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A1 Chloroprocaine Or Prilocaine? Decision Making For Procedure Targeted Day Case Spinal Anaesthesia

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Introduction: For 20 years the only spinal anaesthetic in the UK has been Bupivacaine which has, by virtue of its length of action, not enhanced the reputation of spinal anaesthesia in Day Case. “Low Dose” Bupivacaine spinals have been widely used but have not enjoyed widespread approval across the specialty. We are now fortunate to have two new agents which have obviated the need for the low dose approach, 2% Hyperbaric Prilocaine (2011) and 1% Isobaric Chloroprocaine (2013), and we have examined the role of these two agents in Day Case.

Method: Over 2 years we performed 1028 day case spinals with Prilocaine and 521 with Chloroprocaine in Derby, Bristol and Barlborough for orthopaedic, general, gynaecology and urology. Decision to use either was based on whether a sacral block only or one above T10 was required and procedure greater or less than 1 hour. This was used to create a flowchart displayed in theatres to support anaesthetists in the use of procedure targeted spinal anaesthesia.

Results: Experience demonstrated that in procedures requiring either a block above T10 or those requiring merely a “saddle block” the hyperbaric nature of Prilocaine was ideal and by using differing volumes this could be achieved whilst still allowing early mobilisation. When a full block below T10 of less than 1 hour duration was needed Chloroprocaine proved to be consistently effective with a rapid return of function. Indeed our physiotherapists saw a significant improvement even over Prilocaine following knee arthroscopy and had to bring forward their post op assessment to allow earlier discharge.

Conclusion: Our experience demonstrated that these two new spinal anaesthetic drugs are complementary in the day case setting but that guidance was needed for new users to support a targeted approach. To this end we have created a simple flowchart to help.

A2 Disposable Local Anaesthetic Infusion Pumps: A Step Towards Ambulatory Major Ankle Surgery

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Introduction: Major ankle surgery is associated with severe pain requiring high doses of parenteral opioids and a 3-5 day hospital stay. In a plan to improve analgesia and reduce PONV we initially introduced popliteal sciatic nerve catheters with intermittent bolus doses of bupivacaine with the added benefit of reducing hospital stay. Bolus doses proved logistically difficult thus we gained approval to allow use of disposable continuous elastomeric infusion pumps at home as part of a move towards day case surgery.

Method: We planned a pathway of care from patient admission to post discharge. We included the acute pain team, theatres, pharmacy, ward staff and our orthopaedic outreach. We also produced information for the patient about the device, its placement and side effects and expectations. We taught each how to clamp it off in case of difficulties. Patients were followed up as inpatients and by phone survey at home.

Results: Over a year we assessed 81 patients. In an early report of the first 50 patients (first 8 months) we noted minimal opioid consumption, low nausea and vomiting scores and reduced hospital stay, 21 going home within 48 hours of which 7 were discharged on day of surgery. Some patients had an increased length of stay if operated on Friday or Saturday. The infusion device was removed at 48 hours in the community. Post removal telephone follow up revealed no readmissions, no calls to GPs or 111 about pain and no reports of local anaesthetic toxicity. There was a high level of patient satisfaction.

Conclusion: The use of the disposable continuous elastomeric infusion pumps gave the patient an excellent quality of hospital stay and post discharge experience. They achieved reduced length of stay, a significant number being discharged within 24 hours of surgery.

A3 Does The Physician' Assistant (Anaesthesia) 2:1 Supervision Model Have Any Effect On Theatre Caseload In The Heart Of England NHS Foundation Trust (HEFT)?

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Objective: P'A (A)'s have been working at Solihull Hospital since 2012 using the 2:1 model of supervision. However there has never been an evaluation of this way of working and its effect on theatre efficiency.

Method: In this snapshot audit, we analysed the throughput of cases in the Day Procedure Unit (DPU) 3 years before 2:1 working was introduced and 3 years after. The data was obtained from the HEFT Data Quality team. The specialities include General Surgery, Urology, elective Orthopaedics, ENT and Gynaecology. A general or local anaesthetic technique was used with the supervising Consultant within the theatre suite as recommended by the Royal College of Anaesthetists Supervision Guidelines (2011) [1].

Results: From 2008 to 2011, Solihull DPU averaged 4498 cases per year. Following the introduction of the 2:1 model of working, the average number of cases increased to 5589 per year from 2011 to 2014. This equates to a 19.5% increase in the number of cases undertaken as a result of the change in anaesthetic delivery and

an extra 1091 cases per year. In the same time period conversion from elective day case to overnight stay fell from an average of 10% 450 in the years 2008 to 2011 to 6.6% 369 a reduction of 81 patients or 3.4% in 2011 to 2014.

Conclusion: By using the P'A (A)'s in a 2:1 capacity in Solihull DPU, it has been shown that patient throughput has not been adversely effected with this particular way of working, it has enabled service provision to continue and has subsequently allowed an extra anaesthetist to be made available for other departmental needs.

Reference:

- 1 The Royal College of Anaesthetists (2011) PA(A) supervision and limitation of scope of practice (May 2011 revision), [Online], Available:<http://www.rcoa.ac.uk/news-and-bulletin/rcoa-news-and-statements/paa-supervision-and-limitation-of-scope-of-practice-may> [accessed 1 March 2015].

A4 Evaluation Of PONV In Women Undergoing Day-Case Gynaecology Surgery

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Objectives: To evaluate post-operative nausea and vomiting (PONV) in women undergoing elective day-case gynaecology surgery.

Methods: 125 consecutive women having routine day-case gynaecology surgery under GA were prospectively audited. Apfel risk scoring, anaesthesia, antiemetic & morphine usage, duration of surgery and PONV in recovery & ward was studied.

Results: Median age was 44 (17-86) years. No PONV was observed in women aged 50 or above (n=41). The overall incidence of PONV was 8% (10/125); five in recovery only, three in ward only and two at both places. The discharge of patients with PONV was delayed. One patient was retained. The incidence of PONV was 5% (1/20), 5.2% (4/77), 11.5% (3/26) & 100% (2/2) in Apfel groups 1,2,3 & 4 respectively. 70% of patients (n=87) received two or more anti-emetics and had a PONV incidence of 9.2% (8/87). The incidence of PONV increased with duration of surgery - <30 min 4.9%, 30-60 min 8.6% & >60 min 33% respectively. Laparoscopic surgery was associated with higher PONV than non-laparoscopic surgery (11% v/s 3.8%). PONV was higher in those who received morphine than those who did not (15.2% v/s 3.8%). Only 20% patients (25/125) were managed on a risk-scoring based approach¹.

Conclusions: Age < 50 years, Apfel group 3 or more, GA, laparoscopic surgery, duration of anaesthesia and morphine usage increased the risk of PONV whilst the use of prophylactic combination anti-emetics reduced the risk. Due to the relatively low cost and low incidence of side effects, offering prophylactic combination anti-emetics routinely may be beneficial and easier than a risk based approach².

References:

1. Gan T, et al. *Anaesthesia & Analgesia* 2014; 118:85-113.
2. Kranke P, et al. *Eur J Anaesthesiol* 2014; 31:651-653.

A5 Introducing Desflurane For Day Surgery – A Quality Improvement Project

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Objectives: Introduce a cost-effective technique that improves the recovery profile of day surgery patients.

Method: We submitted a business plan for the use of desflurane in day surgery and implemented a hands-on education programme. A month after its introduction, we prospectively evaluated our recovery outcomes: emergence time, length of first-stage recovery stay and occurrence of PONV. Return to full ambulant activity and clear-headedness were identified during a telephone consultation 24 hours post surgery. We also retrieved the fresh gas flow rates used for maintenance of anaesthesia from the anaesthetic record.

Results: 102 patients received a daycase anaesthetic (12% desflurane, 24% sevoflurane, 29% isoflurane, 31% propofol TIVA). The desflurane group had on average the shortest emergence and first-stage recovery times: 4 minutes and 29 minutes respectively; with no cases of PONV.

86% of the desflurane group reported a return to their normal activities 24 hours post surgery compared to 75% with TIVA, 53% with isoflurane and 36% with sevoflurane. 100% of the desflurane group felt clear-headed at 24 hours compared to 83% with TIVA, 82% with sevoflurane and 53% with isoflurane.

The average fresh gas flow rate for maintenance with desflurane was 0.64 L/min and a one hour anaesthetic was calculated to cost £6.32, compared to £7.87 with TIVA.

Conclusions: Desflurane is not yet a popular choice amongst anaesthetists for day surgery in our trust, but our results encourage us to re-evaluate this thinking. Concerns regarding the cost of desflurane were not founded as adherence to low-flow anaesthesia was excellent. Desflurane appears to perform better than propofol TIVA, isoflurane and sevoflurane in all tested domains, with faster emergence, shorter first-stage recovery stay and a greater return to clear-headedness and normal activity. Introducing desflurane has shown to be a quality improvement to our day surgery service.

A6 Protocolised Analgesia For Day Surgery: An Approach To Exceed Target Outcomes In Post-Operative Pain

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Objectives: The RCOA recommends that fewer than 5% of patients report severe pain 24-48 hours following day surgery, with greater than 85% reporting no or mild pain [i]. We aimed to assess both compliance with these standards and whether deviance from analgesic protocols results in poorer pain outcomes.

Methods: Patients attending Torbay Hospital for day surgery receive a follow-up phone call at 24-48 hours to assess efficacy of analgesia and satisfaction. Outcomes are recorded on our electronic database Galaxy (©CSC) along with demographics, surgical details and discharge medication. We have audited all recorded data for the year 2014.

Results: 9472 patients were treated through the day surgery unit and 6645 (70%) responded to follow-up contact. Of these, 55 (0.8%) reported severe pain, 497 (7.4%) reported moderate pain and 6093 (91.6%) reported either mild or no pain. 92.2% of patients reported an overall experience as good or very good. 6534 (98.3%) take-home analgesic prescriptions were in accordance with protocols. 19 patients (35%) who had reported severe post-operative pain had deviated from departmental analgesic protocols. 17% of 'off-protocol' patients reported severe pain.

Discussion: Our study shows excellent rates of post-operative pain as well as high levels of overall patient satisfaction. Well-established protocols within our unit and straightforward pre-determined 'take-home analgesia' prescriptions are undoubtedly instrumental in this. Clinical judgement demands the ability to override computerised prescriptions; however our audit shows that when analgesic protocols are not followed severe post-operative pain rates are disproportionately higher.

Conclusion: This audit has shown that our unit greatly exceeds the RCOA recommended standards for post-operative pain. Protocolised discharge analgesia prescriptions encourage clinicians to prescribe proven analgesic recipes, which we feel are a major factor in our low rates of post-operative pain. Higher audit standards should be adopted in order to drive excellence on a national scale.

References:

1. Jackson IJB. Raising the Standard. RCOA, 2012.

A7 A Day Surgery Approach For Patients Requiring Incision And Drainage Of An Abscess Through The Introduction Of An Abscess Pathway.

R. Balakumar, N. Samuel, A. Jackson, M. Shiwani

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Objectives: There has been a drive to undertake more procedures through day case surgery. The incision and drainage of an abscess is amongst this list. Patients who present with a superficial abscess are admitted but considered a low priority on the emergency list. This has therefore caused issues with hospital capacity and expenditure. An abscess pathway was therefore introduced to reduce length of stay and allow safe discharge on the same day.

Method: The abscess pathway was designed in collaboration with anaesthetists, theatre staff and surgical ward nurses. It allowed patients to go home to return the following morning and be operated first on the emergency list with nurse-led discharge. The process was audited in 2 cycles, before (retrospectively) and after (prospectively) the introduction of the pathway. It looked at clinically well adults presenting with superficial uncomplicated abscess. High risk cases such as septic patients and complicated abscess were excluded. Data was gathered using patient notes and the hospital electronic system.

Results: A total of 40 and 35 patients were included for the preliminary and subsequent audit cycle. Introduction of the pathway reduced mean (S.D) inpatient stay from 29.3 (14.2) to 10.2 (7.2) hours ($P<0.001$); reduced pre-op waiting times from 12.5 (7.7) to 3.4 (2.5) hours ($P<0.001$); resulted in only 15% of patients waiting more than 6 hours as against 68% prior to its introduction. In-patient hospital costs per patient (calculated at £250 /bed/day for non-clinical services) were mean (S.D) cost to £312.50 (157.60) and £27.78 (80.06) per patient respectively ($P<0.001$), saving £284.72 (95%CI 218.97-350.46) per patient.

Conclusions: The abscess pathway has resulted in significant reduction in pre-op waiting times and total inpatient stay without compromising patient safety. This has in turn reduced the costs and improved capacity of the hospital.

