0%)	83 (0.9%)

Can we predict risk of postop pain?

[Recent research](#) based on the PQIP dataset has evaluated risk factors for severe postoperative pain and developed a predictive model using preoperative variables. Whilst many of the predictors were non-modifiable patient or surgical factors, baseline patient reported outcome measures around anxiety and depression, and higher levels of preoperative pain were potentially modifiable variables associated with problematic postoperative pain. Identification of those patients at highest risk of severe pain may aid both informed consent, patient expectations and adjusted anaesthetic technique as well as help to guide the involvement of the pain team preoperatively where necessary.

The [DrEaMing research paper](#) found that epidural use was associated with a reduced likelihood of DrEaMing within 24h of surgery. However, we know that severe pain is also associated with not DrEaMing, and that epidurals are associated with a lower risk of severe pain on Day 1 after surgery.

Epidurals, pain management and DrEaMing

An epidural may be the best analgesia in patient groups undergoing specific procedures. However, they carry the risk of tethering patients to bedspaces, reducing their ability to mobilise. Teams which are consistently supporting their patients with thoracic epidurals to mobilise within 24h of major surgery, have proactively collaborated to co-design new standardised pathways that are now embedded in their clinical care.

Taking a collaborative approach with your multidisciplinary team involving key stakeholders such as surgeons and physiotherapists, can help to develop and successfully local protocols to facilitate early mobilisation for these more complex patients.

Complications – why do they matter?

Complications have a cost. A cost to patients, and a cost to health care systems and providers. The short-term impact on patients in the perioperative period is well recognised, with complications associated with worse health-related quality of life, increased hospital length of stay (LOS) and in the worst case, an impact on survival. Further, the impact of complications on health-related quality of life and survival endures for [several years after surgery](#). Undoubtedly, this burden is not felt by the patient alone, but also by those around them.

There is also an economic impact on [healthcare systems](#) and on wider society. With finite resources, complications that inevitably lead to a financial cost can have an impact on the remaining resources available. These costs are incurred both during the primary hospital stay, but also from readmissions and pressures on primary and community health and care services.

With surgical waiting lists continuing to rise, [an ageing and increasingly comorbid patient population](#) and an increase in the complexity of surgery offered, it is crucial to think about the impact complications can have. Thinking about this helps to frame the context of this Cohort report, how can we do better? How can we improve the care delivered based on the evidence to avoid preventable complications? It is imperative that we continue to develop and assess systems that can contribute to avoiding preventable complications at all stages of the perioperative pathway and allow early identification and rapid treatment when they do arise.

Inpatient complications and length of stay

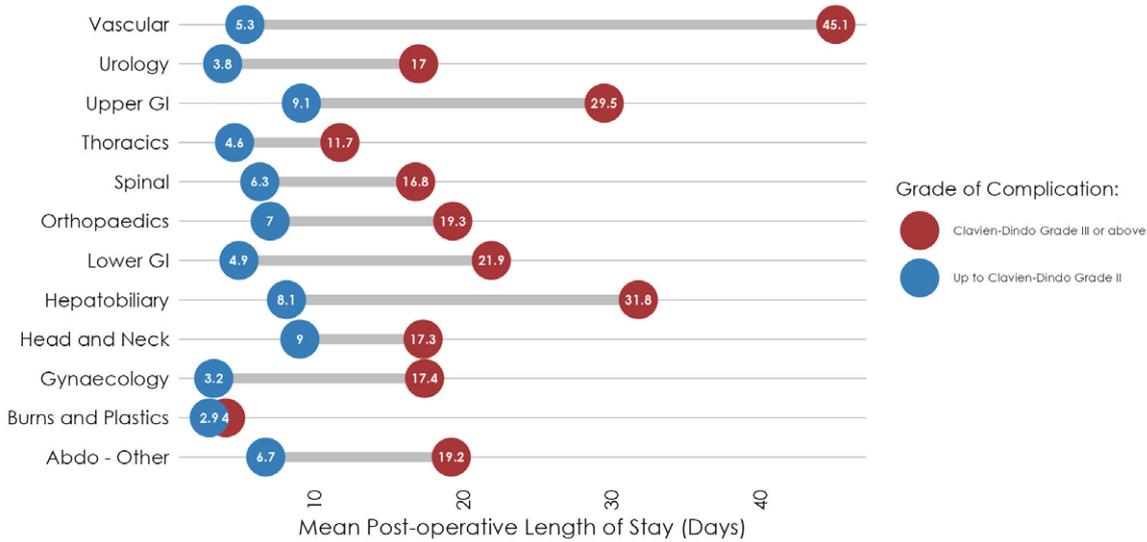
Across the PQIP dataset, with each iteration of the Cohort report, the overall hospital length of stay (LOS) has continued to fall from 8.9 days to 6 days. However, these data are not risk-adjusted for patient case-mix or surgical severity, so interpretation of the raw data must be undertaken with caution.

Table 16 Mean inpatient length of stay by PQIP specialty and Cohort

Mean Length of Stay (in days) by Specialty and Cohort				
	Cohort 1	Cohort 1	Cohort 1	Cohort 1
Abdo – Other	11.0	10.1	9.3	7.8
Burns and Plastics	NA	4.9	3.4	3.0
Gynaecology	NA	3.5	3.7	3.7
Head and Neck	12.9	10.7	11.1	9.8
Hepatobiliary	9.7	10.3	9.5	9.9
Lower GI	9.0	8.7	8.5	6.1
Orthopaedics	NA	9.6	7.5	7.5
Spinal	NA	5.8	5.7	6.5
Thoracics	5.4	5.2	5.2	4.9
Upper GI	13.4	13.3	13.3	12.4
Urology	6.1	5.3	4.5	4.1
Vascular	NA	4.8	7.9	8.5
Original PQIP Specialties	8.9	8.4	7.7	6.2
All PQIP Patients	8.9	8.3	7.3	6.0

Consistent with both the previous PQIP Cohort reports, and existing research, we can see the impact of a complications on mean LOS, which varies by specialty (Figure 11).

Figure 11 Mean postoperative length of stay in patients with and without major complications (Cohort 4)



PQIP routinely collects data on postoperative complications experienced by patients through the Post-Operative Morbidity Survey (POMS) administered on day 7. Morbidity is recorded across nine physiological domains. POMS major has been [previously defined](#) as a POMS morbidity equivalent to a Clavien-Dindo Grade II or higher. Dichotomising postoperative morbidity into POMS major (Clavien-Dindo Grade III and above) or POMS minor (Clavien-Dindo grade II or lower) allows us to identify complications of most significance (Figure 12).

Figure 12 Major postoperative morbidity by specialty (Cohort 4)

POMS category	Abdo - Other	Burns and Plastics	Gynaecology	Head and Neck	Hepatobiliary	Lower GI	Orthopaedics	Spinal	Thoracics	Upper GI	Urology	Vascular
Pain	0 %	0 %	0 %	0 %	1 %	1 %	0 %	0 %	0 %	1 %	0 %	1 %
Haematological	2 %	0 %	1 %	1 %	0 %	1 %	2 %	1 %	0 %	1 %	0 %	2 %
Wound	2 %	0 %	1 %	6 %	3 %	3 %	2 %	0 %	1 %	3 %	1 %	1 %
Neurological	1 %	0 %	0 %	3 %	1 %	1 %	1 %	2 %	1 %	3 %	1 %	3 %
Cardiovascular	1 %	0 %	0 %	2 %	1 %	2 %	2 %	1 %	2 %	5 %	1 %	2 %
Renal	1 %	0 %	0 %	0 %	1 %	1 %	1 %	0 %	1 %	1 %	1 %	2 %
Infectious	12 %	0 %	3 %	16 %	17 %	11 %	9 %	1 %	5 %	27 %	4 %	9 %
Pulmonary	5 %	0 %	1 %	7 %	7 %	4 %	1 %	1 %	4 %	16 %	2 %	6 %

Postoperative morbidity has continued to fall over time between the PQIP Cohorts, although again this may be influenced by changes to the PQIP case mix. In this fourth Cohort, 17% of PQIP patients were still in hospital with morbidity on day seven after surgery, most commonly either gastrointestinal or infective; 12% experienced major postoperative morbidity (Table 17).

Inpatient morbidity

Table 17 Proportion of patients remaining in hospital on Day 7 with major postoperative morbidity

Morbidity Domain	Cohort 1, N = 6,640	Cohort 2, N = 14,226	Cohort 3, N = 11,318	Cohort 4, N = 11,926
Pulmonary				
Complication	6.1%	5.5%	4.5%	3.7%
No Complication	36%	29%	24%	22%
Discharged	58%	66%	71%	74%
Gastrointestinal				
Complication	15%	12%	8.8%	7.5%
No Complication	27%	22%	20%	18%
Discharged	58%	66%	71%	74%
Cardiac				
Complication	2.7%	2.4%	2.1%	1.6%
No Complication	39%	32%	27%	24%
Discharged	58%	66%	71%	74%
Neurological				
Complication	2.4%	2.0%	1.4%	1.2%
No Complication	39%	32%	27%	24%
Discharged	58%	66%	71%	74%
Wound				
Complication	4.6%	3.6%	2.2%	2.0%
No Complication	37%	31%	26%	24%
Discharged	58%	66%	71%	74%
Haematological				
Complication	0.8%	1.0%	0.7%	0.8%
No Complication	41%	33%	28%	25%
Discharged	58%	66%	71%	74%
Pain				
Complication	0.8%	0.9%	0.6%	0.4%
No Complication	41%	33%	28%	25%
Discharged	58%	66%	71%	74%
Renal				
Complication	1.5%	1.1%	1.1%	0.8%
No Complication	40%	33%	28%	25%
Discharged	58%	66%	71%	74%
Infection				
Complication	13%	12%	10%	9.0%
No Complication	29%	22%	18%	17%
Discharged	58%	66%	71%	74%
Any Complication	28%	24%	20%	17%
Major Complication	19%	17%	14%	12%

Measured using the POMS major definition which includes any type of POMS defined morbidity of Clavien-Dindo grade ≥ 2 . For Gastrointestinal morbidity, as all definitions are Clavien-Dindo grade 1 we have shown all morbidity rather than just major. For more information see Grocott et al, *J Clin Epi* 2007; **60**:917–928 and Wong et al, *Brit J Anaes* 2017; **119** (1):95–105.

