A REVIEW OF PATIENT DEMOGRAPHICS, DISEASE PROFILE AND MANAGEMENT OF WOMEN WITH BREAST CANCER SEEN IN PRIVATE PRACTICE IN CAPE TOWN

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Aim: To compare presentation and management of patients presenting with breast cancer in a private practice setting with overseas screened populations.

Method: Data from all patients presenting with breast cancer were collected in a prospective manner. Details from 730 cases (705 women) for which there was detailed information were used for the audit. For clarity, the statistics have been presented as percentages.

Results: Patient demographics. The average age of the women was 55.6 years, and 71% had no family history of breast cancer. Diagnosis: 72% presented with a palpable mass. In 74% of cases the mammogram was consistent with a malignant process. Overall, cytology was malignant in 82% of invasive carcinomas. Fifteen per cent of patients had a stereotactic biopsy, and 7% of these had a false-negative result. Tumour characteristics: 49% were on the left and 51% were on the right. The average tumour size was 19 mm. The pathological subgroups were as follows: DCIS 13%, ductal cancer 72%, lobular cancer 9%, inflammatory carcinoma 1.5%, colloid carcinoma 2%, others 2%. Surgery: 46.5% had a mastectomy as their primary surgery, 53% had a breast conservation procedure (BCET), and 0.5% only had an axillary procedure. Of BCET cases, 12% had a completion mastectomy, 70% for multicentric tumours. Four per cent of BCET cases had a re-excision. In the mastectomy subgroup, 47% had no reconstruction or planned delayed reconstruction. Of those having reconstruction, 45% had placement of an expander, 38% a prosthetic reconstruction, 12% a DIEP flap, 3% a TRAM flap and 1.5% an LD flap. Bilateral mastectomy was performed in 18.8% of cases; 38% of this subgroup presented with bilateral disease and 55% had a family history of breast cancer. Axillary surgery: 10.5% had no axillary procedure, 21% had an axillary dissection and 68% had a sentinel node biopsy. Of these, 72% were negative, 21% were positive, 6.5% showed micrometastases and 0.5% failed. In the group who had a primary axillary dissection, the average nodal involvement was 4.1. In the group with a positive SLNB, the average nodal involvement was 2.4. Four per cent of patients had an additional procedure, 8% had a cholecystectomy and 3% had an IUCD placed.

Conclusion: The data are skewed, as patients with scanty data have not been included. They include patients seeking a second opinion, those with delayed presentations who chose not to have further management, and patients referred to public hospitals. The profile of patients managed in private practice in South Africa is similar to a screened population overseas.

USE OF ALTERNATIVE INFORMATION SOURCES IN BREAST CANCER SURVIVORS

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Aim: To collect data on use of alternative information (information not directly given by the treating doctor) by breast cancer survivors in South Africa.

Method: A questionnaire was compiled and given or sent to breast cancer survivors seen by a single breast surgeon in a private practice. The replies were anonymous. The University of Cape Town ethics committee approved the study. In total, 200 women will be surveyed.

Results: This presentation gives the results from the first 52 surveys returned. The data collected were both quantitative and qualitative. Women were asked about demographic details, their use of alternative information sources, and in what ways they had changed their breast cancer management as a result.

The quantitative data showed that the younger or the more educated the patient, the more likely she was to use an alternative source of information. Income was not related. A similar trend was found with Internet use, with 85% of those aged under 40 years having used the Internet as opposed to 25% of those aged over 65. Income was not related to Internet use. Thirteen different websites were listed and 12 books were cited.

Under the qualitative data section, the women were asked if their breast cancer management had changed as a result of their research and if so how it had changed. Of women who used alternative data sources, 75% changed their management. All of them changed their diet, and in total 21 different dietary changes were listed. The commonest changes described were reductions in red meat and dairy products, a reduction in alcohol intake and an increase in vegetable consumption. While many women took dietary supplements, few took homeopathic medications. The 18 women who took supplements gave a list of 19 supplements taken. The commonest were multivitamin preparations and omega supplements.

Conclusion: This analysis of the first quarter of 200 survey replies suggests that in private practice in RSA alternative information-seeking behaviour is related to age and education level, but not to income. The majority of such patients modify their management as a result, with dietary modification being paramount.
Aim: To audit results from intra-operative assessment of sentinel lymph node biopsy (SLNB) after the introduction of a cytotechnologist service.

Method: Since 2010, a cytotechnologist has been used for the intra-operative assessment of all SLNBs. Data from a larger database were used to compare two groups: the accuracy of intra-operative assessment of lymph nodes from 2006 - 2008 and 2010 - 2012. (Data from 2009 were not used as the technologist was being trained.)