A8 A Novel Protocol To Reduce Day-Case To In-Patient Conversions Rates Due To Post-Operative Urinary Retention (POUR) – Can They Wee At Home?

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Objective: Audit of Day-Case to In-patient conversions following elective outpatient procedures in our hospital showed a significant number of admissions due to post-operative urinary retention(POUR).We carried out a study to investigate these cases and designed a protocol to reduce these rates.

Methods: All Day Case to In-patient conversions due to POUR between Jan-June '14 were retrospectively reviewed. A standardised proforma was used to identify the causative factors and further management strategy employed in each case. The data gathered combined with a literature search of management of day-case surgery patients with POUR was used to enable development of an evidence based management protocol.

Results: A total of 21 patients were identified, of which 20 patients records were available. The most common procedures were inguinal hernia repairs(laparoscopic 6, open 2) and laparoscopic cholecystectomy(6). Bedside bladder-scan was performed in 16/20 patients and showed a mean volume of 490ml(236mlSD). In this series of 20 patients, 9 passed urine spontaneously; in-out catheterisation was in performed in 8 all of whom urinated spontaneously the next day;Foley catheterisation was used in three patients. Two had successful trial without catheter the next day and one the day after.

Evidence from literature search suggested that a strategy of risk-stratification of POUR patients and use of bladder-scans/ in-out catheters could result in fewer conversions – therefore we developed into a practical and novel protocol, shown below:

Conclusion: Conversions due to POUR are largely avoidable by using risk stratification, bladder scans and in-out catheterisation. Ps double improvements in patient satisfaction and cost savings support the proposed algorithm. We suggest development and implementation of similar protocols in other units with further audit to ascertain efficacy and acceptability.

References:

- 1) Pavlin D et al. *SAA* 1999;89:90–7.
- 2) Pavlin D. *Anaesthesiology* 1999.91:42–50.
- 3) Baldini et al. *Anesthesiology* 2009 110:1139–57.

A9 Assessing Risk Factors And Complication Rates In Elective Scrotal Surgery For Benign Conditions

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Objectives: Elective scrotal surgery for benign conditions such as hydroceles and epididymal cysts are some of the commonest urological procedures performed as day surgery. However, the risk factors for complications after benign elective scrotal surgery have not been widely reported. The objectives of this study were to determine the complication rate and possible risk factors affecting it to improve surgical outcome.

Method: Our study included patients from April 2008 to September 2013 who underwent hydrocele repair, epididymal cyst excision or epididymectomy. Patient's notes as well as Accident and Emergency records were reviewed for risk factors and post-operative complications. Risk factors examined were: age, body mass index, ASA grade, diabetes status, pre-operative shaving, post-operative drain, prophylactic antibiotics and heparin prophylaxis against deep vein thrombosis.

Results: 222 notes were reviewed. Overall complication rate was 24.7%. Complications included haematoma (9.0%), infection (5.0%), recurrence (7.2%) and chronic pain (0.2%). On univariate analysis, body mass index $\geq 30\text{kg/m}^2$ was significantly associated with increased complication rate.

Over 36% (27 of 77) of patients with BMI $>30\text{kg/m}^2$ had complications compared to 19.2% (28 of 145) with BMI $<30\text{kg/m}^2$ (Chi2 6.698, p=0.010). Prophylactic antibiotics, diabetes mellitus status or anticoagulation therapy did not affect the complication rate.

Conclusions: Most common complications after scrotal surgery were haematoma formation, infection, and recurrence. Only risk factor identified as having an adverse effect on complication rate was a body mass index of 30kg/m^2 or greater. Reduction of BMI prior to major elective surgery is considered an important factor determining surgical outcome and when planning day surgery. Our study shows that this could improve surgical outcome even in relatively minor surgery.

A10 Defaulting Vaginal Prolapse Surgery To A Day Surgery Setting– Are We Keeping Up The Standard?

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Objectives: To review the practice of performing vaginal prolapse surgery in the day surgery setting over a one year period. To compare admission rates, post-operative symptoms and overall patient satisfaction from 2014 to previous years (2010-2013).

Method: We conducted a retrospective review of day-surgery patients undergoing surgery for vaginal prolapse in 2014. Galaxy and Infoflex databases were scrutinized to collate patient data regarding their surgery. The domains included in the data collection were: operation, anaesthetic type, ASA grade, whether admission was required, and post-operative phone call data. This included pain score, level of nausea and whether they had vomited. In addition, level of satisfaction with the service was recorded along with whether they sought help in the immediate post-operative phase.

Results: 101 patients were included in the study with 7 (7%) requiring hospital admission. Mean duration of admission was 2.5 days. Four (57%) of these patients were in the anterior repair group, with two having had additional sacrospinous fixation. The remaining 3 (43%) patients received vaginal hysterectomy. Reasons for admission included post-operative pain (14%), urinary retention (28%), nausea (14%) and chest pain (14%).

Patients mostly experienced no pain post-operatively (45%), with 10% experiencing moderate pain and only one patient experiencing severe pain. Nausea rating was mostly none (79%) or mild (5%), with only four patients vomiting post-operatively (3.9%).

Four patients (3.9%) required help post-operatively; phoning relatives, GP out-of-hours service or the on-call team. Overall patient satisfaction was excellent, with 63% 'very satisfied' and 36% 'satisfied'. Only one patient was not satisfied due to feeling rushed on discharge.

Conclusions: From this study we demonstrate the ongoing suitability of performing vaginal repair surgery in the day surgery setting, without compromising patient satisfaction. In addition we have shown that the admission rate has fallen from 13.8% in 2013 to 7% in 2014.

A11 Improving Day Surgery Rates For TURBT By Giving Mitomycin-C In Theatre: It's All In The Timing

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Objectives: EAU guidelines state that all new superficial bladder cancer patients should receive a single treatment of intra-vesical mitomycin-C within 6 hours of surgery[1] (trans-urethral resection of bladder tumour TURBT). The objective of this audit was to determine whether this standard was being met, and whether changing our practice with the introduction of the surgeon giving mitomycin-c in theatre would have an impact on the percentage of patients we were able to discharge as day-cases.

Method: We performed retrospective and repeat prospective clinical audits, either side of our change in practice, to determine whether we were meeting the EAU guidelines, and to investigate the percentage of patients who were managed as day cases.

Results: Retrospective audit (08/2011-08/2012) identified 52 patients - 8% of patients received mitomycin-C within the recommended 6 hours post-TURBT and 11% were day-cases. Post change prospective audit (10/2012-04/2013) identified 46 patients - 98% received mitomycin-C within 6 hours and patients managed as day case increased to 46%. A re-audit (01/2014-12/2014) identified 86 patients - 100% of patients received mitomycin-C within 6 hours and 48% of patients were managed as day cases. Delivering mitomycin-C after 16:00 dramatically reduced day-cases from 48% to 14%.

Conclusions: Giving mitomycin-C in theatre has improved our EAU guideline 6-hour compliance rates to 100%, and day-case rates to nearly 50%. Timing of the operation is important; delivery of mitomycin after 16:00 significantly reduces day-case discharges.

Mitomycin-C should be given in theatre immediately post operatively, and before 16:00, in order to increase compliance to EAU guidelines and to maximise day-case management of patients with newly diagnosed superficial bladder cancer. Patients should be proactively scheduled as day-cases unless co-morbidity, or social situation preclude this.

References:

[1] Babjuk M et al. *Eur Urol* 2011 Jun;59(6):997-1008.

A12 Optimising Inguinal Hernia Repairs For Both Patient And Hospital

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Introduction: BADS has advocated that 95% of inguinal hernias can be repaired as a daycase using different choices of anaesthesia, mesh and surgical techniques. HES data for 2013-4 shows that the current daycase rate is 69.6%, thereby incurring additional costs and inpatient stays. While bilateral, recurrent and groin hernias in women should preferentially be repaired laparoscopically, NHS tariff provides little indication of the most cost-effective care solution.

Objectives: We have therefore developed an electronic application ('App') to facilitate evaluation of the costs of inguinal hernia repair, together with the ability to influence overall rates within a fixed fiscal envelope.

Method: The app was designed to assess the cost-effectiveness of the various approaches to inguinal hernia repair, calculating the current cost and income for each English trust, allowing variables such as current daycase rate, type of repair and anaesthetic technique to be modified. A recalculation facility is available, allowing individual trusts to set their own aspirational data against pre-determined information to envisage more cost-effective scenarios for both the proportion and type of repairs.

Results: We found that all inguinal hernia repairs performed as a daycase are cost effective, but the cost of an inpatient laparoscopic repair may exceed tariff income. Daycase open repairs under local anaesthesia generate the greatest revenues, and can compensate for other more expensive options within the surgical programme.

Conclusion: This app empowers both clinician and manager to provide the best inguinal hernia repair for individual patients, while ensuring that the overall hernia programme is cost effective. The application will be released to the iOS (Apple) platform imminently, thereby improving both the cost and efficiency of inguinal hernia management.

References:

1) BADS Directory of Procedures, 4th Edition, BADS, London, 2011.

A13 Bleeding Patients: Four Years On, Still Not NICE. Are Pre-Operative Investigations Undertaken In Accordance With NICE Guidance?

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Objectives: Pre-operative investigations are an important element of assessment and optimisation of patients awaiting elective surgery. They should, however, be used rationally and only when their results have the potential to change management, according to recommendations provided by NICE. This was a follow-up to an audit done in 2011.

Method: Audit data was collected retrospectively regarding which pre-operative investigations were conducted prior to patients undergoing elective day-case surgery during the same week in September 2014. 50 patients' records were assessed from multiple specialties, including electronic scanned paper notes from the day of surgery, as well as electronic pathology and radiology results. The tests undertaken were then compared with NICE guidance CG03 (Pre-Operative Tests - June 2003) on investigations, ASA grading and severity grading of surgical procedures.

Results: Of the 50 patients included in the audit, 21 (42%) patients' investigations were compliant and 29 (58%) patients' investigations were not compliant with NICE guidance. Of the non-compliant patients, 24 (83%) had at least one unnecessary investigation; 4 (14%) did not have investigations which were recommended by NICE; 1 patient (3%) had both unnecessary and missed investigations. The most common unnecessary investigations were FBC and INR assessment. Gynaecology was the least compliant specialty (20%), while Max Fax/ENT had the best compliance (60%).

Conclusion: A large proportion of patients continue to have unnecessary pre-operative investigations. A significant number did not have recommended tests although no patient was cancelled or had any complication peri-operatively due to this reason. Unnecessary investigations cause patients distress, such as pain and anxiety associated with phlebotomy. There are also significant cost implications to the Trust considering the high volume of investigations performed.

Reference:

- 1) Pre-Operative Investigations –The use of routine preoperative tests for elective surgery June 2003. [Online] <http://www.nice.org.uk/guidance/cg3>

A14 Day Surgery Tonsillectomy In A District General Hospital; A Retrospective Audit Of Performance

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Objectives: The 2013 Royal College of Surgeons Tonsillectomy Commissioning Guide suggests that tonsillectomy surgery can safely be performed as a day case procedure and that this should be the expectation.^{1,2} This, however, is not common practice within NHS Wales. In 2014 the Royal Gwent Hospital was the first hospital in Wales to perform tonsillectomy surgery as a day case procedure. This audit reviews the performance of this newly implemented pilot service and aims to determine its success and potential areas for improvement.

Methods: All patients who had undergone tonsillectomy surgery as a day case procedure within the first ten months of this service being available were identified. A retrospective case review was performed in order to determine demographic data, adherence to a proposed intra-operative anaesthetic protocol, unplanned admissions and any potential anaesthetic related complications.

Results: During the study period 15 patients underwent day case tonsillectomy surgery. The mean age was 25 years old. Deviation from the intra-operative protocol without documentation of clinical indication occurred in 2(13%) cases. There was 1(6%) incident of unplanned admission. This was due to post-operative nausea and vomiting. There were 2(13%) cases of re-admission. Both of these occurred more than 48 hours post-operatively, and of these, one was a post-tonsillectomy haemorrhage that returned to theatre.

Conclusions: Anaesthesia for day case tonsillectomy surgery can be safely performed within this clinical setting. Despite low numbers of patients the incidence of unplanned admission rates is low. The proposed protocol appears to be a success in preventing anaesthetic related post-operative complications. Further suitable patients should be considered for tonsillectomy surgery as a day case procedure.

References:

1. Royal College of Surgeons. Commissioning Guide- Tonsillectomy. London: Royal College of Surgeons England;2013
2. Tewary AK, et al. The Journal of Laryngology & Otology 1993; 107:706-708

A15 How Often Does Venous Thromboembolism Occur After Day Surgery And Is The Number Of Risk Factors Associated With Increased Risk?