Patient reported outcome and experience measures

The patient is at the centre of all care that we deliver. Their perception of the quality of healthcare they experience matters and can help to inform improvements to services and care. It is therefore, vital that we measure outcomes that are relevant to patients and both clinically important and valid. A range of different validated measures are routinely collected in the PQIP dataset and provide great insight into patient satisfaction, impact on health-related quality of life and functional outcome.

Bauer Patient Satisfaction Survey

This makes for compelling reading and is testament to all your hard work. Overall satisfaction with perioperative anaesthesia has consistently been very high, with 99% of patients reporting being either 'very satisfied' or 'satisfied' with care provided by their anaesthetic department in general (Figure 13).

Anaesthetic teams show themselves to be excellent communicators, with 89% reporting being very satisfied and 10% satisfied with information shared by their anaesthetist. Treatment of nausea and vomiting is highlighted as the area where patients were least satisfied overall, although the prevalence of severe PONV was lower than severe drowsiness, thirst or pain. This may reflect the differential impact on patients that PONV and pain have, and therefore why they remain important improvement targets.

Figure 13 Patient Satisfaction with Anaesthesia Care



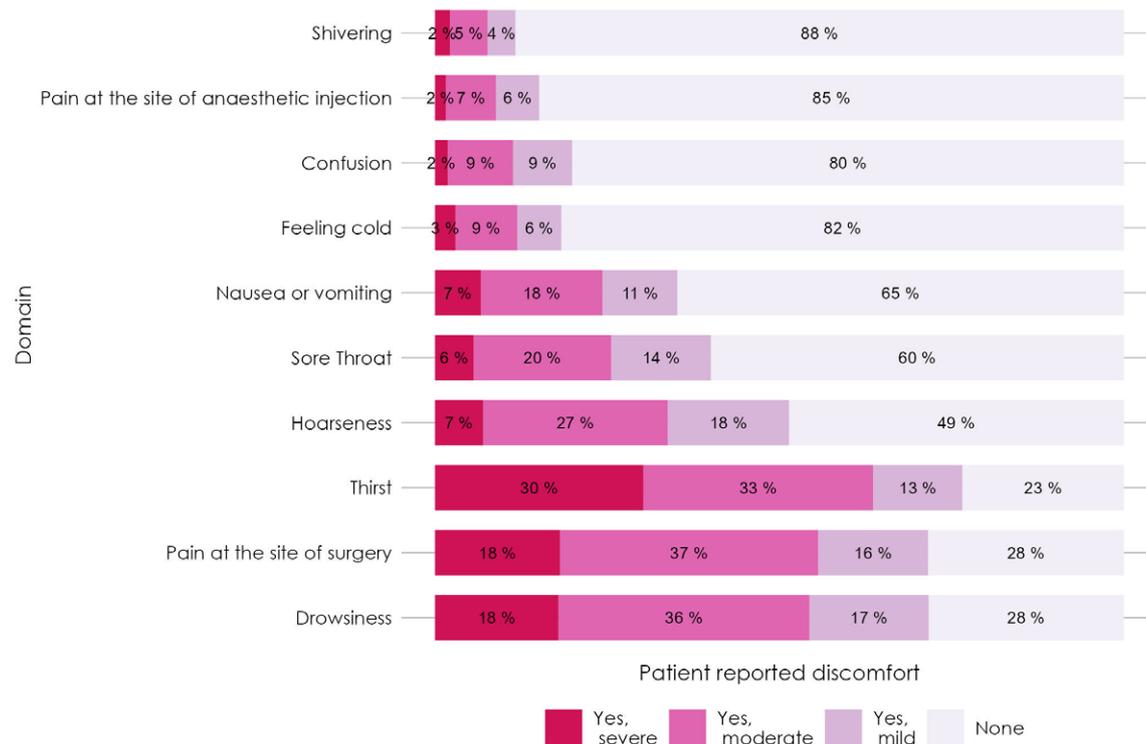
Short-term patient reported outcomes: Surgical/anaesthesia-related discomfort within 24h

The Bauer questionnaire also assesses patient reported surgical and anaesthetic discomfort in the 24-hours following surgery and can identify key areas important to patients to focus your local teams QI efforts. Thirst is the most reported anaesthetic related discomfort with 30% of patients reporting severe thirst and 33% moderate thirst. What could your recovery teams do to address this area of discomfort for patients? Collaborate with your whole team, including surgeons and recovery staff to co-design a solution. Early offering of water sips or an ice pop in recovery to appropriate patients could reduce this area of discomfort.

Surgical site related pain remains a significant issue for patients across all our Cohort reports, with 18% of patients reporting severe pain in our current Cohort. Severe postoperative pain is unpleasant and avoidable, and is associated with increased morbidity and mortality, prolonged LOS, delayed recovery, and reduced quality of life for patients. A new risk prediction model which can be used pre-emptively to identify patients at risk of severe postoperative pain has been developed from the [PQIP dataset](#). This identified both modifiable and non-modifiable risk factors for severe pain. Consider focusing QI efforts on early identification of at risk patients for severe postoperative pain and implement interventions such as pain expectation management and early postoperative acute pain team review. Work to optimise preoperatively modifiable risk factors which include diabetes treated with insulin, smoking status and history of anxiety.

Figure 14 shows the results of the Bauer symptoms measure for Cohort 4 patients.

Figure 14 Postoperative discomfort within 24h of surgery as measured using the Bauer questionnaire

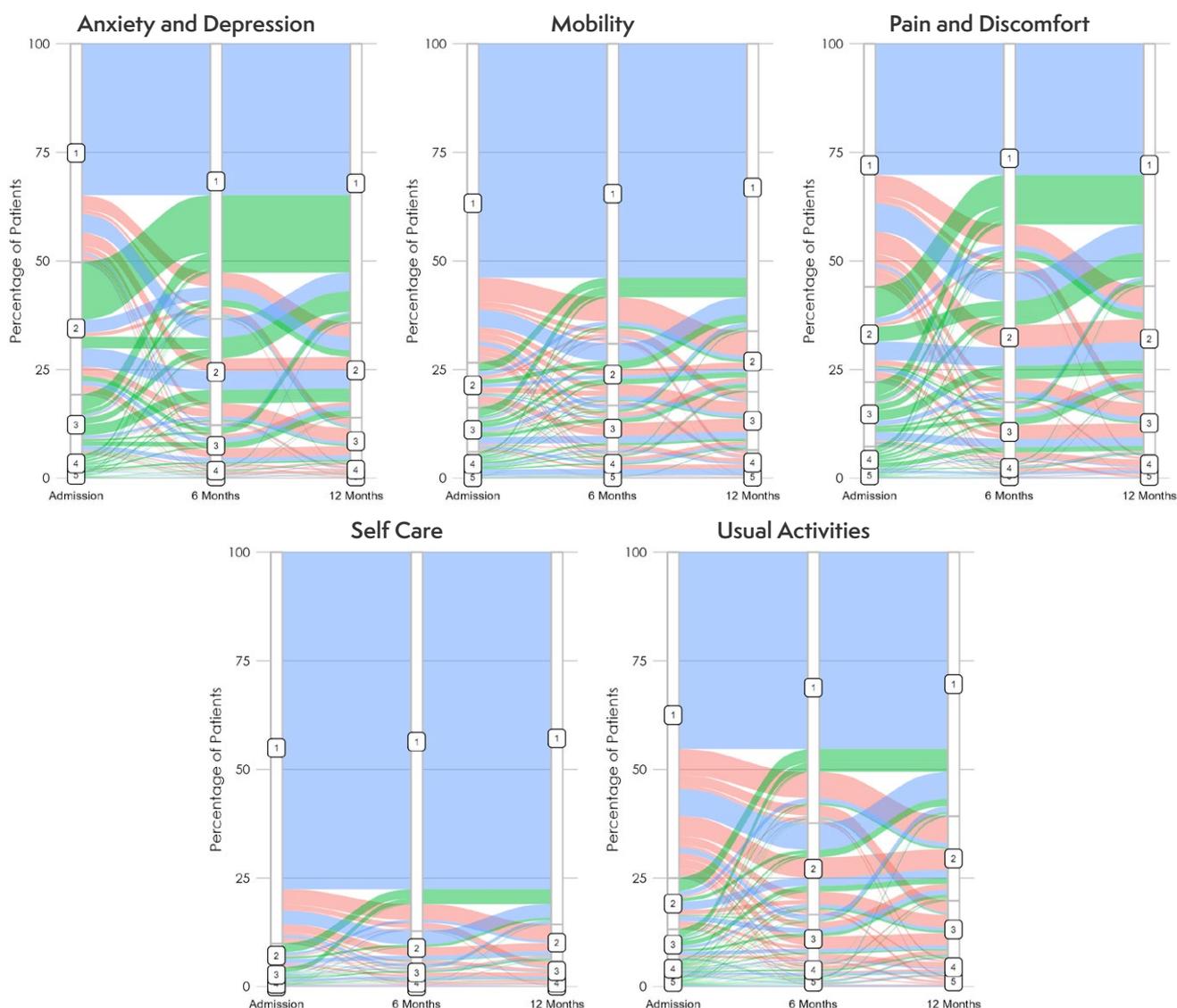


Health related quality of life

The EQ5D-5L evaluates patients’ health-related quality of life (HRQOL) across five dimensions, with graded levels based on the severity of limitation, and an overall global health rating on a visual analogue scale. Completion of the survey on admission, with interval repeats at 6 and 12 months postoperatively gives a fascinating view of the impact of surgery. We also have data on postoperative disability, measured using the WHO-DAS 2.0 tool, but will be reporting this separately in peer-reviewed papers in the next year or so.

