THE USE OF MINI C-ARM MACHINES IN MINOR FOOT AND ANKLE PROCEDURES AND INJECTIONS SHOWS REDUCED COSTS AND CARBON EMISSIONS COMPARED TO TRADITIONAL C-ARM MACHINES IMPROVING ENVIRONMENTAL SUSTAINABILITY

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The mini C-arm is a surgeon-operated smaller machine compared to the radiographer-operated traditional C-arm machine. There is limited data for the financial and environmental impact of the use of mini C-arms in minor foot and ankle procedures and injection cases.

We did a cost and usage analysis including initial purchasing price and yearly operational expenditures of mini C-arms versus traditional C-arms, along with investigating the carbon emissions of each machine. We also studied aspects of the radiation impact of utilising mini C-arms. A database consisting of 156 minor foot and ankle procedures and injections was created.

There were operational cost savings of £8,135.26 for the 156 cases over the course of one year when utilising mini C-arms instead of traditional C-arms, excluding radiation safety course fees. The traditional C-arms created 1.4 times increase in carbon emission output compared to mini C-arms, which demonstrated obvious environmental implications. A diagnostic reference level (DRL) was calculated for the database, producing a 48% lower value compared to the local DRL for foot and ankle imaging. The mini C-arm mean total dose area product (DAP) at 1.63cGy.cm^2 was found to be reduced compared to the local DRL at 4cGy.cm^2.

For the minor foot and ankle procedures and injections of this study, mini C-arms have shown significant financial and environmental benefits compared to traditional C-arms. Radiation exposure benefits of the mini C-arms were also seen in this study. Further larger studies could help confirm our findings and determine best practice for the use of these machines.

REDUCING TRANSFUSION WASTAGE DURING PELVIC TRAUMA SURGERY: SAVING BLOOD AND SAVING LIVES

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Advances in operative techniques have reduced blood loss during pelvic and acetabular trauma surgery. Modern transfusion guidance is aimed at reducing blood transfusions and wastage of blood products. We aimed to assess the impact of introducing a new blood ordering protocol for pelvic trauma procedures on blood product usage and potential wastage.

We reviewed case notes, blood ordering and packed red cells (PRC) transfused for patients undergoing pelvic surgery pre-protocol (Jul 2022-Mar 2023) and post-protocol introduction (Jul 2023-Mar 2024). Patients were sub-grouped into three distinct categories based on their operative procedure: percutaneous pelvic fixation, internal pelvic fixation and acetabular fracture fixation.

104 patients undergoing pelvic and acetabular fracture surgery were included. Patient demographics between the two groups were similar. Blood ordering and usage (median) for each operative group was as follows:

Percutaneous pelvic fixation pre-protocol had 4 units PRC crossed-matched and 2 units transfused, post-protocol had 0 units cross-matched and 0 units transfused ($p<0.05$). Internal pelvic fixation pre-protocol had 4 units cross-matched and 0 units transfused, post-protocol and 2 units cross-matched and 0 unit transfused ($p<0.05$). Acetabular fracture fixation pre-protocol had 3 units cross-matched and 1 unit transfused, post-protocol had 2 units cross-matched and 0 units transfused ($p<0.05$)

We conclude, the introduction of a more conservative blood ordering schedule for pelvic trauma surgery reduces the overall number of units cross-matched peri-operatively, as well as the number of unutilised units. This saves time and money by reducing unnecessary cross-matching of units and prevents potential wastage of this precious NHS resource.

COMPARISON OF PATIENT REPORTED OUTCOMES USING THE MANCHESTER-OXFORD FOOT QUESTIONNAIRE AND SURGICAL COMPLICATIONS FOLLOWING TOTAL ANKLE REPLACEMENT IN RHEUMATOID ARTHRITIS VERSUS OSTEOARTHRITIS

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Total ankle replacement (TAR) is an alternative to ankle fusion for treatment of end stage ankle arthritis. It has been hypothesised that patients with rheumatoid arthritis may experience inferior outcomes due to altered immune response and low bone quality. Previous studies using the American Orthopaedic Foot & Ankle Society (AOFAS) score suggest patient reported outcomes following TAR for osteoarthritis (OA) versus rheumatoid arthritis (RA) are indifferent, however the AOFAS score has limitations and has largely been superseded by the Manchester-Oxford Foot Questionnaire (MOXFQ) score, which demonstrates favourable data characteristics. The aims of the present study were to compare outcomes in RA versus OA following TAR using the MOXFQ and describe associated complication rates.