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Objectives: In 2010 NICE recommended chemical thromboprophylaxis (TP) should be offered to day surgery patients having a general anaesthetic (GA), at risk of venous thromboembolism (VTE).¹ However, there is limited evidence regarding the incidence of VTE and predictive risk factors in day surgery patients. Previous local review had shown that 50% of day case patients had one or more risk factors for VTE. All patients with risk factors were offered anti-embolism stockings and from 2011, patients with previous history of VTE were offered 5 days heparin postoperatively.

We analysed all cases of VTE following GA day case surgery at the Norfolk and Norwich University Hospital over a 5 year period to identify the incidence of VTE and associated risk factors.

Method: A root cause analysis was performed on all cases of hospital acquired thrombosis within 90 days (HAT) following GA day case surgery from August 2009 to April 2014. Non-fatal cases of VTE were identified through the outpatient VTE and inpatient anticoagulation services, and cases of fatal VTE from death certificates and post-mortem records.

Results: 57,000 patients underwent day case surgery under GA. Thirty-seven cases of HAT were identified (pulmonary embolism 14, 1 fatal; proximal deep vein thrombosis 18, distal deep vein thrombosis) with an overall incidence of <7 in 10,000. The number of risk factors identified were: none (five patients); 1-4 (30 patients); five (two patients). Nine patients had VTE after 825 GA varicose vein operations, with an incidence of 1 in 100 cases.

Conclusions: The incidence of VTE following day case surgery was <7: 10,000. The presence of increased number of risk factors does not seem to predict increased risk of VTE. Varicose vein surgery had a higher incidence of VTE than other procedures combined.

Reference:

1. NICE. Venous thromboembolism: reducing the risk (CG92). London: NICE (2010).

A16 Is Spinal 1% Chloroprocaine More Cost Effective Than GA For Day Case Surgery?

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Background and aims: In summer 2013, preservative free 1% Chloroprocaine was licensed for spinal use in the UK. The aim of our audit was to establish if spinal 1% Chloroprocaine can be considered as an alternative to a quick general anaesthesia within day surgery and if it is cost effective?

Methods: 446 patients received spinal anaesthesia with 40 mg of 1% Chloroprocaine, 285 patients received GA over a period of 16 months. Spinal anaesthesia were performed within Emersons Green and Barlborough Care UK NHS treatment centre and in the Derbyshire NHS trust and Nuffield hospital. General anaesthesia were given within the two Care UK hospitals.

Patients included were ASA 1 to ASA 3, BMI < 40, age was not an exclusion criteria. Ambulatory patients for orthopaedic, general surgery, gynaecology and urology procedures were included

Results: The surgical time was between 3 and 70 minutes. The average patient discharge time after the end of surgery was 83,5 min for the Chloroprocaine cohort, 95.3 for the GA cohort. No significant side effects were reported. In the GA group 74 patients needed rescue analgesia in Pacu

Conclusion: With Spinal 1% Chloroprocaine discharge time can significantly be reduced, patient throughput potentially increased. Chloroprocaine 1% is safe, reliable providing a predictable duration of sensory and motoric block appropriate for ambulatory patients

Cost Comparison shown that Spinal 1% Chloroprocaine is a valid alternative to general anaesthesia and it is cost effective

Reference:

- Camponovo. Acta Biomed. 2014 Dec 17;85(3):265-8.

A17 MRSA Screening In Day Case Surgery

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Objectives: MRSA carries with it the risk of severe nosocomial infections. Patients are screened on admission to hospital to minimise these risks, including those attending for elective day case surgery. We carried out a retrospective study to determine the cost effectiveness and appropriateness of universal screening of day case patients.

Methods: We searched the MRSA screening results of all day case patients between October 2012 and September 2014. This included data for nose and groin swabs from 616 patients, giving 1232 results in total. The data to be analysed for trends in positive results, in order to determine whether there were any common characteristics amongst patients with positive swabs, and whether a targeted screening approach for high risk patients would enable a higher detection rate proportionately and low rate of positive results in the group not screened.

Results: All 1232 MRSA swabs were negative in the time period investigated.

Conclusions: With no positive MRSA swabs over a two-year period, we concluded that screening may not be appropriate for all day case patients. We therefore proposed that targeted screening as recommended by the August 2014 Department of Health guidelines may be better suited and more cost effective. The extend the study will include a longer time frame in order to determine more conclusively whether screening is cost effective.

References:

- 1) Implementation of modified admission MRSA screening guidance for NHS (2014) Prepared by ARHAI MRSA Screening Implementation Group. 18 August 2014. Available at <https://www.gov.uk/government/publications/how-to-approach-mrsa-screening>
- 2) Tuebbicke A, et al. BMC Health Services Research 2013. 12:438. [online] Cited Oct 9 2014. Available from URL: <http://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC3553071&blobtype=pdf>
- 3) Schonborn JL et al. *Journal of One-Day Surgery* 2014. 24(3):80-8

A18 Unplanned Admissions After Arthroscopic Knee And Shoulder Day Case Surgery In An Elective Orthopaedic Hospital.

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Objectives: To address various reasons for the overnight stay of the shoulder and knee arthroscopic day surgery patients in an elective orthopaedic hospital.

Method: It was a retrospective study of knee and shoulder arthroscopic day surgery procedures between august 2012 to February 2013 at an elective orthopaedic hospital. The patients who underwent open knee, shoulder procedures, Hand surgery, Foot and Ankle surgery were excluded. Patient clinical case notes were reviewed.

Results: In total 689 patients underwent day case surgery procedures from August 2012 to February 2013. There were 104 patients stayed overnight, 15% of all procedures. Out of 104 patients 79 case notes were retrieved. Average age of the patient was 51.4 years.

Meniscectomy constituted 30% of cases, subacromial decompression 25.3%, 18.9% of patients had rotator cuff repair, Anterior cruciate ligament reconstruction was done in 10.1%, Superior Labrum tear Anterior and Posterior repair in 6.3%, diagnostic knee arthroscopy in 3.7%, and diagnostic shoulder arthroscopy in 1.2%.

Anaesthesia related conditions accounted for 40.5% staying overnight patients waiting for the physiotherapy was 20.25%, Patients admitted because of inadequate pain relief was 8.8%. Medical reasons like chest pain, previous history of deep vein thrombosis were found in 7.5 % of admissions. Post operative bleeding, returning late from the theatre and social reasons like alone in the home all these three factors accounted for 5% each respectively. No reasons could be found in 2.5% of patients.

Conclusion: Anaesthetist need to look whether there are any recurring anaesthetic technique and drug issues which results in nausea, vomiting or giddiness in the post operative period. The day case unit needs to follow a set of guidelines from British association of day surgery, before posting the patients for the day surgery procedures and provision of physiotherapy on same day.

A19 Audit Of Pre-Operative Blood Tests For Day Case Surgery In Torbay Hospital

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Objectives: Pre-operative blood tests may provoke anxiety and discomfort to patients, incur significant cost and should not be performed without indication. A pilot study by Chung et al¹ demonstrated no increase in adverse outcomes by eliminating all preoperative investigations. We performed an audit to determine if day surgery patients were being tested in accordance with trust guidelines and to ascertain if any of those tests resulted in changes in management. The standard we used was that no patient should have blood tests without indication.

Method: A retrospective audit was performed on 100 consecutive patients using data from our electronic patient records, Galaxy (@CSC) and Anaesthesia Manager (@PICIS). We reviewed the patient's history and scheduled operation and compared the blood tests taken with our hospital guidelines.

We also verified whether any action was taken as a result of the blood tests and recorded post-operative complications.

Results: 100 patients were analysed. 10 patients had pre-operative blood tests taken. All were indicated by our current guidelines, with the exception of one patient who had an additional test requested. No patients who had blood tests had a change in management. 3 patients who should have had blood tests had no tests taken; none of these had any adverse perioperative events.

Conclusions: No patients had unnecessary blood taken when compared with our guidelines.

The numbers in our audit are low preventing meaningful statistical analysis but results are in line with Chung's study. We believe that a large study is indicated to ascertain whether guidelines for blood tests could be altered to reduce or even eliminate the number of patients tested prior to day case surgery.

Reference:

1. Chung F et al. *Anesth Analg* 2009;108:467-75.

A20 Day Procedure Survey: Self Care Post Discharge At The Norfolk And Norwich University Hospital (NNUH)

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Objectives: In line with established practice the NNUH require patients being discharged after a day procedure to be accompanied by a responsible adult for 24 hours. Recent RCOA guidelines¹ state, that this is not essential for every patient having a general anaesthetic (GA). Evaluating the need for day patients to have 24 hours supervision post-operatively is topical².

1. Evaluate whether patients felt they needed a carer present for 24 hours post-operatively

2. Develop a policy to enable selected patients to be discharged home after day surgery under GA without a carer present

Methods: After audit project approval, a survey was sent postoperatively to 100 randomly selected day procedure patients deemed suitable for discharge without carer (laparoscopic or airway surgery excluded), over a 3-week period.

Results: 64 forms were returned. 8 were excluded (unplanned overnight stays or laparoscopic procedures). 56 responses were analysed (28 female and 28 male). 23 (6 females and 17 males, 41%) stated they did not require a carer for 24 hours post-operatively. Of the 5 males that lived alone only 1 required assistance.

Conclusions: Most patients have someone to care for them postoperatively. However, those that live alone may not wish to have a carer or are unable to arrange one, leading to hospital admission. In 2014 the NNUH DPU had 76 patients stay overnight as they lived alone. This has an impact on inpatient bed capacity and patient satisfaction. As a result a policy has been developed to allow certain patients having particular procedures to be unsupervised at home post discharge. Patients who would prefer care but are unable to arrange, will be offered an overnight bed.

The new policy has been introduced and is being evaluated.

References:

- 1) *Guidelines for the Provision of Anaesthetic Services*. RCOA. GPAS 2014.
- 2) Wessels F, et al. *Journal of One Day Surgery* 2015;25.1:17-3.

A21 The Use Of Day Surgery For Emergency Abscess Management

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Objectives: We aimed to audit a new emergency day case pathway for surgical management of abscesses, comparing the 12 months of data since the introduction of the pathway against the preceding year.

Method: Patients attending for surgical management of an abscess between 2013 and 2014 were identified using the trust electronic management system. We then compared the location of their surgery against duration of stay.

Results: 308 patient records were identified with 152 undergoing surgery in 2013 and 156 in 2014. Prior to the introduction of the emergency day case surgery pathway 6.6% [n:10] of patients underwent surgical management of their abscess in the day case environment compared to 27% [n:42] in 2014. The median length of stay for patients completing their surgery in the day case environment was 7 hours 34 minutes [5 hours 24 minutes - 9 hours 27 minutes] against a median stay of 49 hours 8 minutes [24 hours 7 minutes - 135 hours 8 minutes] for in patients.

Conclusions: This audit demonstrates a four fold increase in patients undergoing emergency day case abscess management since the introduction of the pathway. This represents a saving of 86 in-patient bed days, demonstrating improved productivity for the trust and reduced duration of stay for the patient. Despite this the majority of patients continue to be managed through the inpatient pathway. The observed 27% of patients managed through the day case environment falls short of the British Association of Day Surgery estimate of 95% for management of incision and drainage of skin abscess [1]. The barrier preventing patients benefiting from the enhanced care afforded through use of Day Surgery for emergency abscess management needs to be examined.

Reference:

- 1) *Directory of Procedures*, 4th Edition. British Association of Day Surgery, 2012. ISBN 978-1-908427-04-5

A22 To Evaluate How Much Theatre Capacity Can Be Freed By Provision Of An Out-Patient Service For Minimal Access Benign Gynaecological Procedures

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Introduction: Technological advances have enabled procedures such as hysteroscopic sterilisations (Essure), fibroids and polyp resections, endometrial ablations and hysteroscopies to be performed under local anaesthetic. This should free capacity in our Day Procedure Unit (DPU) theatre for other GA procedures previously carried out via in-patient theatres.

Objectives: To study the feasibility of undertaking minimal access gynaecology procedures in an outpatient setting and to evaluate the potential theatre capacity freed up by studying the throughput of an out-patient gynaecology service over a 42.5 week period at Norfolk and Norwich Hospital

Methods: Data was collected retrospectively using consultant log book, theatre lists and outpatient service records from April 2014 –Feb 2015 (42.5 weeks).

Results: During the study period 66 Essures, 19 fibroid and polyp resections, 23 endometrial ablations, 14 outpatient hysteroscopies and 7 other minor procedures were performed in out-patients, total of 129 procedures, a saving of 21.5 DPU theatre sessions.