The alluvial plots in Figure 15 show the trajectory over the perioperative period (from baseline before surgery until one-year postop) for all PQIP patients who have completed questionnaires at all three timepoints. The charts are constructed of an individual line plot over the three time-points for each individual patient and are colour coded. Blue means that the patient condition over time is the same in that domain, red means that it has deteriorated and green means that it has improved. You can see that for the five domains, quite different trajectories are evident. Many more patients report problems with anxiety/depression and pain at baseline but equally, a high proportion of them improve. However, significant proportions of patients are reporting that they have not returned to baseline levels of usual activities and mobility within 12m of surgery.

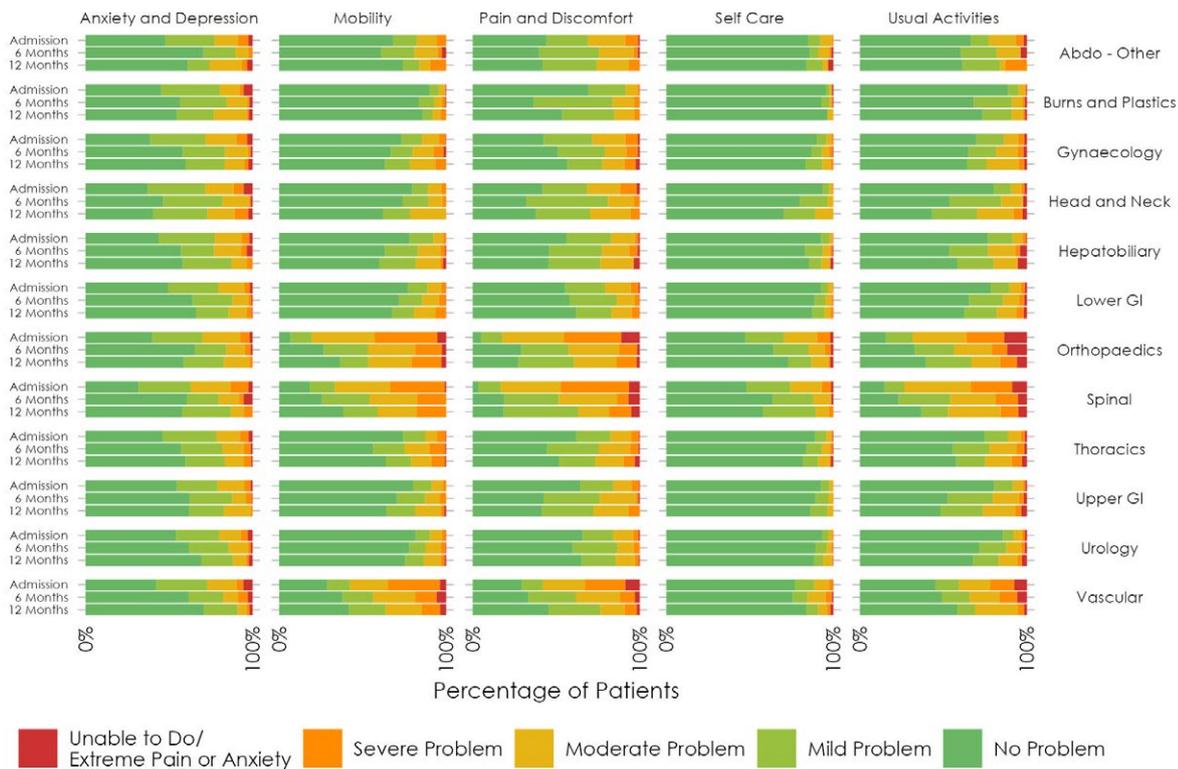
Figure 15 Responses to Euro-Quality of Life (EQ5D) questionnaire at admission, 6 months and 12 months – Cohort 4.
1 = best score (no HRQOL issue); 5 = worst score



Similarly, the stacked bar charts in Figure 16, which are categorised by specialty, make for interesting reading. There are divergent patterns in the usual activity domain, with a trend of reduction in severe or extreme limitation by six months postoperatively in Orthopaedics, Spinal and Vascular, compared with an increasing proportion of limitation across other specialties in this initial period. This is likely to reflect the patient cohort and the intention of surgery, with the primary aim of surgery being symptomatic relief and restoration of function, rather than the high proportion of patients undergoing cancer surgery, who are experiencing different pathological and therapeutic processes.

Across all specialties, the proportion of patients reporting severe or extreme levels of pain or anxiety are highest at admission. Perioperative anxiety is understandable, particularly given the magnitude of surgery planned and the high proportion of patients undergoing cancer surgery. There are simple measures which have been demonstrated to reduce preoperative anxiety, including enabling patients to [listen to music](#) before (and potentially during) surgery.

Figure 16 Responses to Euro-Quality of Life (EQ5D) questionnaire at admission, 6 months and 12 months by surgical specialty – Cohort 4



Top tip: Increasing capture of long term follow-up data

This data is very interesting to see and we are very grateful for all the effort that goes into collecting it. However, we do know collecting the long term follow up data can be a challenge! A range of strategies are employed in different locations, but some that seem to improve participation include:

- at patient recruitment ensure a variety of follow up methods are discussed with the patient, eg phone and email, and ensure they are happy with this
- on last patient contact for PQIP, remind patients they will be followed up in the future and that we look forward to hearing how their recovery has been. You could provide written information about the follow-up for them as an aide memoir
- add site contact details for patients to get in touch with the local PQIP team when their follow-up is due
- recruiting appropriately trained colleagues, for example your PQIP Associate Principal Investigator, or other trainees/middle grades with GCP training, or appropriately trained Band 2,3 and 4 colleagues to help with phone calls.

The QI in PQIP – embedding QI culture and change into practice

Implementing and sustaining QI is notoriously difficult. A core aim of PQIP is to support local hospitals succeed in sustained QI initiatives leading to reduced unwarranted variation in perioperative healthcare delivery that impacts patient outcomes. PQIP has taken an evidence-based approach to support QI, from the quality metrics measured to how data is feedback to you and your local teams.

Building sustainable QI

Quality improvement (QI) aims to improve the quality of healthcare we provide to our patients.

Successful QI can create systematic, sustained change that increases performance and productivity of clinical systems which can improve patients' outcomes by reducing variation and inequalities in care.

However, QI is challenging with multiple barriers to improvement. Poorly planned, unsustainable 'tick box' QI may further dishearten health professionals from future QI engagement.

Healthcare interventions are complex and require the collective action of multidisciplinary teams to work outside of silos, to understand the barriers and enablers that may influence successful implementation and requires integrative and effective leadership.

Don't forget the importance of your local context – the behaviours and practices of individuals, teams and your organisation are constantly adapting and are unique to your improvement project and its success. There is no singular magic bullet intervention that will lead to QI success and what worked at one hospital may not work verbatim at yours, but there are benefits of coming together, locally, regionally, and nationally to collaborate on QI. A wide range of QI interventions are often required and if used appropriately for your planned intervention and local context, may lead to improvements in clinical practice.

Top tip! It's all about the team....

- Think about who is in your QI and PQIP team – collaborate early with surgeons, clinical nurse specialists, and recovery and ward staff to co-design any new intervention and foster those relationships.
- Improvement efforts are more likely to succeed when developed with, rather than imposed on teams.
- Those 'on the ground' should be able to feel empowered to take a 'bottom up' approach.
- Encouraging ownership will help ensure QI interventions become embedded in clinical practice and are sustainable.

PQIP collaboratives

The aim of a collaborative is to unite a group of motivated professionals and facilitate information sharing and collective learning, to improve the quality of health services. The social nature of multidisciplinary collaborations mean they are more successful in their implementation ventures, and in developing the momentum needed for effective discussion and shared learning.

PQIP are dedicated to helping local teams perform QI

- The **PQIP top five priorities** are where we recommend starting a QI project – these are areas the PQIP dataset have identified as key clinical processes to target and improve locally.
- **Use your data** to find out how your team is performing for that area
- **Collaborate and co-design** a QI implementation plan with the MDT
- Keep using your data to **reflect on the success** of your QI interventions
- Remember QI interventions may need **constant adapting** based on your data and feed back – don't be disheartened! This is part of the QI process!
- **Share your results with the team** – this keeps engagement, motivation and feelings of ownership high!



Join our National PQIP Collaborative webinars!

The PQIP Collaborative quarterly webinar series aims to provide a framework for collective learning through educational sessions and collaborative member information sharing. We have focused initially on DrEaMing QI implementation and delivery and collaborated with NHS England to promote their CQUIN incentive. Over time we will be broadening the QI areas we focus on and presenting the most up to date research on how to improve perioperative care. All the past webinars are available on the PQIP website: www.pqip.org.uk

New! The PQIP Associate Principal Investigator (API) Collaborative

The [NIHR associate principal investigator \(API\) scheme](#) was developed to integrate research into clinical training to develop the principal investigators of the future. [SNAP-3](#) generated the highest number of APIs the scheme has ever supported, raising the profile of harnessing health care professionals to support research and QI through the API scheme.

So far, PQIP has benefitted from the efforts of 37 APIs! The PQIP API is an active, indispensable member of the team leading recruitment, data collection and results dissemination under the supervision of the principal investigator.