This single-centre cohort study included 114 patients (143 TARs) who underwent primary TAR from 2010-2023. Data included patient demographics, comorbidities, satisfaction and MOXFQ. Multivariate logistic regression was used to assess differences in outcomes between OA versus RA adjusting for demographic covariates.

Change in MOXFQ score following TAR was equal between the RA and OA group after adjusting for demographic co-variates (OR, 1.01 [95% CI, 0.99-10.3], p=0.284). RA was associated with increased risk of wound healing complications (OR 11.75 [95%CI, 1.06-130.32], p=0.045).

RA status did not influence the likelihood of requiring a revision operation, though this finding lacked sufficient statistical power. RA status was not demonstrated to significantly affect change in MOXFQ score following TAR. Wound healing complications were higher in RA patients, while other surgical and medical complications rates were equivalent.

RECOVERY PLATEAUS AND CEILING EFFECTS OF COMMONLY USED PATIENT-REPORTED OUTCOME MEASURES FOLLOWING TOTAL KNEE ARTHROPLASTY

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Various patient-reported outcome measures (PROMs) are used to assess recovery following total knee arthroplasty (TKA), but the timing of recovery plateaus and the magnitude of ceiling effects remain unclear.

A retrospective observational cohort study was undertaken, involving 229 patients (115 male, 114 female) who underwent TKA from three centres, after screening 287 patients for eligibility. PROMs were assessed pre-operatively, at 6-weeks, 6-months, and annually from 1- to 4-years using the Oxford Knee Score (OKS), Forgotten Joint Score (FJS), Knee Injury and Osteoarthritis Outcome Score (KOOS), EQ-5D and EQVAS. The Objective Knee Society Score (KSS), and range of motion (ROM) were also assessed as physical outcome measures.

All knee-specific PROMs plateaued between 1 and 2 years post-operatively, with the derivative score approaching zero. Plateaus were statistically confirmed by 2 years for all knee-specific PROMs, by 6 months for EQ-5D and EQ VAS, and by 1 year for Objective KSS and ROM. The proportion of patients achieving the Patient Acceptable Symptom State (PASS) typically stabilised by 2 years; the Minimal Important Change (MIC) by 1 year; and the ceiling (maximum) score by 2-3 years. Substantial ceiling effects emerged between 6 months and 3 years for all knee-specific PROMs except the OKS, which remained unaffected.

Following TKA, knee-specific PROMs plateau by 2 years postoperatively, with no further improvement in the proportion of patients achieving the PASS. However, substantial ceiling effects may contribute to this observed plateau. Additional research is needed to determine whether new PROMs could better capture postoperative recovery following TKA.

OUTCOMES OF OPEN REDUCTION AND INTERNAL FIXATION FOR PROXIMAL HUMERUS FRACTURES: A RETROSPECTIVE AUDIT

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Proximal humerus fractures account for approximately 6% of all fractures and their incidence is increasing with an ageing population. These injuries often result in pain, stiffness, and loss of independence, particularly in previously active individuals. While conservative management is common for minimally displaced fractures, surgical intervention is frequently considered for displaced or unstable injuries. The PROFHER study has provided insight, but its findings remain debated in clinical application.

We aimed to assess outcomes of open reduction and internal fixation (ORIF) for proximal humerus fractures, focusing on complication rates and identifying associated risk factors such as comorbidities, lifestyle factors and the operating surgeon's subspecialty.

A retrospective audit was conducted of 100 patients who underwent ORIF between 2022 and 2023 at a single centre. Data collected included age, sex, Neer classification, time from injury to operation, surgeon type, and postoperative outcomes. In cases with complications, we examined associations with smoking, diabetes and alcohol use.