120 sterilisations, 113 endometrial ablations, vulval cyst excisions and other local procedures and 82 polypectomies and fibroid resections (315 procedures) were done in DPU theatres in study period.

Conclusions: Performing a range of procedures is feasible in an outpatient gynaecology clinic. In the first year the out-patient gynaecology service at NNUH carried out 66% of all sterilisations and combined with other LA procedures freed 21.5 DPU theatre sessions. If all potential cases were moved to an out-patient service this would free 52 DPU sessions per year.

Patients seen at the follow up scan appointment after hysteroscopic sterilisation were also quite satisfied with the service provided.

Reference::

- 1) Hysteroscopy, Best Practice in Outpatient (RCOG Green Top guideline No. 59).

A23 Late Conclusion Of Surgery As The Commonest Cause For Unplanned Day Case Admissions

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Objectives: The Association of Anaesthetists of Great Britain and Ireland and British Association of Day Surgery guidelines¹ suggest that day case surgeries are performed in dedicated day surgery units aiming to ensure less than a 2% unplanned admission rate². Due to organizational changes in the Trust, day surgeries are being scheduled alongside major surgeries, with consequent increase in unplanned admissions.

In this audit, the causes of 61 unplanned admissions, reported through Datix over 6 months are explored.

Method: This retrospective case note audit was based on The Royal College of Anaesthetists 2012 audit recipe 5.62 and focused on General Surgery, Orthopaedics and Gynaecology, identifying and categorizing the causes for each unplanned admission.

Results: The male / female ratio was 19/42 (31/69%) ranging in age from 17–88 years distributed across General Surgery (32/61), Orthopaedics (23/61) and Gynaecology (6/61), undergoing surgery lasting 11–193 minutes.

1. Nineteen patients stayed overnight due to inadequate recovery time as the surgery finished after 1800 hours.
2. Persistent post-operative pain due to inadequate intra-operative analgesia was the main cause of delayed recovery in 24 patients, with 11 patients needing overnight admission.

3. Thirteen of 14 patients who had post-operative nausea and vomiting did not receive any anti-emetic intra-operatively. Only 2 patients needed overnight admission.
4. The other causes for delayed discharge were urinary retention (4), inability to undergo physiotherapy (9), prolonged neuraxial anaesthesia (4), social causes (2), and inappropriate discharge management (6).

Conclusions: Late finish of surgery (beyond 1800 hours) with lack of recovery time led to 30% of unplanned admissions (19/61). Persistent post-operative pain accounted for 18% of unplanned admissions (11/61).

References:

1. Verma R, Day case and short stay surgery 2, *Anaesthesia* 2011; 66:417–434.
2. M. Stocker, Royal College of Anaesthetists; Raising the Standard: A Compendium of audit recipes, 3rd Edition, 2012.

A24 Voiding Related Delays In Discharge. Can They Be Avoided?

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Introduction: Protocol-based discharge criteria have evolved and streamlined the discharge process for day surgery patients. In some centres, voiding before discharge is no longer an enforced discharge criterion in low risk patients. However, many centres still require all patients to void after surgery, leading to unnecessary delays in discharge and unplanned overnight admissions¹

Objectives: To identify the number of patients who develop post-operative urinary retention (POUR) following day-case surgeries and to enable review of local guidelines on voiding before discharge.

Methods: We conducted a retrospective cohort study for all day surgery patients at Milton Keynes hospital from October 2014 to February 2015 in general surgery (excluding urology). High risk patients were defined as those who had groin hernia/anal surgery and spinal/epidural anaesthesia²

Results: A total number of 616 general surgical cases were performed during this period. Of these, 78(12%) required an unplanned overnight stays, out of these 7 developed POUR; which is 1.14% of the total day case surgeries. Male: Female ratio was 6:1 with a mean age of 62; 3 Patients had cholecystectomies and 4 hernia repairs (one femoral and three inguinal). In the low risk group, 3(2.1%) out of 139 patients developed POUR, whilst in the high risk group 4(0.8%) out of 473 patients developed POUR, p=0.196 using chi-squared test. All patients had general anaesthesia and no risk factors were detected in patients developed POUR.

Conclusions: Our results show that there is no significant difference between high and low risk groups. This begs the question whether we should discriminate between the two groups when deciding to use voiding as a discharge criterion. We feel there is room to develop guidelines which will improve the discharge rate of patients and prevent unnecessary overnight stays.

References:

- 1 Verma R.et.al. Daycase and short stay surgery:2, *Anaesthesia* 2011;66:417–434.
- 2) Baldini.et.al. *Anaesthesiology* 2009;110;1139–57.

B1 Daycase RALP – The Ultimate Form Of Enhanced Recovery For Radical Prostatectomy

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Objectives: Despite the widespread adoption of robotically-assisted laparoscopic prostatectomy (RALP), average length of stay (LOS) in England remains 2.9 days. Enhanced recovery pathways (ERP) have demonstrated significant patient and organisational benefits leading to earlier discharge from hospital. Key components of a daycase ERP for RALP are described.

Method: 396 patients underwent RALP (Jan 2013 - Dec 2014). 15 patients were identified pre-operatively by the operating surgeon and anaesthetic team to be suitable for planned daycase surgery (medical assessment, social circumstances and patient choice).

Suitable patients were placed first on the operating list and underwent pre-op counselling, carbohydrate loading, standardised anaesthetic and analgesic regimes coupled with planned early mobilisation.

Data was collected prospectively on the BAUS (British Association of Urological Surgeons) complex operation dataset for prostatectomy. Re-admissions were screened for retrospectively. Patient perception of daycase RALP was prospectively evaluated.

Results: 13/15 patients successfully underwent daycase RALP. Mean age was 67 years (range 63 - 72). Median PSA at diagnosis was 8.2 ng/ml (range 5 - 22.8). All patients were ASA grade 1 or 2 and all operations had < 300 mls blood loss. Median operating time was 2 - 2.5 hours. All patients lived within 60 minutes of the hospital. 30-d readmission rate was zero.

Conclusions: At the time of submission, this is the first reported series of robotically-assisted daycase prostatectomy. With appropriate case selection and a dedicated ERP in place, selected patients can safely undergo ambulatory surgery, representing the ultimate form of enhanced recovery.

B2 Daycase Super-Efficient Operation Lists: Are 6 Laparoscopic Cholecystectomies Per Session Feasible?

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Objectives: Running a daycase laparoscopic cholecystectomy (LC) list within tariff is difficult. Increasing the number of patients per session is cost-effective^{1,2}. We set up daycase laparoscopic cholecystectomy lists to carry out six LC per 4 hour theatre session.

Method: We developed a dedicated rapid-access biliary clinic to select appropriate patients using simple criteria. Between September 2012 and January 2014, 56 patients (19 male) underwent daycase LC on these lists.

Results: We carried out ten super-efficient LC lists over the 16-month period. The median (range) age, ASA, and BMI was 54 (21-80) years, 2 (1-3), and 29 (18-49) kg/m², respectively. 15/56 (27%) patients had preoperative cholecystitis, and two were urgent LCs. The median (range) operating time and length of operating session was 24 (11-52) and 230 (184-283) minutes, respectively. No intraoperative or postoperative complications were encountered and no conversion to open surgery. The median (range) postoperative hospital stay was 199 (131-587) minutes, excluding 2 patients; one had a planned and another had an unplanned overnight stay. There were no readmissions. The generated income more than offset the cost of the additional theatre personnel (an extra anaesthetic operating department practitioner).

Conclusions: Daycase super-efficient LC lists (6 cases per theatre session) are safe and feasible in comparison to the standard practice (3 LC per session). They increased surgeon utilisation, reduced waiting time, and improved revenue. Excellent theatre team work is the cornerstone in establishing safe and successful high volume LC lists, continuing them may necessitate staff incentives.

References:

1. Stahl JE, et al. *Med Decis Making* 2004; 24: 461-71.
2. Macario A, et al. *Anesth Analg* 2001; 93: 669-75.

B3 Day Surgery: Culture And Readiness For Change

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Objective: Our dedicated day surgery unit serves a small, remote community. Analysis of activity over a 3-year period from 2011 identified significant room for improvement when compared with British Association of Day Surgery (BADS) Directory of Procedures 2012¹.

The aim was to assess staff attitudes to change in a 'green-field' site. Would culture eat strategy over breakfast?

Method: NHS Institute for Innovation & Improvement, Transforming your Day Surgery Services² Culture Kit was selected to assess readiness of staff for change.

Under six broad headings: Performance, Team working, Clinical leadership, Finance, Information, and Innovation, respondents were asked to select which of 5 statements most accurately reflected their current working environment.

The following staff groups were selected: anaesthetists, surgeons (general, urology, ENT, orthopaedic, gynaecology), pre-assessment (administrative), Day Unit Ward, theatre and recovery, and managers.

Results for each group were analysed separately. The most frequent response in each category was plotted on a spider diagram. The wider the shape on the spider diagram plot the more open a particular group is towards change.

Results: Within each group of respondents results were surprisingly consistent. Anaesthetists and surgeons were least open for change. Theatre and recovery staff were most open to change.

Conclusions: Many respondents found the selectable responses difficult to understand in the local context. This is probably due to lack of exposure to change unlike NHS staff. The culture tool has indicated that most staff groups have not started the 'change' journey. It will be a challenge to overcome established work practices in our quest for improvement.

References:

1. BADS Directory of procedures, Fourth Edition 2012
2. Transforming your day surgery services kit: focus on cholecystectomy www.institute.nhs.uk 2011

B4 Does Intravenous Lidocaine Reduce Opioid Requirement After Ambulatory Gynaecological Laparoscopy? A Randomised Controlled Trial

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Objective: Does single bolus IV lidocaine reduce opioid requirements and time to discharge after ambulatory gynaecological laparoscopy?

Methods: Sixty ASA 1–2 adult female patients undergoing elective ambulatory gynaecological laparoscopy were recruited. Patients were randomised to receive intravenous 1% lidocaine 1.5mg/kg or 0.9% normal saline 1.5ml/kg at induction of anaesthesia. Anaesthetic management was standardised. Patients received paracetamol 1g and diclofenac 75mg. Intravenous fentanyl was titrated to pulse and blood pressure. If required, rescue fentanyl was given in PACU and Oramorph was given in second stage recovery. Fentanyl requirement, oramorph use, time to discharge, post operative nausea and vomiting and side effects were recorded.

Results: Two patients were excluded due to surgical complications and one for protocol breach. Groups were comparable in age, weight, ASA grade and length of operation. 28 patients received saline, 29 lidocaine. Mean IV fentanyl consumption: 125mcg vs 135mcg (lidocaine vs saline group, $p=0.355$). Mean oramorph consumption: 3.8mg vs 5.7mg (lidocaine vs saline group, $p=0.311$). Mean time to discharge: 2hrs 47mins vs 3hrs 2 mins (lidocaine vs saline group, $p=0.276$). No significant differences in postoperative nausea and vomiting rates. No serious side effects noted.

Conclusions: Previous research suggested lidocaine provides significant benefit in gastrointestinal laparoscopic procedures when given as a bolus dose followed by infusion.¹ We investigated whether this benefit could be reproduced with a single bolus before ambulatory surgery. Patients who received lidocaine had a lower opioid consumption and a shorter time to discharge. However, these differences were not statistically significant. The study was powered to detect such differences. Lidocaine does not reduce analgesic requirements or time to discharge when given as a single bolus dose.

Reference:

1. McCarthy GC, et al. *Drugs*. 2010 Jun 18;70(9):1149–63.

B5 Spot The Difference – A Quality Improvement Initiative And Audit To Improve Medication Adherence Post Cataract Surgery

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Objectives: Reduce medication risk- preventing wrong identification of medication by patients and preventing missed or inappropriate dose administration. Improve adherence to medication and patient understanding of medication prescribed post cataract surgery.

Method: The specific area of focus for improvement was the dispensing process in particular the labelling of medication and information provision- how could this be improved so that patients can read and understand the information post cataract surgery especially given that their vision may still not be 100%?

It was decided the most feasible option was to introduce a system of coloured dots for each eye drop and placing the dots both on the bottle and box of the product whilst still retaining the usual dispensing label. In addition to the dots, large printed sheets were provided; these sheets corresponded to each coloured dot and contained the following information: drug name, what the drug is for and how often to use it. There was also a helpline number in case of any enquiries.

Once the changes were implemented, an audit was carried out across 2 sites (Emersons Green and Devizes NHS Treatment centres). The audit consisted of 6 questions and a total of 100 patients were questioned over 2 months

Results: Each audit question scored above 90%.The results demonstrated that patients: Know how to use the eye drops. Know what each drop is for. Know when to use each drop. Can easily identify the eye drops. Found the information less confusing. Found the medication process easier overall.