The PQIP project team want to further build on the role of the PQIP API with a QI focus, so we are developing a national API collaborative. This aims to enrich the API's experience and success within the scheme, while in parallel facilitating recruitment and QI efforts at their local PQIP site. Through this programme, we want to support our colleagues on the API scheme to learn the foundations of implementing sustainable QI. We will deliver sessions in line with the new RCoA curriculum, but the collaborative is open to all APIs, irrespective of professional background, and will have a focus on learning and information sharing. We anticipate that some colleagues will want to continue in the collaborative beyond their 6-month API role, so hopefully supporting sustainable improvement in their own institution, or indeed across multiple institutions for trainees on rotational placements.

If you are already PQIP API we will be getting in touch with you soon about joining the collaborative.

If you are interested in becoming a PQIP API and would like to join our API collaborative, sign up to the API scheme via the [NIHR website](#) and email PQIP@rcoa.ac.uk

Useful resources

[This.institute – elements of improving quality and safety in healthcare](#)

[IHI breakthrough series – collaborative model for achieving breakthrough improvement](#)

pomVLAD

near real-time reporting of risk-adjusted postoperative morbidity outcomes

Tracking postoperative morbidity and care quality using pomVLAD

PQIP have launched new online dashboards to provide you and your local teams with the most up-to-date postoperative complication data for your PQIP recruited patients.

Launched in spring 2023, the new **postoperative morbidity Variable-Life Adjusted Display** (pomVLAD) charts are accessible to all PQIP sites recruiting patients undergoing colorectal surgery. The Quality Improvement (QI) dashboard provides all sites with near-real time, risk-adjusted morbidity monitoring accompanied by the display of key enhanced recovery QI targets. For sites recruiting patients of other surgical specialties there is also a newly developed **POMS dashboard** which does not incorporate risk-adjustment. The pomVLAD programme has been led by Dr James Bedford, former PQIP fellow, who developed and evaluated this approach to improvement during his PhD studies.

pomVLAD will enable you to see key local data **in real-time**. **Linking risk-adjusted postoperative outcome data with key process measures**, pomVLAD will help you identify areas which require improvement, and provide a focus for the MDT's QI projects.

Impact of complications

Death following major elective surgery is rare, but major complications much more common. Complications can be measured in lots of ways (see [Complications – why do they matter?](#)), but for pomVLAD, we are focusing on patients who remain in hospital at D7 with POMS-defined morbidity. In Cohort 4, the overall complication rate defined in this way was 17% and major complication rate was 12%. Complications increase hospital length of stay and predict reduced long-term survival and worse health-related quality of life for patients.

What is pomVLAD?

Variable life-adjusted displays (VLADs) were originally developed to monitor observed against expected mortality after cardiac surgery. The VLAD chart shows how many fewer (or more) complications there are over time compared to what would be expected based on a risk-adjustment or risk-prediction model.

The PQIP-Colorectal Risk (PQIP-CR) model

pomVLAD calculates the expected risk of postoperative morbidity for each individual patients using the PQIP-Colorectal risk (CR) model



The PQIP-CR model was developed from PQIP cohort of 11,646 colorectal patients and includes 12 PQIP variables.

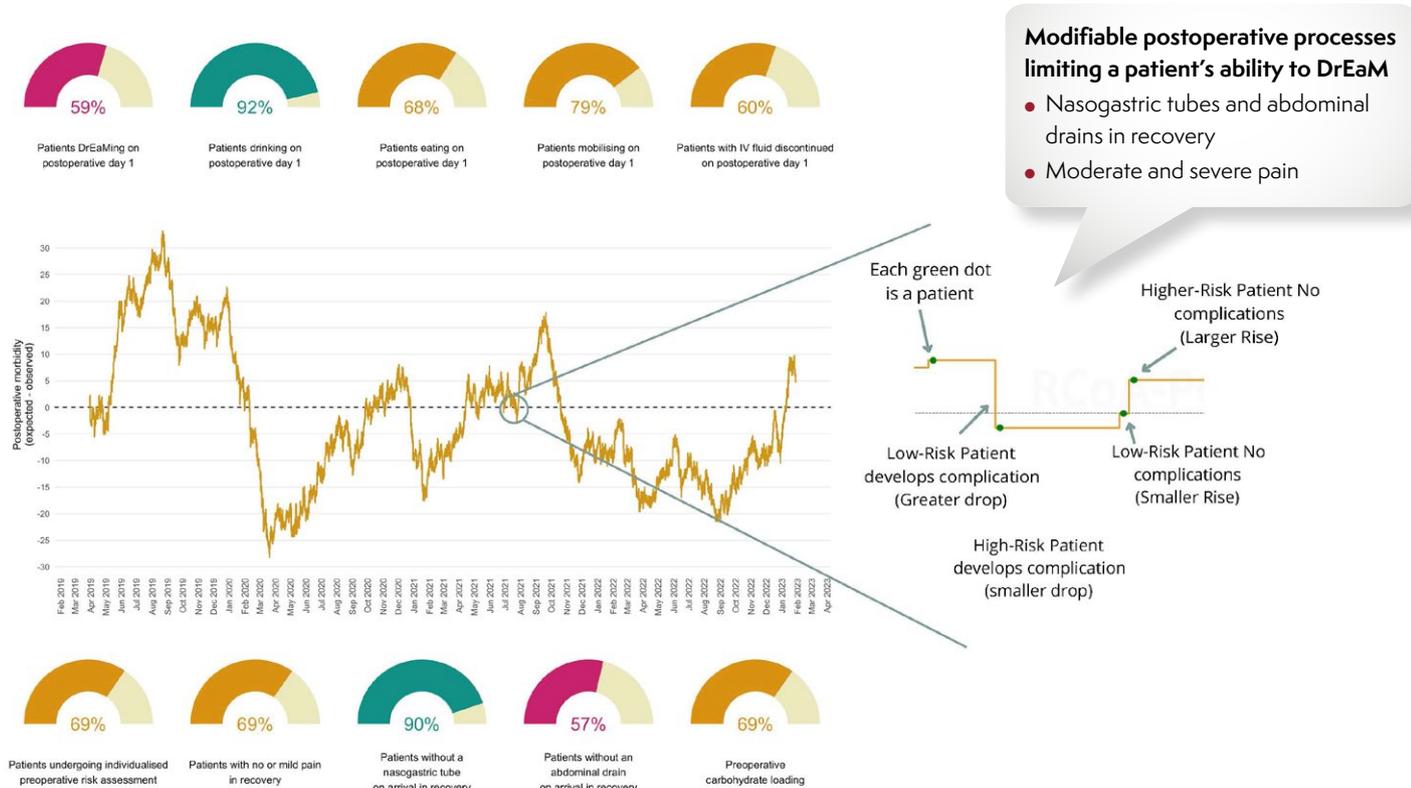
It performed favourably compared to existing morbidity risk prediction models.



pomVLAD monitors morbidity at postoperative day 7 using the Postoperative Morbidity Survey (POMS)

The VLAD chart plots the predicted risk of morbidity minus the observed outcome for each consecutive patient based on the [PQIP-colorectal risk model](#). Upward trends in the VLAD are positive (lower observed postoperative morbidity than expected), downward trends are negative (higher observed postoperative morbidity than expected) (Figure 17).

Figure 17 pomVLAD chart demonstrating expected outcome minus the observed outcome for each consecutive patient combined with the ten QI targets



Modifiable postoperative processes limiting a patient's ability to DrEaM

- Nasogastric tubes and abdominal drains in recovery
- Moderate and severe pain

Tips on how to use the pomVLAD and dials to support QI success

To help support local QI, included in the pomVLAD and POMS dashboards are easy to interpret displays which represents the proportion of PQIP patients achieving ten PQIP-recommended enhanced recovery (ER) recommended processes. We know that DrEaMing within 24h of surgery ending is associated with reduced hospital length of stay and fewer later complications, therefore focus your local QI efforts on processes that we know improve patients' chances of DrEaMing.

Top tips to get the most out of the new dashboards!

- PQIP at your hospital should be recruiting as many patients as possible and entering the data as close to the time of surgery as possible.
- Focusing recruitment efforts on a single specialty or small number of specialties will yield the most helpful data and be most rewarding for your team and your patients.
- Positive, multidisciplinary collaboration is vital for sustainable QI. Co-design your QI approach with your team!
- Start QI interventions on one metric, such a management of severe postoperative pain and review your results regularly to alter your QI strategy. Remember not all progress is linear and that trial and error is part of the process!
- Share your pomVLAD dashboard data with your colorectal perioperative team (surgeons, anaesthetists, theatre staff, specialist nurses, ward nurses and AHPs) to help engage and collaborate with these key stakeholders.

Local investigators from the pilot study found the dashboards intuitive to interpret and felt it was helpful to identify and monitor QI projects.

Unadjusted Postoperative Morbidity Survey (POMS) chart

- For all surgical specialities in PQIP except lower-GI
- Unadjusted POMS provides a near-real time chart demonstrating day 7 morbidity
- POMS is an 18-point tool which characterises morbidity into nine organ systems.
- Patients discharged before day 7 are assumed to have not have any POMS defined morbidity.
- Patients who died before postoperative day 7 are attributed morbidity by the Clavien-Dindo classification

Useful resources

- [RCoA Bulletin article](#)
- [PQIP collaborative webinar pomVLAD](#)
- [Bedford et al. *Anaesth* 2022;77\(12\):1356–1367](#)

How PQIP is using your data to improve care and support other research

PQIP is substantially the largest Cohort study of adult major surgery which has taken place in the UK. We have supported several research papers, including some which have been delivered by colleagues outside the core PQIP team following a data access application.

The [PQIP study protocol](#) gives you an overview of the PQIP study, its aims and objectives.