83% of procedures were performed by upper limb surgeons. Eight patients (8%) experienced complications: five required hardware removal, two had non-union or malposition, and one developed an infection. In cases performed by upper limb surgeon there was a 6% rate of complication, in cases performed by non-specialists there was a 17% rate of complication. Of the complications 87.5% were smokers.

Our findings suggest a substantially lower complication rate for ORIF than previously reported in PROFHER, particularly when performed by an upper limb surgeon. This may challenge its generalisability and support the continued use of surgery in selected patients.

MALUNION, INTERVENTION AND PATIENT-REPORTED OUTCOMES IN PATIENTS AGED 65 YEARS AND OLDER WITH A FRACTURE OF THE DISTAL RADIUS

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The aim was to determine the rate of radiographic malunion and subsequent intervention following a dorsally displaced distal radius fracture in patients aged 65 and older.

Patients were identified from a retrospective database and radiographs at a minimum of 28 days post-injury measured to determine whether or not radiographic malunion was present. Patient-reported outcome measures in the form of the QuickDASH, PRWE, Normal Wrist Score (NWS) and ED-5D-3L were obtained at a mean of 5 years post-injury.

There were 385 distal radius fractures in the cohort. Patients had a mean age of 75 years and were predominantly female (88.1%). Of the 73 (19.0%) patients managed with primary operative intervention, a complication occurred in 20.5%. There was a 77.9% rate of radiographic malunion, with 86.67% occurring in patients managed non-operatively. Five patients (1.67%) underwent a surgical procedure for the management of symptomatic malunion. There were no significant differences in the QuickDASH (p=0.636), PRWE (p=0.964), NWS (p=0.192) or EQ-5D-3L (p=0.506) when comparing patients who developed and malunion and those who did not.

There was a high rate of radiographic malunion but a low rate of surgical intervention for symptomatic malunion. Malunion was significantly more likely following non-operative management although there was no significant difference in patient-reported outcome when comparing patients with and without radiographic malunion. This tolerance of malunion, combined with the complication rate with primary operative management and low rate of further surgery required for symptomatic malunion, has implications regarding better defining the optimal management of these injuries the elderly.

TOTAL HIP ARTHROPLASTY RESTORES POPULATION HEALTH RELATED QUALITY OF LIFE NORMS: A PROPENSITY-MATCHED STUDY WITH MEDIATION ANALYSIS OF BMI

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This study compares health-related quality of life (HRQoL) between patients undergoing primary total hip arthroplasty (THA) for osteoarthritis (OA) and a propensity-matched general population cohort. We also aimed to clarify the relationship between body mass index (BMI) and postoperative improvements, mediated via preoperative HRQoL.

In this retrospective case-controlled study using the Edinburgh Arthroplasty database (2013-22; n=3495) and Health Survey for England (2010-12; n=25,320), propensity score matching (1:1) was performed based on age, sex, and BMI. The primary outcome was EQ-5D-3L index score. Secondary outcomes included EQ-VAS and mediation analysis examining how preoperative EQ-5D-3L mediated the relationship between BMI and postoperative improvement.

Preoperatively, THA patients had significantly lower EQ-5D-3L scores compared with matched general population (median difference: 0.280, bootstrapped 95% confidence intervals; 0.258 to 0.306; $p<0.001$). At one-year follow-up, THA patients exceeded population norms (THA median: 0.814 vs. general population: 0.796, $p=0.014$). Patients >85 years showed the greatest relative improvements compared with the age-matched general population (THA median: 0.796 vs. general population: 0.696, $p=0.142$). Mediation analysis revealed that BMI's negative direct effect on improvements in EQ-5D-3L was counterbalanced by stronger indirect effects transmitted through preoperative scores (indirect effects: Obesity I (30-34.9kg/m^2): $\beta=0.048$, $p<0.01$; Obesity II (35-39.9kg/m^2): $\beta=0.108$, $p<0.001$; Obesity III (≥40kg/m^2): $\beta=0.151$, $p<0.001$).

THA was shown to restore HRQoL to that expected of a matched normal population. Postoperative HRQoL improvement was predominantly influenced by preoperative functional status, rather than BMI alone. These findings challenge current BMI based eligibility thresholds and support surgical prioritization based on functional impairment severity.