Conclusions: Whilst this initiative may not seem like a massive technological advance it is an example of how MDT working can provide a simple effective solution in order to enhance medication safety and improve the patient experience.

B6 STOP BANG Testing And Obstructive Sleep Apnoea In Day Surgery Patients; Review Of Patient Outcomes.

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Objectives: Undiagnosed obstructive sleep apnoea (OSA) potentially causes perioperative airway problems. Day Surgery pre-operative assessment noted higher body mass indexes (BMI), a risk factor for OSA. For safe day surgery we developed a system using the STOP BANG questionnaire¹ (validated in predicting OSA pre-operatively) to refer for formal testing and sleep clinic review. Mild OSA patients proceeded to day surgery. Moderate and severe OSA, if established on Continuous Positive Airway Pressure (CPAP) treatment for 3 months could also proceed. Outcomes were audited.

Methods: Patients sent for OSA testing were reviewed with OSA severity and any CPAP noted. Outcomes of successful day surgery or overnight stay were determined with reasons. Severe OSA was defined as oxygen desaturation index (ODI) over 30, moderate OSA; 15-30, mild OSA; 5-15.

Results: 168 records found and 105 (63%) diagnosed with OSA. 22 (13%) severe, 29 (17%) moderate and 54 (32%) mild OSA. 3 patients did not attend testing and 1 had no records. 44/54 (81%) with mild OSA were successful day cases. 14/29 (48%) moderate OSA (8 on CPAP, 5 under regional block) and 18/22 (82%) severe OSA (17 on CPAP) had successful day surgery.

Conclusions: 63% of patients tested had OSA (30% moderate or severe) which is clinically significant for anaesthesia. Over 80% of mild and severe OSA (usually on CPAP) patients were successful day cases as was our aim. Moderate OSA gave lower day surgery rates, probably as reduced numbers accepted CPAP treatment (having low Epworth scores)so perceived no benefit. Anaesthetists felt untreated patients unfit for day surgery if longer operations or needing stronger opiates.

Our success reflected the equal percentage mild and severe OSA being successful day surgery patients.

References:

- 1) F Chung. *Br J Anaes* 2012. 108(5);768–775.

P1 Accuracy In The Provision Of Postop Contact Telephone Numbers

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Objectives: Safe and effective day surgery requires patients be provided with a telephone number in order to seek help from appropriate persons in the event of complications following discharge. The contact telephone numbers for the Day Treatment Centre (DTC) at the Whittington Hospital are available from a number of sources, including pages on the hospital website and a multitude of information leaflets relating to different procedures across specialties. In May 2014, following a complaint from a patient, a study was undertaken to collect together all the different contact telephone numbers available online and on paper to determine their accuracy.

Method: Telephone numbers were extracted from all available patient leaflets, together with the Whittington Hospital's webpages relating to the DTC. Within a one week period, these numbers were dialled and the individual answering the phone was asked to confirm that they were appropriate staff in the DTC to respond to patients' concerns. If there was no answer initially, the number would be dialled on another four occasions on two different weekdays.

Results: Thirty five sources of information (paper and electronic) yielded twenty-two telephone numbers. From only six (17%) sources were the provided telephone numbers accurate, the large majority connecting to other areas of the Trust or were not valid phone numbers at all.

Conclusion: This study demonstrated that the large majority of contact telephone numbers, available from patient leaflets at the Whittington Hospital, were outdated and incorrect. Now at the point of discharge, nursing staff offer an accurate telephone number for contacting the DTC. There is ongoing work to update patient information.

References:

1. Verma R, et al. *Anaesthesia* 2011; 66: 417–434

P2 A Prospective Review Of Ultrasound-Guided Axillary Brachial Plexus Block For Elective And Emergency Forearm Or Hand Surgery

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Objectives: Our objective was to review the quality of intra-operative and post-operative analgesia, and survey patient's satisfaction to ultrasound(USS)-guided axillary brachial plexus(ABP) block.

Methods: Patients undergoing elective or emergency forearm/hand surgery in the period between 1st January 2012 to 30th May 2012 were included in this audit. All data was prospectively documented. Post-operative analgesia requirement and satisfaction data were obtained with a post-discharge phone call.

Results: All 49 patients received USS-guided ABP block with 28 blocks performed under USS guidance and 21 blocks were performed with USS and nerve stimulator guidance. 47 patients received a 50:50 mix of 0.5% levobupivacaine and 2% lignocaine with 1:200000 adrenaline and 2 patients received 0.5% levobupivacaine. The median surgical duration was 60 minutes. No patients required additional analgesia during the operation or in the recovery area. Median duration of analgesia was 14.75 hours, median time to first intake of oral analgesia was 16 hours, and median time to discharge from hospital was 4 hours. All patients were satisfied with the ABP block and the quality of post-operative pain relief.

Conclusion: We found that USS-guided ABP provided good quality analgesia and was well received by patients. O'Donnell et al showed that ABP block provides superior quality analgesia to general anaesthetic technique.¹ Chan et al found that USS guidance significantly improves the success rate of ABP block. We conclude that USS-guided ABP is a viable alternative to general anaesthesia for forearm/hand short stay surgery.

References:

1. O'Donnell B, et al. *Anaesthesia and Analgesia*. July 2009;109(1):279–283.
2. Chan V, et al. *Can J Anaesthesia* 2007;54(3):176–182.

P3 Are Group And Save Blood Samples Required For Hernia Repair?

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Objectives: Hernia repair is a very common procedure, increasingly being performed on a day case basis. This retrospective audit assesses the need for Group and Save samples taken prior to hernia repair at a district general hospital.

Method: Using medical records, patients who had a hernia repair on a day case basis between January and December 2014 were identified. These patients were categorized according to the type of hernia repaired. The medical laboratory intranet website was then used to identify which patients had a Group and Save sample prior to their procedure. The same software was used to identify which patients required blood cross-match and transfusion postoperatively.

Results: 64 patients had hernia repair during aforementioned period (n=64). 4 patients were excluded due to incomplete casenotes. 45 patients had inguinal hernia repair (n=45), 7 had umbilical hernia repair (n=7) 4 had epigastric hernia repair (n=4) 3 had paraumbilical hernia repair (n=3) whilst 1 person had incisional hernia repair (n=1). All patients had a Group and save sample taken prior to the procedure. Only 1 patient required blood cross-match and transfusion postoperatively.

Conclusions: Hernia repair is an extremely safe procedure to be done on a day case basis. The routine Group and Save sampling prior to procedure is not justified. Bleeding risk prior to procedure still needs to be assessed however and patients at risk of bleeding during or after operation carefully monitored.

Reference:

- 1) Association of Surgeons of Great Britain and Ireland, London, Clinical Practice Guideline on Groin Hernias, [Internet, last updated May 2013; cited March 2015], Available from: <http://www.britishherniasociety.org/publications/>

P4 An Audit On Day Case Rate Of Elective Laparoscopic Cholecystectomies In A District General Hospital In The West Midlands

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Objective: To assess the elective laparoscopic cholecystectomy day case rate as compared with the BADS target of 60%. To identify contributing factors that could affect day case rate.

Method: Retrospective analysis was performed on data collected from the ResQ theatre database and electronic notes between 01/09/2013-31/08/2014 for all elective laparoscopic cholecystectomies. Data collected on 251 elective laparoscopic cholecystectomies included admission and discharge date, readmissions, start time of surgery, drain insertion and operating surgeon.

Results: The hospital had a day case rate of 46% compared to the BADS target of 60%. Significant differences were seen in the rate of day case surgery on morning lists; 57% compared with afternoon lists; 27% (p=0.012, significant p <0.05). Day case rates varied between operating surgeons along with their number of laparoscopic cholecystectomies performed per annum. Re-admission rates (less than 28 days) for both day case and non day case elective laparoscopic cholecystectomies were 0.4% for each. In both day case and non day case elective laparoscopic cholecystectomies 10% had drains in left in situ post operatively.

Conclusions: The trust is currently performing 14% below the BADS target of 60%. The data suggests that prioritising elective laparoscopic cholecystectomies onto morning lists would increase the day case rate. In addition day case units could remain open later in order to facilitate same day discharge from afternoon theatre lists. There seems to be an unclear correlation between surgeons operating number and day case rate. Drain insertion does not appear to affect day case rate.

References:

1. NHS Institute for innovation and improvement (2006). Delivering Quality and Value. Focus on: Cholecystectomy. DH London
2. BADS. *BADS Directory of Procedures*. 4th edition (2012)

P5 Robot-Assisted Laparoscopic Prostatectomy (RALP) In Wales, Early Anaesthetic Experiences.

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Objectives: RALP is an established treatment for localised prostate cancer. It offers a reduction in surgical bleeding and patient length of stay (LoS) ¹ amongst other benefits. In September 2014, Cardiff began RALP surgery using the da Vinci Xi system. Early surgical data is comparable to more established centres. The typical anaesthetic technique involves a combination of intrathecal opioid with a general anaesthetic.

The aim of this audit was to evaluate anaesthetic related outcomes from the early stages of Cardiff's RALP programme.

Method: Five months data (09/2014-02/2015) was collected from the UHW 'clinical portal', the Acute Pain Service database and patient notes.

Results: Forty four patients were identified. Full data was available for 30 (68%). Analgesia was required in recovery for eight of 33 patients (24%). Highest pain scores during the first 24 hours were: nil – six (20%), mild – 11 (37%), moderate – 12 (40%), severe – one (3%). Twelve patients (40%) required only regular

paracetamol, 18 (60%) requested supplementary analgesia; All patients received anti-emetic prophylaxis. None (0%) required anti-emetics in recovery and only four (14%) required any during the first 24 hours. The mean LoS was 1.6 days with a median of 1.5 days. Previous data showed a mean LoS of 3.6 days for open radical prostatectomy.

Conclusions: RALP surgery has been successfully implemented in Cardiff, using a standardised anaesthetic technique, with minimal morbidity. Compared to data from before the service was introduced, LoS following RALP has decreased. A majority of patients need no analgesia in recovery and report satisfactory pain scores post-operatively. Nausea and vomiting does not seem to be a particular issue despite the prolonged pneumo-peritoneum, pelvic surgery and steep Trendelenberg position.

References:

- 1) Prostate Cancer Advisory Group, *Advice on the Development of Robotic Assisted Radical Prostatectomy in England*, BAUS, 2012.

P6 “Our Procedure Suite”

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Objectives: To appraise our outpatient gynaecology procedure suite.

Since the birth of our outpatient gynaecology procedure suite, there have been many obstacles. As Nurses we have seen many of these changes, some diminished along the way and some flourish into new and exciting plans, all with the patient as the main focus.

Methods: One of our main concerns was the recovery period for each patient. All patients react to different procedures differently and this needed to be addressed. As a team we wanted to give each patient the necessary time and best care, while running an efficient service.

Prior to each procedure, information is sent out to patients providing details and advice pre and post procedure. This includes advice on taking oral analgesia like Paracetamol and Ibuprofen.

One of the nursing staff's main role is reassuring the patient. Known within our department as “vocal local” we aim to build a nurse-patient relationship as soon as the patient arrives. Local anaesthetic is at hand as well as Entonox, if needed. Oral analgesics are also available.

Results: As a small group of gynae nurses we have worked alongside our Gynaecology Consultants to develop once solely a Hysteroscopy procedure room into an expanded procedure suite which now sees an average of 40 patients per week for a range of procedures including Hysteroscopies, Essures, Novasures and Myosures.

There have been very few patients requiring extended recovery time of 10 minutes or more. Water as well as a hot drink and biscuits are offered to all patients post procedure in the recovery room where a bed and recliner are available.

Conclusions: Overall the procedure suite has been a great success not only to the department but the hospital as a whole and the whole nursing team have developed both individually and as a team.

P7 Regional Anaesthesia In Day Surgery - A Survey

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Objectives: Surgery under regional without general anaesthesia can be stressful for a patient, with anxiety under fear of surgery, anaesthesia, its complications, previous unpleasant experience of anaesthetics, or a predisposing personality¹. Previous “good” experiences of anaesthetics or surgery invariably mean a more relaxed patient². The aim of this survey is to report patients’ experience under regional nerve blocks, and changes in regional anaesthesia practice over the time.

Method: The clinician performing a peripheral nerve block completed details of the block performed on a patients’ feedback form. Patients’ experiences were then acquired and recorded by a nurse, over phone, on the next day and a week after. Data collected over the last 10 years between February 2004 and February 2014, was analysed.