Don Miliken, Martin Rooms and Sham Jhanji at the Royal Marsden hospital, used cardiopulmonary exercise testing (CPET) data from 2742 PQIP patients to validate a locally developed approach – to establish if [Peak Power Output](#) could predict a high-risk CPET test, which in turn would predict postoperative complications.

The principles of DrEaMing being a short-hand for enhanced recovery pathways were finally validated by Matt Oliver, Sam Warnakularsuriya and colleagues from the PQIP project team publishing [this paper](#) in Jan 2022, which firmly established the association between DrEaMing and reduced length of hospital stay and complications. This has directly led to the development of the NHSE CQUIN for DrEaMing. More about this on the DrEaMing pages of this report.

Optimising prevention and treatment of postoperative pain remains a top priority for PQIP and for perioperative care in general. Richard Armstrong and colleagues [developed a risk prediction tool](#) for predicting severe pain within 24h of surgery, as reported in the Bauer questionnaire. The tool is complex and requires incorporation into an app or electronic health record, but the risk factors for severe pain can immediately be incorporated into preoperative assessment, so addressing modifiable risks, and identifying patients who would benefit from targeted support such as preoperative pain team review and/or enhanced follow-up.

James Bedford, former PQIP fellow and now Consultant anaesthetist and perioperative physician, developed the pomVLAD project, the topic of his PhD. We have described pomVLAD in some detail elsewhere in this report, but if you want to understand the geekiness underpinning it, [this paper](#) details the development of the underpinning risk-adjustment model. Papers will follow on the outcomes of James' pilot work which have helped shape our approach to the national roll-out of pomVLAD.

A very exciting move for the PQIP programme was establishing our first collaboration with a research team delivering a randomised controlled trial (RCT). [VITAL](#) (Volatile vs Total intravenous Anaesthesia for major non-cardiac surgery) is led by Joyce Yeung (Birmingham) and Sham Jhanji (Royal Marsden) and supported by the Warwick Clinical Trials Unit. VITAL have adapted the PQIP dataset to support their trial and use the PQIP webtool to collect most of their study data. Patients approached for PQIP participation who are also eligible for VITAL

are offered the opportunity to enter both studies, and conversely, all patients approached for VITAL participation are recruited into PQIP. VITAL is recruiting on target, with 964 patients randomised as of 31/03/2023 and participation from 35 NHS Trusts. We are also collaborating with and promoting the newer [SINFONIA](#) trial, led by Jon Silversides (Belfast) which is evaluating the benefits and risks of sugammadex versus neostigmine for reversal of neuromuscular blockade at the end of surgery.

The future

We have a lot of exciting plans on the horizon – here are just a few of them.

- Former PQIP fellow Dr Martha Belete has analysed the relationship between frailty and postoperative outcome, including frailty in patients under the age of 65 – what this space for a forthcoming publication.
- Dr Sandy Jackson, an anaesthetic trainee from Southampton, has been awarded a prestigious National Institute for Health Research doctoral fellowship, during which he will study trajectories of outcome for PQIP patients. This will include use of all the amazingly valuable health-related quality of life data which you work so hard to collect and which patients give their time to complete.
- We will be looking further at the barriers and enablers to improving compliance with DrEaMing within 24h, led by PQIP fellow Dr Rachael Brooks and building on the work led by former fellows Dr Eleanor Warwick and Dr Georgina Singleton.
- We will be delving deeper into the data we have reported in this report, including understanding what appears to be deviation from best practice in postoperative destination and processes of perioperative care.
- And we will be undertaking detailed work looking at the relationship between deprivation, ethnicity and outcome in PQIP patients.

Positive deviance

Anaemia Management: National target >80% with preoperative Hb > 130

>80% of all patients having elective surgery in these hospitals had an Hb of >130: None

>80% of male patients having elective surgery in these hospitals had an Hb of >130: Bristol Royal Infirmary, Darent Valley Hospital, Ipswich Hospital, Lister Hospital, Milton Keynes University Hospital, Pinderfields Hospital, Poole Hospital, Royal Berkshire Hospital, Royal National Orthopaedic Hospital, St Thomas' Hospital, Sunderland Royal Hospital, Torbay Hospital, University Hospital Llandough, University Hospital, Coventry, Wrightington Hospital

>80% of patients having elective surgery in these hospitals who had a blood loss of >500ml had an Hb of >130: Colchester General Hospital, Huddersfield Royal Infirmary, Queen Victoria Hospital, Royal Berkshire Hospital, Royal Bolton Hospital, Royal Derby Hospital, Royal Sussex County Hospital, Royal United Hospital, St Bartholomew's Hospital, St James's University Hospital, St Richard's Hospital

Diabetes (HbA1c measurement): National target 100%

These hospitals recruited at least five patients with diabetes and recorded HbA1c in 100% of those patients: Airedale General Hospital, North Devon District Hospital, St Richard's Hospital, Sunderland Royal Hospital, The Royal Oldham Hospital, Torbay Hospital, Worthing Hospital, Yeovil District Hospital

Individualised Risk Assessment: National target >80%

Aintree University Hospital, Airedale General Hospital, Basildon University Hospital, Bristol Royal Infirmary, Broomfield Hospital, Hereford County Hospital, Newcastle Freeman Hospital, Royal Berkshire Hospital, Royal Blackburn Hospital, Royal Cornwall Hospital, Royal Lancaster Infirmary, Royal United Hospital, Royal Victoria Infirmary, St Bartholomew's Hospital, The Royal Oldham Hospital, University College Hospital, University Hospital, Coventry, West Middlesex University Hospital, Worthing Hospital

Carbohydrate loading: National target >80%

These hospitals gave >80% of all their PQIP patients in specific specialties preoperative carbohydrate loading:

Lower GI: Airedale General Hospital, Bedford Hospital, Bristol Royal Infirmary, Broomfield Hospital, Colchester General Hospital, Darent Valley Hospital, Royal Blackburn Hospital, Royal Cornwall Hospital, Southend University Hospital, Torbay Hospital, Worthing Hospital

Thoracics: Basildon University Hospital, Bristol Royal Infirmary

Urology: Lister Hospital

Burns and Plastics: Queen Victoria Hospital

Hepatobiliary: Royal Blackburn Hospital, University Hospital Wales

Upper GI: University Hospital Wales

Drinking within 24hrs of surgery: National target >90%

>90% of patients in these hospitals were drinking within 24hrs: Airedale General Hospital, Basildon University Hospital, Bristol Royal Infirmary, Chelsea and Westminster Hospital, Colchester General Hospital, Croydon University Hospital, Darent Valley Hospital, Dorset County Hospital, Hereford County Hospital, Huddersfield Royal Infirmary, Ipswich Hospital, Milton Keynes University Hospital, Musgrove Park Hospital, Newcastle Freeman Hospital, North Devon District Hospital, Pinderfields Hospital, Queen's Hospital, Burton upon Trent, Royal Berkshire Hospital, Royal Cornwall Hospital, Royal Lancaster Infirmary, Royal National Orthopaedic Hospital, Royal Preston Hospital, Royal United Hospital, St Bartholomew's Hospital, St Richard's Hospital, St Thomas' Hospital, St Peter's Hospital, Sunderland Royal Hospital, The James Cook University Hospital, The Royal Oldham Hospital, Torbay Hospital, University Hospital Llandough, University Hospital, Coventry, Warwick Hospital, Watford General Hospital, Worthing Hospital, Wrightington Hospital, Yeovil District Hospital

By specialty – these are the hospitals where >90% of patients in specific specialties were drinking within 24h of surgery:

Abdo – Other: Darent Valley Hospital, Salford Royal Hospital

Burns and Plastics: Hereford County Hospital, Lister Hospital, Pinderfields Hospital

Gynaecology: Dorset County Hospital, Glan Clwyd Hospital, Hereford County Hospital, Ipswich Hospital, Milton Keynes University Hospital, Musgrove Park Hospital, North Devon District Hospital, Royal Lancaster Infirmary, Royal Victoria Infirmary, Southend University Hospital, University Hospital Wales, University Hospital, Coventry, Watford General Hospital, Yeovil District Hospital

Hepatobiliary: Aintree University Hospital, Royal Blackburn Hospital

Lower GI: Aintree University Hospital, Airedale General Hospital, Basildon University Hospital, Bristol Royal Infirmary, Broomfield Hospital, Chelsea and Westminster Hospital, Colchester General Hospital, Croydon University Hospital, Darent Valley Hospital, Dorset County Hospital, Hereford County Hospital, Huddersfield Royal Infirmary, Ipswich Hospital, Lister Hospital, Milton Keynes University Hospital, Musgrove Park Hospital, Newcastle Freeman Hospital, North Devon District Hospital, Pinderfields Hospital, Poole Hospital, Queen's Hospital, Burton upon Trent, Rotherham General Hospital, Royal Berkshire Hospital, Royal Blackburn Hospital, Royal Cornwall Hospital, Royal Derby Hospital, Royal Lancaster Infirmary, Royal Preston Hospital, Royal United Hospital, Royal Victoria Infirmary, Salford Royal Hospital, St George's Hospital, St Richard's Hospital, St Peter's Hospital, Sunderland Royal Hospital, The James Cook University Hospital, The Royal Oldham Hospital, Torbay Hospital, University Hospital Wales, Warwick Hospital, Watford General Hospital, Worthing Hospital, Yeovil District Hospital

Orthopaedics: Chelsea and Westminster Hospital, Colchester General Hospital, Darent Valley Hospital, Dorset County Hospital, Hereford County Hospital, Huddersfield Royal Infirmary, Lister Hospital, Musgrove Park Hospital, Pinderfields Hospital, Rotherham General Hospital, Royal Derby Hospital, Royal London Hospital, Royal National Orthopaedic Hospital, St Thomas' Hospital, Wrightington Hospital, Yeovil District Hospital