A PROSPECTIVE AUDIT EVALUATING THE SURGEON'S 'TASK-LOAD' PERFORMING SURGERY AROUND THE KNEE WITH AND WITHOUT A TOURNIQUET

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Although tourniquets have traditionally been used in knee surgeries to improve intraoperative visibility, emerging evidence suggests their use in total knee replacements may increase the risk of adverse events. No studies have examined how tourniquet use affects the perceived workload of surgeons performing these procedures.

This study investigated surgeon-perceived task load during knee surgeries with and without a tourniquet. Data were collected on total and partial knee replacements, high tibial osteotomies, and trauma-related operations. After each procedure, the lead surgeon completed the Surgical Task-Load Index (SURG-TLX) questionnaire, rating their workload across multiple domains. A weighted SURG-TLX score (0–100) was calculated. Surgical field visibility was rated on a 1–5 Likert scale.

Of the total of 100 procedures, 47 were performed with a tourniquet and 53 without. Mean SURG-TLX scores were 39.65 (SD 18.98) for the tourniquet group and 41.59 (SD 19.26) for the no-tourniquet group. This difference was not clinically nor statistically significant (mean difference 2.04, $p = 0.299$). Field visibility was rated significantly higher in the tourniquet group (mean difference = 0.527, $p = 0.001$). Subgroup analyses showed no significant differences in individual SURG-TLX domains or between procedure types.

Despite the reduction in field visibility, surgeons did not report increased workload demands when operating without a tourniquet. These findings, in combination with growing evidence of better short-term patient outcomes in tourniquet-free knee surgery, support wider adoption of tourniquet-free techniques as a more patient-centred surgical approach.

THE EFFECT OF INCREASING BONE LOSS ON PRIMARY STABILITY OF METAPHYSEAL SLEEVES IN REVISION TOTAL KNEE ARTHROPLASTY

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Approximately 20% of primary and revision Total Knee Arthroplasty (TKA) patients require multiple revisions, bone loss may worsen and present an increasing challenge at each operation. The aims of this study were to investigate the effect of increasing bone loss on primary stability of metaphyseal sleeves and suggest a critical bone loss limit after which the sleeve may not be stable.

A two phase experiment was performed on biomechanical testing sawbones and human cadaveric tibiae. Sleeves were inserted into the tibia and a standard axial pull-out (0 – 10mm) force and torque (0 - 30°) tests were carried out.

For the sawbone experiment The peak pull-out force with no defect was 160N, for small defect (15mm) was 133N, medium defect (25mm) 108N and large defect (35mm) 56N. The peak torque with no defect was 17.8Nm, for small was 13.4Nm, medium 13.3Nm and large 11.1Nm. The only significant reduction of force was for the large defect. For the cadaveric experiment only the no defect, medium and large were tested. The mean peak pull-out force with no defect was 208N, medium 150N and large 50N. The peak torque with no defect was 13.6Nm, medium 9.9Nm and large 4.7Nm. The only significant reduction in force was observed in the large group.

For the scenarios examined, up to 25mm radial defect may be acceptable, between 26-35mm may be the “critical limit” for bone loss making the implant unstable. This is the first study in the literature to quantify this critical limit in any arthroplasty.

LONG TERM CLINICAL OUTCOMES OF THE DISCOVERY TOTAL ELBOW REPLACEMENT

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The Discovery Elbow System is a total elbow replacement (TER) designed to address complications associated with earlier TER designs which had high revision rates. Due to the relatively low volume of TER performed in the UK each year the literature lacks high-quality long-term outcome data. The aim of this study is to report long term clinical outcomes of the Discovery TER.

TERs were performed from 2011 to 2024 by 3 surgeons at a single tertiary referral centre. The patients were identified through retrospective search of prospectively coded patients. The mean follow up was 89 months (12-165). The average age at operation was 59.4 years. Kaplan-Meier analysis was performed with revision as the end point and deaths censored.

A total of 177 TER were included in the study. Implant survivorship was 96% at 5 years (121 patients) and 90% at 10 years (38 patients) The overall revision rate was 7% (13 TER). Infection occurred in 6% (9) and periprosthetic fracture in 4% (8). Ulnar neuritis occurred in 7% (10) of which 1 patient underwent ulnar nerve transposition. 13% (24) had radiographic signs of component loosening, of which 5% (7) underwent revision surgery for this.