Results: In total, there were 293 intra-operative assessments of SLNB performed: 164 for 2006 - 2008 and 129 for 2010 - 2012. (Data from 2009 were not used as the technologist was being trained.)

Table 1. Types of cancer in 2006 - 2008 and 2010 - 2012

<table>
<thead>
<tr>
<th></th>
<th>Total N</th>
<th>DCIS n (%)</th>
<th>Ductal cancer n (%)</th>
<th>Lobular cancer n (%)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 - 2009</td>
<td>164</td>
<td>18 (11)</td>
<td>122 (75)</td>
<td>21 (12)</td>
<td>3 (2)</td>
</tr>
<tr>
<td>2010 - 2012</td>
<td>129</td>
<td>13 (10)</td>
<td>103 (80)</td>
<td>12 (9)</td>
<td>2 (1)</td>
</tr>
</tbody>
</table>

Table 2. Comparison of intra-operative assessment of SLNB in 2006 - 2008 compared with 2010 - 2012

<table>
<thead>
<tr>
<th></th>
<th>Total N</th>
<th>True –ve n (%)</th>
<th>True +ve n (%)</th>
<th>False –ve mets &gt;2 mm n (%)</th>
<th>False –ve micromets n (%)</th>
<th>False +ve n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 - 2008</td>
<td>164</td>
<td>121 (73)</td>
<td>34 (21)</td>
<td>5 (3)</td>
<td>4 (2.5)</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>01/2010 - 03/2012</td>
<td>129</td>
<td>92 (71)</td>
<td>27 (21)</td>
<td>2 (1.5)</td>
<td>6 (4.5)</td>
<td>1 (0.7)</td>
</tr>
</tbody>
</table>

Conclusion: A suitably trained cytotechnologist can be used to give a reliable intra-operative assessment of sentinel nodes.

Background: Demodex mites are a common but under-recognised ectoparasite found on the skin in all humans. They are often described as bedmites, although their natural habitat is the pilosebaceous unit of human skin. The mite has a predilection for the face, especially the nasolabial fold, but cases have been described in other areas of the body, particularly in patients with immunocompromising diseases such as HIV/AIDS and diabetes mellitus. The presence of Demodex folliculorum in the human nipple has been described infrequently, and hypothesised to cause itching and eczematous changes to the nipple.

Aim: To describe the occurrence of D. folliculorum in the nipples of patients undergoing mastectomy for breast cancer in a single specialist unit.

Methods: As part of a study looking at our practice in contralateral prophylactic mastectomy procedures, all patients undergoing bilateral mastectomy for a unilateral cancer over 10 years (2002 - 2011) were recorded. Patients with a recorded finding of demodex were identified. Demographics and risk factors were recorded and compared with the complete cohort of patients undergoing bilateral mastectomy.

Results: The study found 358 patients undergoing bilateral mastectomy for unilateral breast cancer. Eight of these patients had a nipple infestation with D. folliculorum confirmed histopathologically on final mastectomy. Each infestation was bilateral.

Presentations with a mass in 87.5% (n=31) and, screening detected calcifications in the remaining patient.

The patients' ages ranged from 27 to 64 years, with an average age of 51 years. Four patients were premenopausal and four were postmenopausal, of whom 2 had taken HRT. No patient...
had significant comorbidities, including HIV/AIDS or diabetes mellitus. In considering these patients within the larger cohort, there was no significant difference in age or menopausal status. No patient with demodex had received neo-adjuvant chemotherapy.

Conclusions: The finding of *D. folliculorum* in the nipples of our patients undergoing mastectomy has been a recent interesting finding. In comparing this cohort with other patients with similar pathology undergoing similar procedures, it can be seen that the finding of demodex does not appear to translate to additional nipple symptoms in these patients. We aim to expand this study to consider all available patients with pathological specimens of the nipple, and to correlate it to possible pre-mastectomy symptoms, perhaps under-reported to the treating clinician.

EVALUATING BREAST CANCER IN YOUNG WOMEN OVER THE PAST DECADE (2000 - 2010) FROM A SINGLE MULTI-DISCIPLINARY BREAST UNIT
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Background: Breast cancer is the leading cause of cancer death among females in most countries, and although more frequent with increasing age, it also occurs in the young. Young women are thought to present later and at a more advanced stage than older women, with a subsequent poorer prognosis. Whether this is due to a delay in diagnosis or due to more aggressive tumour characteristics is unclear.

Aim: The aim was to profile women under the age of 35 years presenting with breast cancer to a single specialist breast unit over a 10-year period. It involved looking at common trends in variables such as patient history, risk factors and clinical and pathological features both at presentation and during treatment.