Spinal: Musgrove Park Hospital, Royal National Orthopaedic Hospital, St Peter's Hospital

Thoracics: Basildon University Hospital, Bristol Royal Infirmary, St Bartholomew's Hospital, St James's University Hospital, St Thomas' Hospital, University Hospital Llandough, University Hospital, Coventry

Urology: Airedale General Hospital, Bedford Hospital, Broomfield Hospital, Darent Valley Hospital, Dorset County Hospital, Hereford County Hospital, Lister Hospital, Musgrove Park Hospital, Newcastle Freeman Hospital, Pinderfields Hospital, Royal Berkshire Hospital, Royal Cornwall Hospital, Salford Royal Hospital, St George's Hospital, St James's University Hospital, Sunderland Royal Hospital, The James Cook University Hospital, University College Hospital, University Hospital Wales, University Hospital, Coventry, Watford General Hospital, Worthing Hospital

Vascular: Bedford Hospital, Musgrove Park Hospital, The Royal Oldham Hospital

Eating within 24hrs of surgery: National target >80%

>80% of patients in these hospitals were eating within 24hrs: Airedale General Hospital, Basildon University Hospital, Bristol Royal Infirmary, Hereford County Hospital, Huddersfield Royal Infirmary, Musgrove Park Hospital, Newcastle Freeman Hospital, North Devon District Hospital, Queen's Hospital, Burton upon Trent, Royal Berkshire Hospital, Royal Cornwall Hospital, Royal Lancaster Infirmary, Royal National Orthopaedic Hospital, St Bartholomew's Hospital, St Richard's Hospital, St Thomas' Hospital, St Peter's Hospital, Sunderland Royal Hospital, The Royal Oldham Hospital, Torbay Hospital, University Hospital Llandough, University Hospital, Coventry, Watford General Hospital, Wrightington Hospital, Yeovil District Hospital

By specialty – these are the hospitals where >80% of patients in specific specialties were eating within 24h of surgery:

Abdo – Other: None

Burns and Plastics: Hereford County Hospital, Lister Hospital, Pinderfields Hospital

Gynaecology: Dorset County Hospital, Glan Clwyd Hospital, Hereford County Hospital, Ipswich Hospital, Milton Keynes University Hospital, Musgrove Park Hospital, North Devon District Hospital, Royal Lancaster Infirmary, Royal Victoria Infirmary, Southend University Hospital, University Hospital Wales, University Hospital, Coventry, Watford General Hospital, Yeovil District Hospital

Hepatobiliary: Aintree University Hospital, Royal Blackburn Hospital

Lower GI: Aintree University Hospital, Airedale General Hospital, Basildon University Hospital, Bristol Royal Infirmary, Broomfield Hospital, Glan Clwyd Hospital, Hereford County Hospital, Huddersfield Royal Infirmary, Lister Hospital, Musgrove Park Hospital, Newcastle Freeman Hospital, North Devon District Hospital, Queen's Hospital, Burton upon Trent, Rotherham General Hospital, Royal Cornwall Hospital, Royal Lancaster Infirmary, Royal Victoria Infirmary, St Richard's Hospital, Sunderland Royal Hospital, Torbay Hospital, University Hospital Wales, Watford General Hospital, Yeovil District Hospital

Orthopaedics: Chelsea and Westminster Hospital, Colchester General Hospital, Darent Valley Hospital, Dorset County Hospital, Hereford County Hospital, Huddersfield Royal Infirmary, Lister Hospital, Musgrove Park Hospital, Pinderfields Hospital, Rotherham General Hospital, Royal Derby Hospital, Royal London Hospital, Royal National Orthopaedic Hospital, St Thomas' Hospital, Wrightington Hospital, Yeovil District Hospital

Spinal: Musgrove Park Hospital, Royal National Orthopaedic Hospital, St Peter's Hospital

Thoracics: Basildon University Hospital, Bristol Royal Infirmary, St Bartholomew's Hospital, St James's University Hospital, St Thomas' Hospital, University Hospital Llandough, University Hospital, Coventry

Urology: Airedale General Hospital, Bedford Hospital, Broomfield Hospital, Darent Valley Hospital, Hereford County Hospital, Lister Hospital, Musgrove Park Hospital, Newcastle Freeman Hospital, Pinderfields Hospital, Royal Berkshire Hospital, Royal Cornwall Hospital, Salford Royal Hospital, St George's Hospital, St James's University Hospital, Sunderland Royal Hospital, University College Hospital, University Hospital Wales, University Hospital, Coventry, Watford General Hospital

Vascular: Bedford Hospital, Musgrove Park Hospital, The Royal Oldham Hospital

Mobilising within 24hrs of surgery: National target >85%

>85% of patients in these hospitals were mobilising within 24hrs: Basildon University Hospital, Bristol Royal Infirmary, Dorset County Hospital, Hereford County Hospital, Ipswich Hospital, Milton Keynes University Hospital, North Devon District Hospital, Pinderfields Hospital, Queen's Hospital, Burton upon Trent, Royal Lancaster Infirmary, St Bartholomew's Hospital, St Richard's Hospital, St Thomas' Hospital, St Peter's Hospital, Sunderland Royal Hospital, University Hospital Llandough, University Hospital, Coventry, Warwick Hospital, Watford General Hospital, Worthing Hospital, Yeovil District Hospital

By specialty – these are the hospitals where >85% of patients in specific specialties were mobilising within 24h of surgery:

Burns and Plastics: Hereford County Hospital, Pinderfields Hospital

Gynaecology: Dorset County Hospital, Glan Clwyd Hospital, Hereford County Hospital, Milton Keynes University Hospital, Musgrove Park Hospital, North Devon District Hospital, Royal Lancaster Infirmary, Southend University Hospital, University Hospital Wales, University Hospital, Coventry, Watford General Hospital, Yeovil District Hospital

Lower GI: Aintree University Hospital, Airedale General Hospital, Basildon University Hospital, Bristol Royal Infirmary, Hereford County Hospital, Ipswich Hospital, Lister Hospital, Milton Keynes University Hospital, Newcastle Freeman Hospital, North Devon District Hospital, Queen's Hospital, Burton upon Trent, Royal Lancaster Infirmary, Royal Victoria Infirmary, St Richard's Hospital, Sunderland Royal Hospital, University Hospital Wales, Warwick Hospital, Watford General Hospital, Worthing Hospital, Yeovil District Hospital

Upper GI: Royal Derby Hospital

Orthopaedics: Chelsea and Westminster Hospital, Colchester General Hospital, Dorset County Hospital, Huddersfield Royal Infirmary, Lister Hospital, Musgrove Park Hospital, Pinderfields Hospital, Royal Derby Hospital, St Thomas' Hospital, Yeovil District Hospital

Spinal: St Peter's Hospital

Thoracics: Basildon University Hospital, Bristol Royal Infirmary, St Bartholomew's Hospital, St Thomas' Hospital, University Hospital Llandough, University Hospital, Coventry

Urology: Bedford Hospital, Broomfield Hospital, Darent Valley Hospital, Lister Hospital, Pinderfields Hospital, Royal Berkshire Hospital, Salford Royal Hospital, St George's Hospital, University College Hospital, University Hospital, Coventry

Vascular: Bedford Hospital

DrEaMing within 24hrs of surgery: National target >80%

>80% of patients in these hospitals were DrEaMing within 24hrs: Basildon University Hospital, Bristol Royal Infirmary, Hereford County Hospital, North Devon District Hospital, Royal Lancaster Infirmary, St Bartholomew's Hospital, St Thomas' Hospital, Sunderland Royal Hospital, University Hospital Llandough, University Hospital, Coventry, Watford General Hospital, Yeovil District Hospital

By specialty – these are the hospitals where >80% of patients in specific specialties were DrEaMing within 24h of surgery:

Burns and Plastics: Hereford County Hospital, Pinderfields Hospital

Gynaecology: Dorset County Hospital, Glan Clwyd Hospital, Hereford County Hospital, Milton Keynes University Hospital, Musgrove Park Hospital, North Devon District Hospital, Royal Lancaster Infirmary, Royal Victoria Infirmary, University Hospital Wales, University Hospital, Coventry, Watford General Hospital, Yeovil District Hospital

Lower GI: Aintree University Hospital, Airedale General Hospital, Basildon University Hospital, Bristol Royal Infirmary, Hereford County Hospital, Newcastle Freeman Hospital, North Devon District Hospital, Royal Lancaster Infirmary, Royal Victoria Infirmary, Sunderland Royal Hospital, University Hospital Wales, Watford General Hospital, Yeovil District Hospital

Orthopaedics: Chelsea and Westminster Hospital, Colchester General Hospital, Dorset County Hospital, Huddersfield Royal Infirmary, Lister Hospital, Musgrove Park Hospital, Pinderfields Hospital, Royal Derby Hospital, St Thomas' Hospital, Yeovil District Hospital

Spinal: St Peter's Hospital

Thoracics: Basildon University Hospital, Bristol Royal Infirmary, St Bartholomew's Hospital, St Thomas' Hospital, University Hospital Llandough, University Hospital, Coventry

Urology: Bedford Hospital, Broomfield Hospital, Darent Valley Hospital, Lister Hospital, Pinderfields Hospital, Royal Berkshire Hospital, Salford Royal Hospital, St George's Hospital, St James's University Hospital, Sunderland Royal Hospital, University College Hospital, University Hospital, Coventry, Watford General Hospital