Results: All-in-all 1094 records were analysed: about 50% had sedation; ~25% remained awake; ~15% had general anaesthesia. Upper limb blocks were performed in 1074 patients and interscalene for >50%. Majority of patients were pleased with the block, but few didn’t like it; post-op heavy-arm being most common. No change in local anaesthetics’ concentration but a significant reduction in volume was recorded over the years; it was reduced from ~40 ml to ~20 ml. Ultrasound was not mentioned before November 2006.

Conclusion: Adequate explanation of the benefits and risks, with constant communication and reassurance throughout the procedure, would establish rapport and alleviate fears. Although these measures are well-established methods to reduce patients’ anxiety – for example affirmation that the patient always “has the option to go to sleep if needed”, should not be underestimated to allay most anxieties³. In this survey, improvement in clinicians’ experience was evident by reduction in LA volume and ultrasound usage.

References:

- 1) T. Heidegger et al, bjaoxfordjournals.org/content/89/6/863
- 2) Adam M Boyd, et al, *Acute Pain* 03/2006; 8(1). DOI: 10.1016/j.acpain.2006.01.002
- 3) Hatem A Jlala, et al, www.dovepress.com/getfile.php?fileID=7342

P8 The Appropriateness Of Preoperative Bloods For Elective Orthopaedic Trauma Day Cases

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Objectives: The study sought to identify the incidence of preoperative blood tests incorrectly omitted or performed inappropriately in patients undergoing Minor or Intermediate (Grade 1 or 2) elective orthopaedic trauma daycase surgery at a large University teaching hospital.

Method: Patients with an ASA Grade of 1, 2, or 3, undergoing any elective orthopaedic trauma daycase procedure classified as either Grade 1 or Grade 2 surgery within the period August to October 2014 were identified through clinical coding and cross referenced using theatre logbooks. Each patient was evaluated based on their age, co-morbidities and grade of operation they underwent to assess what blood tests (if any) should have been undertaken based on the recommendations outlined in the NICE Clinical Guideline 3: Preoperative tests. This was compared to any blood tests the patient did undergo by consulting the ‘ICE Desktop System’ which records all patient investigation requests.

Results: 42 of 158 patients (27%) received an unnecessary blood test preoperatively whilst 13 patients (8%) had a blood test incorrectly omitted. This amounted to 131 individual inappropriate requests following an assessment of ASA grade and grade of operation. The highest number of inappropriate blood tests were performed in patients undergoing Grade 2 surgery who were ASA Grade 1 (21 of 42; 50%). A subset of patients referred via the Emergency Department team received arbitrary ‘sets’ of investigations including: FBC, U&Es, LFTs, CRP and glucose which were frequently unnecessary. African or Afro-Caribbean patients were generally under investigated. An additional problem identified was the high number of blood tests which were performed and not checked subsequently.

Conclusion: Significant numbers of patients undergoing elective orthopaedic trauma day case surgery are subjected to inappropriate preoperative blood tests. Greater awareness and understanding of existing NICE guidance regarding preoperative investigations would reduce unnecessary harm to patients and save NHS resources.

P9 What A Difference A Day Makes: A Systematic Approach For Continuous Improvement

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Objectives: Establish an environment of continuous improvement involving all day unit staff. Increase capacity. Increase breadth and quantity of day surgery procedures.

Method: Several improvement concepts were introduced to staff such as plan-do-study-act (PDSA) cycles¹, change management, process mapping, data collection, standardisation to excellence and patient focused care.

Suggestions for improvement were sought, assessed for impact, ease of change, financial consequence and then prioritized.

Regular meetings were established

Results: What a difference a day makes as PDSA cycles initiated: 1 Chairs not trolleys – increased capacity.

2 Discharge without need to pass urine – patient and nursing staff time saved.

3 Ward admissions from Day Unit – minimized.

4 Day Unit waitress – released nursing expertise.

5 Procedure information leaflets – better informed patients.

6 Minor theatre – better utilisation.

7 Communications – daily briefing.

8 Unified day surgery note keeping – reduced paper work.

9 Rationalise pre-packed take home analgesia – reduced waste

Conclusions: With effective leadership a small day unit, with no previous exposure to change management, has embraced a structured approach to continuous improvement. Capacity has been increased without needing extra physical space or trolleys. The foundation has been laid for expanding the type and numbers of day surgery procedures.

References:

- 1 Quality and service improvement tools, NHS Institute for Innovation and Improvement 2008

P10 Patients' Written Consent For Elective Surgery: A Retrospective Audit Of ENT Day Case Surgery At A Welsh Hospital

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Objectives: For consent to be valid the patient must (1) be competent for the specific decision; (2) have received sufficient information; and (3) not be acting under duress¹. As patients may be considered vulnerable on the day of the surgery, consenting then may be open to challenge and considered invalid². In the local ENT department, patients were routinely consented on the same day as their surgery. This Audit aimed to improve best practice around consent for elective surgery. The three objectives were: (1) Ascertain the proportion of patients consented on the day of their surgery, (2) promote best practice, and (3) re-audit to evidence any changes.

Method: In the first cycle, a retrospective analysis was completed. Case notes covering a three months period were reviewed. Results from this analysis led to recommendations, which were applied in the department for three months. Notably surgeons were required to consent patients whilst listing them for surgery. The second cycle took place in the form of a prospective analysis of cases over a 6 weeks period.

Results: 106 case notes were reviewed in the first cycle and 100 in the second. All patients had a signed consent form. Consent on the day of surgery dropped from 58.2% to 44.5%. In both cycles more than 90% of patients was invited to and attended the nurse led pre operative assessment clinic (POAC).

Conclusions: Minor procedural changes were shown to promote standards i.e all patients are consented prior to the date of their surgery. POAC is highlighted as an opportunity to further discuss the surgery, and consent if not already done in clinic at the time of listing.

References:

- 1) Anderson, et al, *Journal of Royal Society of Medicine*, 2007, 100(2), 97–100.
- 2) Berry, et al, *Annals of The Royal College of Surgeons of England*, 2008, 90(2), 150–152.

P11 Is Your Hospital At Risk Of Being Accused Of Not Providing Fair And Equitable Daycase Vein Surgery To Patients?

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Objectives: The majority of varicose vein procedures are performed in a day surgery unit. In our region, to be eligible for NHS treatment, patients must have Lipodermatosclerosis, skin damage, ulceration, a healed ulcer, bleeding from the vein, at least 2 episodes of thrombophlebitis or varicose eczema. Patients that suffer with symptoms such as pain and oedema alone are not eligible. It was not clear that all patients were treated within the criteria set by the clinical commissioning group (CCG) and therefore the hospital might have been accused of treating some patients unfairly. Our aim was to identify what proportion of patients who had a varicose vein procedure had documented evidence of the CCG criteria. The audit standard was set at 100%.

Methods: Data were collected for all patients that had daycase varicose vein surgery at a single centre between July 2013 and August 2014. Electronic clinic letters and operation notes were read to identify evidence that patients met the CCG criteria for NHS funded treatment.

Results: Some 309 patients were identified, of which 221 (72%) had documented evidence of eligibility. There was variation between consultants with a range from 79% to 55% of patients having documented evidence of meeting the criteria.

Conclusion: Up to 28% of patients might have been ineligible for NHS funded treatment and there was variation between consultants. There was little evidence from the notes that the provision of vein surgery in our hospital was fair and equitable. We advise all units to ensure that criteria are followed and the reasons for operating are clearly documented in the patients' records.

P13 Day Case Hand Surgery Under Regional Anaesthesia: A New Patient Pathway

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Objectives: Prior to 2012 a general anaesthetic (GA) was the default anaesthetic technique for day case hand surgery in our hospital. We have developed a new patient pathway whereby the majority of patients receive a regional anaesthetic (RA) as the sole anaesthetic technique. In January 2014 we translocated this pathway from inpatient theatres to our day surgery unit. We present clinical data supporting this change of practice.

Methods: Prospective data collection from 9th January to 18th December 2014 covering patient demographics, surgical procedure, block performance, requirement for supplemental local anaesthetic (LA) or sedation, conversion to GA and patient satisfaction.

Results: 169 cases were identified during the study period. 71% of patients received RA, 12% LA and 17% GA. This compares with a rate of 5% RA, 11% LA and 84% GA in 2011.

Our RA technique: Primary block was: axillary (74%) and supraclavicular (26%). 87% of blocks were performed with 1% lidocaine/1:400,000 adrenaline. A mean of 33.5ml was used (range 15–50ml). 95% of patients received secondary distal forearm nerve blocks with 0.25% levobupivacaine to extend post-operative analgesia. Over 97% of RA cases were performed by regular regional anaesthetists.

Outcomes: 98% of RA cases performed proceeded under RA. Two cases required conversion to GA. Four cases (3%) needed supplemental surgical LA infiltration. 15 cases (13%) received some sedation/analgesia in theatre (usually fentanyl for tourniquet discomfort). There were no discernible differences between patients who received axillary vs. supraclavicular blocks. 88% of patients who received RA were very satisfied with their experience compared with 77% of patients who received GA. There were no recorded complications.

Conclusions: We have demonstrated that our RA patient pathway provides safe, reliable surgical anaesthesia with high patient satisfaction.

P14 Does The Physician' Assistant (Anaesthesia) 2:1 Supervision Model Have Any Effect On 30 Day Mortality In Heart Of England NHS Foundation Trust?

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Objective: In Heart of England NHS Foundation Trust (HEFT) qualified Physician's Assistant in Anaesthesia (P'A (A) have been working in a 2 to 1 model of supervision in HEFT since 2012 yet no evaluation of 30 day mortality has been carried out.

Method: In 2013 the P'A (A)'s were involved in 4,451 cases. Of this number, 418 operations were at a direct level of supervision. The remaining 4033 cases (12.06%) were at a 2 to 1 level of supervision where one Consultant Anaesthetist supervises 2 P'A (A)'s working in separate theatres but within the same theatre suite. The P'A (A)'s were involved in elective Orthopaedics, Gynaecology, General Surgery, Ophthalmic surgery and Ear, Nose and Throat surgery.

A general or regional anaesthetic technique was used with the supervising Consultant within the theatre suite as recommended by the Royal College of Anaesthetists Supervision Guidelines (2011)¹. Analysing the 4033 cases we review the 30 day mortality of these cases to ascertain if working in a 2 to 1 capacity has any impact on mortality rate. The data was obtained from the HEFT Data Quality team.

Results: The elective 30 day mortality rates in HEFT were analysed and it was determined that there was a 0% mortality rate using the P' A (A) 2 to 1 supervision model.

Conclusion: Within HEFT using the 2 to 1 level of supervision there is no 30 day mortality in elective surgical cases anaesthetised by a P'A (A). Whilst it is acknowledged that the patients are predominantly ASA 1 to 3, it demonstrates that P'A (A)'s can be utilised to safely run 2 operating theatres, with expert proximal Consultant Anaesthetist supervision.

Reference:

- 1) The Royal College of Anaesthetists (2011) PA(A) supervision and limitation of scope of practice (May 2011 revision), [Online], Available:<http://www.rcoa.ac.uk/news-and-bulletin/rcoa-news-and-statements/paa-supervision-and-limitation-of-scope-of-practice-may> [accessed 15 March 2015].

P15 Laparoscopic Cholecystectomies 85% Day Surgery Rate Safe And Satisfied

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Introduction: The trust day surgery rate for laparoscopic cholecystectomy [LC] has been recorded at 62–72 % for the past 3 years. Auditing has shown a day case rate of 85% with potential for higher. Patient satisfaction remains very high.

Methods: Audited 3 months of LCs by retrieving their clinic letters and tracking them on theatre management system.

Telephoned 222 day case LC the following day, asking questions on wellbeing, rate our service etc

Results: Over a 3 month period 89 patients underwent a LC. 63 were recorded as day case 26 patients as inpatient. Our recorded day surgery rate for that 3 month period was 69%. However 14 of those 'inpatients' were completed as a day case. The day surgery rate for LCs was 85.4% for the 3 month analysis period. Of the 11 true in patients 8 fulfilled the day surgery criteria. A potential day case rate of 95%. Pain: 80% mild, 16.9% moderate, 2% severe.

Contact with healthcare in the following 24 hours: 97% [169] no contact, 2% (5) contacted A&E for dressing review or minor wound bleed.

Rate service: 90% rates us 9–10/10

Conclusions: Despite surgical engagement in the day surgery process, a good safety record and excellent patient satisfaction there is caution at clinic when booking LCs as a day case especially as day surgery is performed at the cold site with limited overnight cover. A validation meeting involving clinicians and booking staff challenges these decisions however inpatients need to be visibly rebooked as a day case hence to avoid losing out on best practise tariff remuneration.