This is the largest series in the literature of clinical outcomes of the discovery total elbow replacement. The overall rate of complications was reduced compared to other studies on TER and can be used to council patients on promising outcomes when the procedure is performed by higher volume surgeons.

PATTERN OF HIP OSTEOARTHRITIS ON PLAIN RADIOGRAPHS PREDICTS OUTCOME AT 1 YEAR FOLLOWING TOTAL HIP ARTHROPLASTY

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Many classification systems exist for primary osteoarthritis (OA) of the hip. The primary aim of this study was to determine the effect of radiographic patterns of osteoarthritis on patient reported outcome measures (PROMs) in patients undergoing THR.

This retrospective study assessed 445 patients with idiopathic osteoarthritis undergoing THR in a high-volume centre. Independent observers assessed radiographs to determine Kellgren-Lawrence OA grading and pattern of arthritis: hypertrophic, atrophic or mixed. Demographic and comorbidity data were collected. PROMs included pre-op and 1 year post operative EQ5D score and oxford hip score (OHS).

284 females (63.5%) and 161 males (36.5%) were included in the study. Females were more likely to have atrophic OA (120/284, 39% vs 47/161, 23%, $p<0.05$). Males were more likely to have hypertrophic OA (52/161, 37% vs 47/284, 23%). Overall OHS improvement at 1 year was significantly lower in the atrophic group (17.3 vs 22.6 (hypertrophic) and 18.6 (mixed), $p<0.05$). Patients with atrophic OA had smaller improvements in both pain and function components of the OHS at 1 year post op ($p<0.05$). EQ5D score improvement at 1 year was lower in patients with atrophic OA compared to hypertrophic OA (0.33 vs 0.45, $p<0.05$).

Patient outcome following THR can be influenced by the radiographic pattern of their OA. Patients with atrophic OA report similar levels of pain and functional disability pre op but have a smaller improvement following surgery. Patients with hypertrophic OA have the largest improvements following surgery. Patients with atrophic OA should be made aware of potentially inferior outcomes.

THE EPIDEMIOLOGY AND OUTCOMES OF PERIPROSTHETIC FEMUR FRACTURES: THE SCOTTISH NATIONAL AUDIT OF PERIPROSTHETIC FEMUR FRACTURES (SNAP FEMUR) STUDY

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Periprosthetic femoral fractures (PFFs) are underreported in national registries, making their impact on healthcare services difficult to quantify. This study aimed to describe PFF patient characteristics, management, and outcomes, and to compare these with native hip fractures (NHFs) using Scottish Hip Fracture Audit (SHFA) data.

This was a nationwide retrospective cohort study of patients aged ≥50 who sustained a PFF and were treated in 16 centres over 12 months (2019). Data included demographics, Clinical Frailty Scale (CFS) score, treatment modality, and mortality. Comparisons with NHF were made, and Cox regression was used to identify mortality predictors, adjusting for confounders.

A total of 328 PFFs were included (mean age 79, SD 10; 66% female). Median follow-up was 2.8 years (IQR 1.67–3.22). Compared to NHF patients, those with PFF were less frail (median CFS 4 vs 5, $p<0.001$) and more often home-dwelling (91% vs 76%, $p<0.001$). Most PFFs occurred around arthroplasties (93.5%), involving the hip (70%) or knee (24%). Management included fixation (53%), revision arthroplasty (30%), and conservative care (15%). Median hospital stay was 15 days (IQR 8–28), and one-year mortality was 21%. Independent mortality predictors included interprosthetic fracture (aHR 2.65, $p=0.003$), male sex (aHR 1.76, $p=0.015$), older age (per year: aHR 1.07, $p<0.001$), and higher frailty (CFS 5–9: aHR 4.16, $p=0.027$).

PFF patients were less frail than NHF patients but had prolonged hospital stays and high one-year mortality. As 70% of PFFs did not undergo revision arthroplasty, registry-based surveillance underestimates their true burden.