Vascular: Bedford Hospital

Collaborators

Mayavan Abayalingam	Andy Bracewell	Roger Davies	Yvonne Gleeson
Sue Abdy	Joanne Bradley-Potts	Jenny Davis	Kelly Goffin
Andrea Ackerman	Elizabeth Bradshaw	Khaled Dawas	Dhanny Gomez
Ian Adams	Debbie Branney	Peter Delve	Gayna Grantham
David Adamson	Elizabeth Brannigan	Mohammed Deputy	Juan Graterol
Anjum Ahmed-Nusrath	Philip Braude	Amit Deshmukh	Irina Grecu
Doug Aitken	David Brealey	Somi Desikan	Louise Greig
Louise Akeroyd	Andrew Brennan	Jugdeep Dhesi	Lisa Grimmer
Nick Aldridge	Anne-Jayne Brien	Matt Dickinson	Chris Grocock
Tamara Alexander	Kathryn Brodbelt	Toby Dixson	Mike Grocott
Hind Al-Husain	Helen Bromhead	Emma Dougherty	Esra Gumus Bayazıt
Syed Ali	Rachel Burnish	Claire Dowse	Paul Gunning
Jason Ali	Wendy Byrne	Steve Drage	Denise Hadfield
Charlotte Allan	Debbie Campbell	Dragos Dragnea	Chandima Halahakoon
Laurin Allen	Debra Champion	Kate Driver	George Hallward
Wei-Lin Allen	Sara Campos	Stephen Duberley	Sarah Hammons
Denise Almond	Joel Cardoso-Pereira	Lucy Dudgeon	Vivienne Hannon
Ziad Alrifai	Sue Carnell	Sarah Duff	Clair Harris
Edward Andrade	Ben Carrick	Stephanie Dukes	Colin Harris
Gillian Ansell	Clarissa Carvalho	Lauren Duraman	Robert Hartley
Gill Arbane	Ben Chandler	Rebecca Dyar	David Harvie
Giuseppe Aresu	Mogera Chandra	Simon Dyer	Jess Heaps
Susanne Armitage	Asif Chaudry	Jonathan Easterbrook	Sarah Herbert
Glenn Arnold	Irfan Chaudry	Christine Eastgate	Emily Hetherington
Jon Arnot-Smith	Belinda Chieng	Mark Edwards	Matt Hill
Linda Ashley-Edden	Mahindra Chincholkar	Ramesh Ekambaram	Ned Hobbs
Anam Asif	Sadasivan Chinniah	Kerry Elliott	Tim Hodgkins
Sheila Avery	Maria Ciaponi	Serena Elliott	Sheila Hodgkinson
Jennifer Awolisi	Emma Clarey	Ahmed El-Sharkawy	Tracy Hodgkiss
Ewa Babisz	Richard Clark	Mark Eltringham	James Holding
Morgan Back	Tom Clark	Jonathan Epstein	Liz Hood
Madhu Balasubramaniam	Edwin Clark	Matt Everson	Kathleen Horan
Samantha Banks	Sarah Clarke	Mark Fairbrass	Deborah Horner
Rebecca Barker	Hannah Clarke	Joanne Falconer	Tanvir Hossain
Veronica Barnes	Tristan Clarke	Sarah Farnell-Ward	Tim Hughes
Gillian Barnett	Peter Coe	Naila Farooq-Iqbal	Jenny Hughes
Nina Barratt	Helen Cole	Helen Farrah	Alistair Hughes
Andy Bates	Libby Cole	Catherine Farrow	Rob Hull
Rachel Baumber	Julie Colley	Imogen Fecher	Spencer Humphrys
Rose Beesley	Nikki Collings	Teresa Ferreira	Louise Hunt
Martha Belete	Clare Conlon	Helder Filipe	Lisa Hurley
Jane Bellamy	Karen Connolly	Stuart Finn	Melanie Hutchings
Melissa Benavente	Daniel Conway	Gracie Fisk	Mark Ibrahim
Julia Benham-Hermetz	Sarah Cooper	Jill Fitchett	Ugo Ihedioha
Eva Benke	Karen Copeland	Katie Flower	Jennifer Illingworth
Jenny Bennett-Britton	Zoe Copp	Jessica Forrester	Matthew Jackson
Anna Bewlay	James Corcoran	Damon Foster	Reni Jacob
Chetan Bhan	Victoria Cordrey	Ming Fung	Vipul Jain
Ravi Bhatia	Henry Corner	Jackie Furlong	Kate James
Arnab Bhowmick	Darryl Cornish	Rosie Furness	Nalayini Jeyavel
Sian Birch	James Coulston	Claire Gallagher	Shaman Jhanji
Brian Bisase	Nicholas Courtenay-Evans	Fang Gao Smith	Helgi Johannsson
Kevin Blizzard	James Craig	James Garrod	Joanne Johnson
Aneta Bociek	Jayne Craig	Emma Gent	Carolyn Johnston
Clare Bolger	Jason Cross	Norma Gibbons	Dawn Johnstone
Pieter Bothma	Janette Curtis	Kayleigh Gilbert	Cathy Jones
Anne-Marie Bougeard	Claire Dalton	Julian Giles	Laura Abernathy
Rebecca Boulton	Diane Daniels	Marc Gimenez	Nkemjika Abiakam

Oluronke Adanini	Julie Bracken	Bobby Dasari	Bence Hajdu
Maame Aduse-Poku	John Bramall	Dave Smith	Dawn Hales
Neil Agnew	Barbara Bray	Beena David	Angela Hall
Michael Agyemang	Matthew Bridge	Louisa Davies	Geraldine Hambrook
Salman Ahmad	Elaine Brinkworth	Amanda Davies	Vincent Hamlyn
Sarfraz Ahmad	Catherine Britton Jones	Charlie Davies	Kate Hamerton
Lindianne Aitken	Fiona Brogan	Richard Davies	Sarah Hammond
Mansoor Akhtar	Adam Brooks	Samantha Davies	Fiona Hammonds
Timothy Alce	Johanna Brown	Andrew Day	Aimee Hampton
Rod Alexander	Michelle Bruce	Toni de Freitas	Janice Hanley
Bilal Alkhaffaf	Zoe Brummell	Joanne Deery	Daniel Hanratty
Clare Allcock	Sarah Buckley	Anne Devine	Will Hare
Jo Allison	Rhian Bull	Priya Dias	Daniel Harper
Elana Anastasescu	Karen Burns	Chimverly Diaz	Andrea Harren
Prematie Andreou	Hazel Cahill	Lisa Ditchfield	Yasmin Harrington Davies
Eleanor Andrews	David Cain	Hiren Divecha	Stephen Harris
George Antoniou	Bridget Campbell	Annette Dowdell	John Harris
Michael Argent	Marta Campbell	Ronald Druyeh	Sanjay Harrison
Nadeem Ashraf	Suzanne Carey Jones	Leon Dryden	Alister Hart
Omer Aziz	Millie Carnachan	Steven Dunkley	Emma Hartland
Sheeba Badu	David Carter	Almu Duran-Rosa	Liz Hawes
Craig Bailey	Jaime Carungcong	Rebecca Dyer	Nancy Hawkins
Tessa Bailey	Paula Carvelli	James Eales	Christine Hawkins
Pearl Baker	Kim Chan	Megan Eardly	Kat Haynes
Mansoor Bangash	Tristan Chapman	Tracy Edmunds	Olivia Hayward
Smita Bapat	Katy-Jane Chick	Emma Edmunds	Chantelle Heppolette
Chris Barben	Anna Chillingworth	Mandy Edwards	Sarah Hierons
Musa Barkeji	Gayathri Chinnappa Srinivas	Ashley Elden	Susan Hill
Debi Barnes	Sara Churchill	Kaytie Ellis	Simon Hindley
Lisa Barrell	Amy Clark	Iony Evans	Elizabeth Hodge
James Barrowman	Thomas Clark	Paul Evans	Tracey Hodgkiss
Katherine Batte	Sheron Clarke	Fiona Fitzgerald	Gemma Hodgson
Hannah Beadle	Leon Cohen	Jayne Foot	Maureen Holland
Chloe Beard	Martin Cole	Selina Ford	Ann Holmes
Paul Bedford	Andrea Cole	Greg Forshaw	Cassandra Honeywell
Kate Beesley	Alison Colhoun	Kito Fusai	Anil Hormis
Xiao Bei Zhao	Peter Collett	Claire Gabriel	Kate Howard
Jan Belcher	Dawn Collier	Joanne Galliford	Linda Howard
Sarah Bell	Rachel Collis	Carina Galpin	Georgina Howell
Jocelyn Bell	Thomas Collyer	Amina Garcia	Lucie Howie
Gillian Bell	Edward Combes	Mark Garfield	Jo Hubert
Zoe Bennettan	Louise Conner	Zoe Garland	Danielle Huckle
Mariana Bernardo	Tim Cook	Theresa Garratt	Karen Hudson
Stephanie Berry	Nadine Cooper	Philip Gedling	Rachel Hughes
Emily Bevan	Lisa Cooper	Emma Gendall	Adam Hunt
Kailash Bhatia	Jim Corcoran	Roman Genetu	Nik Husain
Edward Bick	Patricia Correia da Costa	Simon George	Arjuna Imbuldeniya
Janine Birch	Edward Costar	Ranjit Gidda	Fiona Ingoldby
Janine Bird	Edward Courtney	Kim Giraud	Francious Ioffidis
Ethel Black	Amanda Cowton	Jon Glass	Jacqueline Routledge
Lauren Blackburn	Nicholas Crabtree	Prisca Gondo	Zara Jalal
Verity Blackburn	Andrew Cresswell	Romana Govindaraju	Rose Jama
Doug Blackwood	Nikki Crisp	Lia Grainger	Sunil Jamadarkhana
Jackie Bladon	Jennifer Crooks	Neus Grau Novellas	Katherine James
Melanie Bloor	Carina Cruz	Caris Grimes	Parandeep Jandu
Andrea Boedo	Peter Csabi	Jessica Gunn	Anna Janowicz
Jessica Bowen	Fiona Culley	Zoe Guy	Anne Jayne Brien
Sophie Boyd	Zoe Daly	Laura Gwathil	Richard Jennings
Sharon Boyne	Sarah Daniels	John Gwatkin	Emily Jeynes
Andrew Bracewell	Thelma Darian	Brigid Hairsine	Mhairi Jhugursing