References:

- 1) *Cochrane Database Syst Rev.* 2013 Jul 31;7:
- 2) Vaughan J et al. *Ambulatory Surgery* 20.1 March 2014

P16 Minimising Overnight Admissions In Paediatric Urology Day Case Surgery

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Objectives: Day case surgery is becoming increasingly desirable due to patient preference, cost factors and national targets. This is especially the case in paediatric surgery where an unplanned overnight stay can negatively effect patient satisfaction and be extremely disruptive to their families.

Method: Electronic records for all paediatric urology day case operations performed by our team in a tertiary referral centre over a three year period were studied to identify overnight stays and potentially avoidable causes.

Results: In total, 323 cases were identified, with 8 failures to discharge on the same day (2.5%). The three most common procedures were circumcision, orchidopexy and hypospadias repair respectively. Causes for overnight admission included urinary retention, pain, vomiting, and the request of the operating surgeon due to length of surgery and need for intravenous antibiotics or medical review. Each year the admission rate decreased, from 5.2% in 2011 to 1.8% (2012) and finally 0.9% in 2013.

Conclusions: These results have been achieved through effective communication between our team and the families, anaesthetic team, pre-assessment department and ward staff. Regular audit has identified key areas that have allowed improved education of parents during initial clinic visits and the supply of adequate analgesia and advice upon discharge.

P17 The Day Case Rates Of Tympanoplasty Procedures According To Hospital Episode Statistics From 2000 To 2014

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Objectives: Day case surgery has been an important way for NHS hospitals to reduce hospital capacity and expenditure. The British Association of Day Surgery proposed that Tympanoplasty is a suitable procedure to be undertaken in this manner. We looked at the national day case trends of this procedure over a 14 year period.

Method: The information was gathered using the Hospital Episode Statistics website. The 'Procedures and interventions' database was analysed and a search for Tympanoplasty procedures was conducted.

Results: The incidence of tympanoplasty procedures had increased from 2000 (7,241) to 2014 (10,674). Over the last 14 years the overall day case rates of Tympanoplasty procedures had risen by 40.2%, with Tympanoplasty using graft (42.9%), Tympanoplasty NEC (41.7%) and Revision of Tympanoplasty (47%). The Combined approach Tympanoplasty was only documented from 2006/2007 period and had increased from 12.1% to 37.3% in 2014.

Conclusions: This shows a promising future for Tympanoplasty as a day case procedure as more cases are being undertaken through this route.

P18 Sore Throats And Laryngeal Mask Airways - Blown Out Of Proportion?

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Objectives: In our institution it is common practice to inflate Laryngeal Mask Airways (LMAs) to their maximum recommended volume rather than titrating to a seal as is the practice with endotracheal tubes. There is evidence that this practice may result in an increased incidence of sore throat post operatively¹.

Our objective was to measure the cuff pressures of LMAs used in our day surgery unit to establish whether our practice was resulting in over-inflation and an increased incidence of sore throat.

Methods: Data was collected prospectively over a 1 week period and included LMA type, size, cuff pressure and cuff insufflation volume. Patients were asked about sore throat in primary recovery and at a follow up phone call 24 hours post operatively.

Results: 51 patients were identified during the study period. Mean patient age was 49 years (range 14-88). 29 patients had LMAs inserted. Of these 25 (86%) had cuff pressures exceeding 60cmH₂O and 19 (66%) had cuff pressures exceeding 120cmH₂O. The incidence of sore throat in recovery was similar in those who had an LMA inserted (22%) compared with those who did not (23%). No patients who had an LMA inserted reported a sore throat at 24hr follow up.

Conclusions: We have demonstrated that routinely inflating LMAs to their maximum recommended volume results in extremely high cuff pressures. However, we have not demonstrated an increase in the incidence of sore throat. This could be because high LMA cuff pressures are clinically insignificant during short day case procedures. However, given our relatively small sample size further evidence is needed before this conclusion can be confidently made.

References:

1) Bick E, et al. *Anaesthesia* 2014, 69, 1299-1313

P21 Recovery After Desflurane Anaesthesia In Ambulatory Surgery Is Quicker And Has Less Impact On Patient Cognitive And Memory Functions

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Objectives: Cognitive functions are affected by general anaesthesia. The recovery of cognition after anaesthesia is multifactorial and depends on the type of anaesthesia used, the type of surgery, and the patient. This audit compared the speed of recovery in patients undergoing general anaesthesia with sevoflurane or desflurane and the effect of general anaesthesia on patient memory

Methods: 160 patients scheduled for KAS were included, ASA 1 to 3, age was not an exclusion criteria. All patients received antiemetic prophylaxis, the anaesthetic protocol was standardised and after placement of a laryngeal mask, anaesthesia was maintained with either sevoflurane or desflurane

Analgesia was provided with IV paracetamol, diclofenac and local anaesthetic infiltration. Assessments included times to eye opening, response to command, orientation, first oral intake, discharge and patient memory assessment done by the surgeon at their follow up appointment

Results: Emergence from anaesthesia, return to orientation, ability to respond to command was more rapid after desflurane. The time to discharge home (46 +/- 17 min in desflurane and 61 +/- 22 min in sevoflurane, respectively), 94% of the patient of the desflurane cohort did remember the surgeon explanation given before discharge whilst only 51% of the patients of the sevoflurane cohort were able to remember

Conclusion: The benefits of desflurane vs sevoflurane when used for maintenance of anaesthesia in ambulatory setting are controversial, the impact of this difference on patient recovery end points is difficult to establish

In our audit, patient initial recovery was noticeably quicker with desflurane, discharge times shorter and temporary memory loss/impairment was definitely less evident in the cohort of patients who received desflurane anaesthesia

Reference:

Rörtgen D. *Br J Anaesth.* 2010 Feb;104(2):167-74 doi: 10.1093/bja/aep369 Epub 2009 Dec 30

P23 Prilocaine Use In Spinal Anaesthesia: A Survey Of Clinical Activity At The Norfolk And Norwich University Hospital (NNUH). February – July 2014

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Objectives: To explore the current use of prilocaine for spinal anaesthesia in our trust. To use the information obtained to modify and expand our current guideline for prilocaine use.

Method: A questionnaire was completed by the Anaesthetist when prilocaine was used. Information gathered included volume used, addition of an opiate, level of sensory block achieved, blood pressure changes and the occurrence of any problems. Questionnaires were collected over a 6 month period.

Results: 30 questionnaires were returned from day surgery and main theatres. Surgery was general, gynaecological, orthopaedic and urological in nature. Satisfaction was generally high. A higher than recommended volume was frequently used (7/12 cases where a dose was advised by trust protocol). A higher than advised volume frequently resulted in a higher than necessary sensory

level (5/7 occasions). The larger the volume used, the longer the duration of motor block therefore negating the benefit of using prilocaine. For internal genitourinary surgery a block to T10 is advised. This was achieved in these cases with doses ranging from 1.5–2.5mls.

A saddle block can be achieved with < 1ml.

Conclusions: Prilocaine is used at NNUH for a variety of procedures not all of which are day case. Adjustments to our guideline have been made as follows: For internal genitourinary procedures: 2mls 2% hyperbaric prilocaine and lie supine (no guideline previously) For anorectal, vulval, perineal, penile procedures: 1ml 2% hyperbaric prilocaine in a sitting position (previously 1–1.5ml) Fentanyl is optional but should not exceed 10mcg to avoid urinary retention.

P24 Audit Of Pre-Operative Fasting Practice In The Day Surgery Unit

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Objectives: Prolonged fasting before general anaesthesia has been shown to be detrimental to patients undergoing surgery. The purpose of this audit was to determine current starvation practice in our Day Surgery Unit (DSU) and compare it to the national recommendations for pre-operative fasting. We compared actual fasting time with length of stay in recovery until discharge.

Methods: A paper audit tool was completed by theatre staff over a one week period in DSU. Both adults and children undergoing general anaesthetic or a regional technique were included in this audit.

Results: 85 cases were reviewed. 94% of patients were informed that they could take clear fluids up to two hours prior to surgery and 95.2% informed they could eat up to six hours prior to surgery. 51.2% of patients reported being hungry or thirsty pre-operatively. Median time between last fluid intake and start of anaesthesia was 4 hours 50 minutes (2:17 – 17:05). Median time between last food intake and start of anaesthesia was 12 hours 54 minutes (6:09 – 21:31).

Conclusions: Of the cases considered, almost all were starved according to or for longer than the minimum times stipulated by current guidelines (98.8%). In fact, more than one fifth of adults (21%) and 40% of children were deprived fluids for 8 hours. Our findings did not demonstrate any significant relationship between fasting time and length of time from recovery to discharge. However, multiple patient and intra-operative factors may considerably confound the picture and further investigation would be of benefit.

References:

1. de Aguilar-Nascimento JE, et al. *World Journal of Gastrointestinal Surgery*. 2010. 27: 2(3):57-60.
2. Chin KH et al. *The Journal of One-Day Surgery*. 2006. 16(3): 71-74.

P26 Capturing The Ripple Effect: Re-Designing Patient Pathway For Cataract Surgery

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Objectives: The aims of the project: Release day unit trolleys to increase capacity for general anaesthetic procedures. Teach improvement methods for future use on the unit.

Method: The cataract patient's journey on the day unit was observed from arrival to discharge. It was realised substituting chairs would release trolleys. Other potential improvements were also identified. Using structured 'plan-do-study-act' (PDSA) cycles, the effect of change was observed on one patient, one consultant, and one list. The patient pathway was refined, further changes introduced and PDSA cycles repeated. Improvements were then rolled out for the lists of three consultants. Each week comments were captured from surgeons, nurses, patients and support staff and analysed.

Results: An average of 10 trolleys per week released. In addition we have: Standardized the patient pathway for all three consultants. Reduced the number of steps in the patient pathway. Staff feedback showed that: Consultants prefer new process; Time spent marking patients at beginning of list reduced; Microscope no longer moved between cases saves time in theatre; Day unit nurses prefer new process; Less nursing time per patient; Fewer trolleys to prepare; Eye drop administration prior to surgical marking.

Patients prefer new process; Staggered admissions means less waiting in hospital; Selected patients discharged without requiring surgical review; Don't feel 'hospitalised'.

Porters prefer new process; No longer involved therefore released for other duties. Information; Patient day unit leaflet updated to reflect new processes; Cataract patient leaflet rewritten; System introduced to identify patients who will still need a trolley

Conclusions: Adopting a structured approach to re-design achieved our objective to release trolleys. There was a ripple effect beyond initial expectations. Several other improvements were established. Many of the changes introduced are transferable to other day patient procedures.

P27 Understanding Why Day Surgery Patients Are Admitted Overnight And Exploring Alternative Solutions

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Objectives: To understand reasons for overnight stay following day surgery. To minimize the need for overnight stays and reduce the burden on inpatient wards

Method: A retrospective case note review was carried out of all patients admitted to inpatient wards from the day surgery unit between January and June 2014. Reasons for admission were noted.

Results: Of 78 patients admitted, 40 were planned transfers from the day patient unit (10 because they lived alone). Thirty eight patients were true unexpected admissions: 8 for pain control, 6 lived alone or on another island, 4 late returning from theatre, 3 had a change to their planned surgical procedure, 2 failed to pass urine, 2 had unexpected bleeding post operatively, 2 had drains inserted at surgery, 1 became septic, 1 developed laryngospasm, 1 requested to stay. In 8 cases the reason for admission was not clear.

The cases were 10 general surgery, 9 orthopaedics, 8 ENT, 5 urology, 4 gynaecology, 1 dental, 1 medical and involved seven different anaesthetists.

Conclusions: 38% of overnight admissions (10 planned and 20 unplanned) could have been managed differently and overnight admission post procedure prevented. We are putting measures in place to minimize admission by: Improving post operative pain regimens, ensuring day patients have a carer at home, scheduling day surgery patients first on mixed lists, changing discharge criteria and extending opening hours to allow later discharge.

References:

- 1 Noble T, *Journal of One-Day Surgery* 2014; 24 supplement:21

P28 Being Bold: Discharging Patients Without Waiting To Pass Urine

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Objectives: To allow patient discharge without waiting to pass urine (PU). To establish a (free) re-attendance pathway for patients unable to PU after discharge.

Method: Historically one discharge criteria for day surgical units has been to PU. Failure to PU often results in catheterization and overnight admission. Our Urologist advised that passing urine prior to discharge was not necessary: Once home the vast majority will be able to void without difficulty. We reviewed the pathway for patients who could not PU once home. We streamlined the re-attendance process with direct access to the surgical wards via Accident & Emergency reception, nurse assessment, in-out catheter and directly home^{1,2}.

1. All surgeons and anaesthetists agreed the default position of discharge without the waiting to PU. Exceptionally they could specify if a particular patient had to PU before discharge
2. Patient advice sheet on process if they experienced problems with micturition after discharge
3. A structured notes entry/audit form for re-attenders

Results: Patients spend less time on unit as no longer waiting to PU. Patients are less stressed – not asked repeatedly if they have passed urine and no bladder scanning. No catheters passed on day unit. No re-attendances with urinary retention.

Conclusions: Quality improvement for patients: less time in hospital, streamlined re-attendance process, no re-attendance charge and less work for nursing staff.

References:

1. Urinary catheterization & Catheter Care. Best Practice Statement NHS Quality Improvement Scotland 2004. http://www.healthcareimprovementscotland.org/previous_resources/best_practice_statement/urinary_catheterisation_care.aspx
2. Williamson J. Nursing Times 2005 <http://www.nursingtimes.net/management-of-postoperative-urinary-retention/203763.article>

P29 Trolleys And Chairs In A Day Surgery Unit

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Objectives: Day surgery units are required to be increasingly productive and efficient. The Day Treatment Centre (DTC) at the Whittington Hospital has 36 curtained cubicles and 2 side-rooms with trolleys for patients' use before and after procedures, with little flexibility in their use and limiting throughput. We wished to determine whether reclining chairs would be an acceptable alternative for patients undergoing minor procedures (no anaesthetic, local anaesthetic or conscious sedation) and patient preference.

Method: Data was collected over two weeks concerning patients having minor procedures, detailing types of procedure and anaesthesia, DTC trolley allocation, patient mobility and patient preference.

Results: 82 patients aged 19 to 84 years of age were interviewed. 65% had a procedure using local anaesthesia only and 15% without anaesthetic at all. 93% were deemed independent in mobility (able to comfortably walk at least 50 metres).

23% were given a trolley pre-operatively (average wait 60 minutes) and 77% a trolley post-operatively (average time to discharge 60 minutes).

85% of patients stated that their preference would have been a reclining chair for the pre-procedure wait and post-procedure recovery to discharge.

Conclusions: Patient preference was strongly in favour of using a reclining chair rather than a traditional hospital trolley for before and after the procedure. Limited space and equipment within the fabric of a traditionally laid out surgical unit so far have limited such options to us. Advantages of such a resource would include better matching of facilities to patient needs and preferences; increased patient comfort and empowerment and normalising of the surgical experience; encouraging earlier mobilisation; reducing bottle-necks in patient throughput and improving patient satisfaction and unit efficiency.

P30 Point Of Care INR Testing In A Daycase Setting

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Objectives: Many patients undergoing day surgery are prescribed warfarin. INR management is problematic and testing INR the morning of surgery can be required. The average time to take, process and report a sample in our trust is 105 mins. Considering our management places an approximate value of £1000 per hour on operating theatre time, time saved benefits the trust as well the patient. From August 2014 we have used the Coagucheck point of care INR testing system to minimise these losses.

Method: Over a six month period any patient requiring INR testing before surgery had a Coagucheck test performed. Time and resources permitting, an additional sample was sent to the hospital laboratory. In total, 47 Coagucheck samples were processed and 15 of these had a simultaneous laboratory sample. The results of both tests were documented. Only staff trained to use the Coagucheck machine used it. The machine was maintained in line with manufacturer specification.

Results: On average the Coagucheck results were 0.437 (12.6%) different from laboratory results. However, subanalysis of INRs less than 2.5, there is a 4.32% difference. From the 47 cases a potential 82 hours of operating time was saved. Admittedly list order can be changed but that is generally undesirable.

Conclusions: The Coagucheck machine appears to be a reliable INR test, especially if the result is less than 2.5. In addition, secondary benefits such as time, financial gain and maximised lists exist. Consideration should be given to using a Coagucheck test on patients taking warfarin on arrival to daycase theatres. Additionally, if the result is greater than 2.5, a laboratory sample should be sent.

P31 Risks Of Venous Thromboembolism (VTE) In Day Surgery And Travel Of More Than Six Hours Duration. What Advice Should We Give Our Patients?

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Case Summary: A 60-year-old female was admitted with left calf and thigh pain associated with swelling for 3-days. She had a left knee arthroscopy 4-days prior to admission and had returned from holiday in Australia 7-days before her surgery. An ultrasound demonstrated extensive left leg deep vein thrombosis (DVT) extending into the left iliac vein. Treatment with 12,500 units of LMWH was commenced whilst awaiting thrombolysis. Our patient had no significant medical history or risk factors for VTE, drug history included norethisterone.

Discussion: With increasing frequency of day surgery along with the accessibility and affordability of long haul travel the issues surrounding travel, surgery and the risk of VTE will become increasingly important.

NICE in 2013 produced the document 'DVT prevention for travellers'. It has been shown that the relative risk of developing DVT is increased by long distance travel by any mode 1. NICE gives recommendations on when to travel after surgery.

Although the absolute risk of DVT (with journeys greater than 6 hours continuously) is very low in healthy individuals, there is evidence that risk is increased by the presence of risk factors including obesity, previous DVT and cancer¹. The period for developing VTE post long travel can be up to 8 weeks². There are, however no recommendations for the timing of surgery after long haul travel. This case demonstrates that even low risk patients are at risk of developing VTE if they have travelled prior to surgery.

Conclusion: Evidence based advice is not available to give patients who have travelled before surgery. VTE can lead to significant morbidity, questions need to be asked as to what advice we should give our patients, in what form and when.

References:

1. NICE (2013) DVT prevention for travellers.
2. Watson H, et al. *British Journal of Haematology* 2010;152:31-34.

P32 How Do You Increase Productivity Of Your Operating List? Move It! Introduction Of A Day Surgery Regional Anaesthetic Hand Service:

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Department of Anaesthesia, Torbay Hospital, South Devon Healthcare NHS Foundation Trust, Devon, UK

Objectives: In 2012 a new patient pathway was introduced for day case hand surgery in our trust. We changed from a default general anaesthesia (GA) based service to regional anaesthesia (RA). Initially the theatre lists remained in our inpatient theatre suite with no increase in case load or productivity. In January 2014 this pathway relocated to our dedicated day surgery unit. We present caseload, productivity and patient feedback resulting from this change of location.

Methods: Patient journey data and subsequent day 1 telephone feedback was retrospectively collected from the trust's theatre administration system 'Galaxy' (©CSC) for all hand surgery lists occurring in 2013 and compared with 2014

Results: A total of 133 cases were performed in 2013 across 31 lists. RA cases accounted for 65% of the cases. In 2014; 169 cases were performed (28 lists). The RA rate had increased to 71%.

The mean number of cases completed on an all-day theatre list increased by 49% from 4.5 in 2013 to 6.7 per list once the service had located to the day surgery unit in 2014, with an increase in efficiency of allocated operative time (i.e. the proportion of time spent operating as a fraction of the total allocated theatre time) from 41% to 57%.

Patient satisfaction rates increased. 74% of patients reported "very satisfied" in 2013, rising to 84% in 2014. RA subgroup analysis showed an increase by 20% of "very satisfied" patients from 68% to 88%. We hypothesise that this is due to shorter waiting times due to staggered admissions in the day surgery unit plus a more personalised service offered in this environment.

Conclusions: Relocating our RA based service to a dedicated day surgery unit has had the dual benefit of increased patient satisfaction and productivity increases with associated financial benefits.

P33 Improving The Efficiency Of An Abscess Pathway While Reducing NHS Costs: Every Little Helps.

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Objectives: Abscesses make up a significant part of the emergency surgical workload. However, due to their low clinical priority, delays may result in their treatment. Patients kept in hospital unnecessarily cost the NHS in excess of £250 a day per patient. Abscess pathways aim to reduce length of stay and time to treatment by creating a system whereby patients are recalled the following day, operated first thing in the morning and discharged the same day. The aim of our study was to evaluate the efficacy of abscess management at our trust.

Methods: A retrospective study examining the management of abscesses under general surgery from July to September 2014 was performed. Data was collected for length of stay and delay to treatment. Patients that did not meet inclusion criteria for abscess pathway were excluded (i.e Diabetic/septic patients, unsuitable ASA grade, inappropriate social circumstances).

Results: Of 66 patients suitable for an abscess pathway, 31 were

admitted the same day of presentation and 35 were recalled. Of the former group, 32.3% of patients were operated the same day, with an in-patient bed occupancy of 21 bed days between the 31 patients. In direct contrast, 94.1% of recalled patients were operated on the day of admission (82.9% performed first thing in the morning) and 91.2% discharged the same day ($P < 0.001$), saving 31 bed days for the NHS.

Conclusions: An all-inclusive abscess pathway, whereby all suitable patients are recalled the following day, not only reduces the time to treatment from admission, but also decreases the hospital stay of medically fit patients, thereby improving efficiency and reducing costs. In the light of our results, a comprehensive abscess pathway proforma was implemented to provide guidance to medical and nursing staff for the recall of eligible patients.

References:

Amin A et al. SAGES 2012.

P34 Day Surgery: The BMI Is No Limit

R. Tibble

Royal Derby Hospital, Derby, UK

Objectives: In day surgery we aim to offer surgery to as many people as possible despite growing numbers with multiple comorbidities and higher Body Mass Index (BMI). I describe the management of a patient with a BMI of 66 to allow successful same day surgery.

Methods: Once the patient was identified as needing a day surgery procedure despite a BMI of 66 we developed a plan to maximise the chance of success.

This involved a thorough pre-operative assessment to exclude any significant health problems including screening for obstructive sleep apnoea and an airway assessment. A detailed discussion with the patient occurred at this point to outline the risks associated with different anaesthetic choices. The patient refused any local or regional anaesthetic despite the increased risks of a general anaesthetic.

Next we organised theatre equipment needed to minimise delays during operative time. Theatre staff were informed and bariatric table and leg fins were organised with a hoover mat for transfers. Bariatric equipment for blood pressure monitoring and a sensitive nerve stimulator were acquired for the case.

Additional assistance for ODP and anaesthetist were available and an anaesthetic plan developed with preoxygenation of the patient with CPAP, ramped 30° head up in theatre. Intubation was planned with rocuronium allowing reversal sat up using sugammadex.

Ward care involved the patient walking to theatre pre-operatively and a bariatric bed for recovery. Thromboprophylaxis with enoxaparin was used.

Results: All equipment and staff were in place and a successful general anaesthetic with intubation performed to allow surgery.

Post operatively the patient returned to the day surgery ward and was discharged the same day

Conclusions: If patients are appropriately pre-operatively assessed and the pathway for day surgery managed well, a BMI of 66 does not preclude a successful outcome.

P35 Day Case Inguinal Hernia Repair; How Do The Complication Rates Differ Between A Laparoscopic And Open Mesh Repair?

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Royal Free Hospitals NHS Trust, London, UK

Objectives: The Association of Surgeons of Great Britain and Ireland have produced guidelines for the management of inguinal hernias¹. They show that hernia recurrence rates in laparoscopic versus open mesh repairs are similar^{1,2}. Our experience suggests a higher recurrence rate in laparoscopic repair.

Method: Our retrospective audit of 102 consecutive elective day case inguinal hernia repairs over a three month period, comparing laparoscopic with open mesh techniques by all surgeons at two district general hospitals. Patient records and clinic reviews were analysed at 18 months post-operatively to determine complication rates and recurrence.

Results: Fifty-six open mesh repairs were performed versus 46 laparoscopic repairs (both trans-abdominal and extra-peritoneal approaches were used). The patient demographics were equivocal between the two groups, with a median age of 62 years and a 3:1 male to female ratio. Of the open repairs, one suffered a haematoma (2%), one chronic pain (2%) and one a cardiac event. No recurrences occurred. The laparoscopic repairs had two seromas (4%), three chronic pain (7%) and two recurrences (4%). No infections requiring antibiotics were recorded in either group.

Conclusion: Our audit suggests laparoscopic hernia repair has a higher risk of recurrence, but this is not statistically different ($p = 0.11$). Chronic pain also appears to be higher, with a lower risk of haematoma. There are multiple confounding factors including patient number, selection method, and follow up that may affect the validity of our conclusions, however, our results compliment a recent comparative effectiveness review that suggests laparoscopic repair may have a higher recurrence rate, thought partly due to operator inexperience and mesh size³.

References:

1. Sanders D, et al. *ASGBI Groin Hernia Guidelines* 2013
2. McCormack K, et al. *Cochrane Database* 2003.
3. Neumayer L, et al. *New England Journal Medicine* 2004; 350.18:1819-27

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