Jo Bennett	Maurice Lau	Clare Mason	Andy Morrison
Teishel Joefield	Helen Lawrence	Alexandra Matson	Alison Moss
Summayyah Jogi	Tessa Lawrence	Rosanna Maurin	Susan Moss
Rebekah Johnson	Heidi Lawson	Debbie Mawson	Bhvani Mothe
Linda Johnson	William Lawson-Brown	John May	Lorraine Motuel
Rob Johnston	Tom Lawton	Denzil May	Jessica Muchmore
Rhidian Jones	Susannah Leaver	Frank McAuley	Karim Muhammad
Claudette Jones	Julie Lebas	Laura McCafferty	Hassan Mukhtar
Lyndon Jones	Gemma Lee	Ananya McCarthy	Amanda Mulholland
Colette Jones-Criddle	Michelle Leemans	Jacqueline McCormick	Joe Mullender
Lesley Jordan	Mairi Leggatt	Bruce McCormick	Amanda Mullholland
Matt Julian	Cynthia Leigh	Richard McCormick	Maxene Murdoch
Miriam Kadry	Dee Leonard	David McCretton	Henry Murdoch
Prashant Kakodkar	David Leslie	Evanna McEvoy	Rosie Murdoch
Vidya Kasipandian	Denny Levett	John McGrath	Jo Murfin
Ramanathan	Christopher Levett	Sophie McGrath	Anthony Murphy
Kasisvisvanathan	David Levy	India McKenley	Zoe Murphy
Tasneem Katawala	Juliette Li Wan Po	Emma Mckenna	Katherine Murray
Jasmin Kaur	Rosario Lim	Elizabeth McKerrow	Dave Murray
Sharon Kaur	Woei Lin Yap	Euan McLaughlin	Rosemary Musanhu
Ambreen Kauser	Jonathan Lloyd Evans	Laura Mcleavy	Esther Mwaura
Anne Keen	Alison Loftus	Fiona McNeela	Priya Nadarajah
Natalie Keenan	Ruth Longfellow	Margaret McNeil	Seema Nadkarni
Jessica Kelly	Rita Lopes	Denise McSorland	Zin Naing
Andrea Kelly	Rui Lopes	Johannes Mellinghoff	Rajesh Nair
Peter Keltie	Bruno Lorenzi	Teresa Melody	Ashok Nair
Clive Kelty	Gretel Loten	Julie Melville	Priya Nair
Christopher Kennedy	Robert Loveridge	Arun Menon	Shireen Naqui
Jo Keogh	Justine Lowe	Stuart Mercer	Andres Naranjo
Amy Kerr	Clare Lummis	Pauline Mercer	Nagendra Natarajan
Joyce Kibaru	Val Luoma	Megan Meredith	Noel Nathaniel
Katie King	Craig Lyness	Susan Merotra	Shakira Nathoo
Maureen King	Marc Lyons	Rachel Meskell	Deanna Naylor
Jane Kingham	Sara Ma	Clare Mewies	Aaron Ng
Harry Knight	Neil MacDonald	Maria Milburn	Yang Ng
John Knight	Mark MacGregor	Martin Millar	Onie Ngwenya
Peter Knowlden	Ami Mackay	Jessica Miller	Sotiris Nicholas
Shum Koin Lon	Ailie Mackenzie	Don Milliken	Claire Nicholas
Dimitrios	Jennifer MacLellan	Simran Minhas	Tom Nightingale
Konstantopoulos	Joe Macmillan	Gary Minto	Louise Nimako
Christos Kontovoniosis	George Madden	Sarah Mitchard	Marie Nixon
Damir Kosutic	Karen Maher	George Mochloulis	Hannah Noble
Kartik Kota	Parisa Mahjoob-Afag	Jignasa Modha	Harriet Noble
Bobby Krishnachetty	Christopher Mahon	Faizal Mohamed-Hossen	Aidan Noon
Priya Krishnan	Cathryn Mainwaring	Helen Molloy	Julie North
Monika Krupa	Sola Makinde	Georgia Monantera	Kribashnie Nundlall
Agnieszka Kubisz-Pudelko	Jasmina Mandair	Rugaia Montaser	Ruth O'Dowd
Mohan Kumar	Mira Manoharan	Jane Montgomery	Paul O'Loughlin
Vikas Kumar	Hosnieh Marbini	Maria Moon	Vikki O'Loughlin
Snehal Kumbhare	Kalimuthu Marimuthu	Claire Moore	Jonathan Ockrim
Rajeev Kushwaha	Nicky Marks	Tim Moore	Tessa O'Halloran
Inese Kutovaja	Suzie Marriott	Alison Moore	Maxine Okello
Thyra Kyere-Diabour	Emma Marshall	Iain Moppett	Alison O'Kelly
James Lai	Jane Martin	Lucy Moran	Padraig O'Scannill
Sandeep Lakhani	Tim Martin	Tom Morgan-Jones	Ayo Oshowo
Aroon Lal	Sarah Martindale	Catherine Moriarty	Harriet Owen
Jo Lambert	Guillermo Martinez	Clare Morkane	Sara Owen
Ben Lane	Laura Martins	Rebecca Morris	Jamie Pack
Tamsin Lane	Gladys Martir	Lucy Morris	Andrew Padwick
Katy Later	Sushil Maslekar	Sophie Morris	Valerie Page

Katherine Pagett	Alison Potter	Anna Roynon Reed	Jason Smith
Anirudda Pai	Gail Pottinger	Webster Rushesha	Rachel Smith
Glykeria Pakou	Sarah Powell	Lucy Ryan	Neil Smith
Carole Paley	Chris Powell-Wiffen	Christine Ryan	Theresa Smith
Claire Palmer	Oliver Pratt	Parv Sains	Jennifer Smith
Janet Palmer	Joel Prescott	Amina Sajid	Fran Smith
Shivani Pandya	Karen Prevc	Mark Salmon	Debbie Smyth
Kerry Paradowski	Anna Price	Collette Samuels	Rebecca Snell
Dhruv Parekh	Carly Price	Amanda Sanderson	Manisha Sodhi
Zarah Paris	Stephanie Prince	Siva Sangaralingham	Kathryn Sollesta
Linda Park	Florence Prior	Sumayer Sanghera	Julian Sonksen
Jane Parker	Ffion Pritchard	Seliat Sanusi	Simon Sparkes
David Parkinson	Mark Pulletz	Laura Sarmiento Valero	William Speake
Valerie Parkinson	Anne Pullyblank	Christine Sathananthan	Will Spencer
Sanjay Parmar	Bally Purewal	Nicholas Savage	Yolande Squire
Julia Parnell	Charlotte Quamina	Heather Savill	Gemma Squires
James Parry	Ramasamy Radhika	Amrinder Sayan	Philippa Squires
Penny Parson	Govindaraju Ramana	Magda Sbai	Seema Srivastava
Georgie Parsons	Sean Ramcharan	Andrea Scala	Frank Stafford
Judith Partridge	Lidia Ramos	Mark Scarfe	Claire Stapleton
Jonathan Pass	Nirmalabaye Ramsamy	Rosaria Scarpinata	Lorraine Stephenson
Jaimin Patel	Fiona Ramsden	Lyndsay Scarratt	Joseph Stevens
Rajan Patel	Simon Rang	Anne Scase	Nathalie Stevenson
Johanna Paterson	Mohan Ranganathan	Louise Schonborn	Richard Stewart
Kate Paterson	Valluvan Rangasamy	Simon Scott	Duncan Stewart
Abigail Patrick	Sameer Ranjan	Michaela Scott	Adrienne Stewart
Mathew Patteril	Rajashankar Rao	Chloe Searles	Julian Stone
Dan Paul	Steph Ratcliffe	Karthikeyan Selvaraju	Mark Stoneham
Mark Paul	Dave Raw	Neel Sengupta	Sharon Storton
Varghese Paul	Shilpa Rawat	Victoria Senior	Alexa Strachan
Mark Pauling	Caroline Reavley	Darreul Sewell	Richard Struthers
Stephanie Pauling	Jon Redman	Helen Seymour	Charlotte Strzelecki
Nikhil Pawa	Ellie Reeves	Nirav Shah	Daren Subar
Corinne Pawley	Hafiz Rehman	Samir Shah	Akshay Sule
Louise Pearson	Karen Reid	Deep Shah	Mark Sullivan
Andrew Peethamsingh	Simon Reid	Andy Shannon	Jaysimha Susarla
Suzannah Pegler	Andrew Renehan	Sophie Shapter	Paul Sutton
Melchizedek	Johannes Retief	Emma Sharkey	Asheesh Suxena
Penacerrada	Adam Revill	Helen Sharples	Andrew Swain
Lisa Penny	Nicolas Rey de Castro	Adnan Sheikh	Catherine Swann
Stacey Pepper	Anna Reyes	Tom Sheppard	Kathy Swanson
Lauren Perkins	Ramasamy Rhadika	Julie Sheriff	Mike Swart
Raj Pervalli	Matthew Rhodes	Paula Shirley	Katie Sweet
Cecilia Peters	Karen Rhodes	Anthony Short	Yadullah Syed
Chris Peters	Anna Riccoboni	Charmaine Shovelton	Abdul Syed
Carroll Petty	Zoe Ridgway	Pauline Sibley	Rebecca Symes
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