Methodology: All patients aged under 35 years presenting to the Netcare Breast Care Centre in Johannesburg between 1 January 2000 and 31 December 2010, and who were subsequently shown to have breast cancer, were included in this observational retrospective record review. Patients with benign disease or insufficient records were excluded.

Results: 144 patients under the age of 35 attended the Breast Care Centre during the study period and 18 were excluded (3 benign disease, 15 insufficient data). The median age at presentation was 32 years (range 8 - 34 years), and 46.8% (*n*=59) had a positive family history of breast cancer (14.3% of total patients (*n*=18) in a first-degree relative and 39.7% (*n*=50) in a second-degree relative). Only 2 of the patients were known carriers of a BRCA gene mutation. Most patients were diagnosed on core biopsy (*n*=95) or surgical biopsy (*n*=31). The most common stage at presentation was stage 3B. Histological findings are set out in Table 1. Histological findings.

Of the patients who underwent known surgical management (*n*=114), 52.6% were treated with wide local excision (*n*=60) and 47.4% (*n*=54) had mastectomies; 76% underwent immediate or delayed breast reconstruction.

<table>
<thead>
<tr>
<th>Table 1. Histological findings</th>
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<tr>
<td>Grade 1</td>
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<td>Grade 2</td>
</tr>
<tr>
<td>Grade 3</td>
</tr>
<tr>
<td>Total</td>
</tr>
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</table>

Conclusion: Our study shows that a significant proportion of patients had a positive family history of breast cancer in both first- and second-degree relatives, suggesting that this could be used to guide screening programmes in young women. Other risk factors did not appear to be significant.

Patients tended to present with late-stage disease and high-grade tumours. There were also more ER/PR-negative tumours than expected. Women in our population did not favour breast-conserving surgery over mastectomy, but this may be a product of late-stage disease or patient preference.

COMPARING A 21-GENE RECURRENCE SCORE ASSAY WITH ADJUVANT ONLINE IN PREDICTING DISEASE RECURRENT IN EARLY BREAST CANCER IN SOUTH AFRICA
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Introduction: The administration of adjuvant chemotherapy in a subset of patients with early breast cancer is controversial. This subset of patients is classified as having T1, ER/PR positivity, sentinel node negativity or micro-metastases. Numerous modalities exist to predict recurrence of breast cancer 10 years after initial treatment. The 21-gene recurrence score assay is a diagnostic test that predicts the average risk of an individual developing distant recurrence at 10 years. Commericially the test is known as OncotypeDX. The test classifies patients into three risk groups, namely low risk, intermediate risk and high risk. Adjuvant-Online, a validated software programme, is another modality that uses clinical and histological factors to assess the risk of mortality or recurrence at 10 years for patients with early breast cancer.

Aim: The aim of the study was to determine whether concordance exists between the recurrence score of Adjuvant-Online versus OncotypeDx in the South African setting.

Methods: This was a retrospective comparative study on data collected from the records of patients with early-stage breast cancer who were treated at a single centre in Johannesburg. All patients sent for OncotypeDx testing were discussed at a multidisciplinary meeting with a minimum of two specialists in every field and also had their risk assessed using Adjuvant-Online. The first 30 patients from the database with T1, ER/PR-positive, node-negative breast cancer who had undergone an OncotypeDx test were included in the study. Any patient who did not have all available prognostic markers was excluded.
**Results:** For the 30 patients who had undergone OncotypeDX testing, 24 files were available and 21 files had complete data. OncotypeDX revealed 3 high-risk, 6 intermediate-risk and 12 low-risk scoring results for breast cancer recurrence. Adjuvant-Online revealed 13 high-risk, 8 intermediate-risk and no low-risk scoring results.

**CONCLUSION:** In the South African setting there is little concordance between OncotypeDX and Adjuvant-Online estimation of risk of distant recurrence.

**THE SUCCESS OF MAGNETIC RESONANCE IMAGING IN PREDICTING CONTRALATERAL OCCULT DISEASE IN PATIENTS WITH UNILATERAL BREAST CANCER WHO ELECTED TO UNDERGO BILATERAL MASTECTOMY**

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**Introduction:** Over the past decade magnetic resonance imaging (MRI) has become a recognised tool in the staging of patients diagnosed with breast cancer. It can be particularly useful in detecting occult lesions in both breasts, which can enable comprehensive care and prevent recurrence. Despite the ability of MRI to detect occult lesions, studies show that it may also have a high rate of false positives. These true and false positives can both have a negative impact not just oncologically but psychologically and financially.

**Aim:** To assess the prevalence of contralateral occult disease in women with a unilateral breast carcinoma who chose to undergo a contralateral prophylactic mastectomy (CPM) and who also underwent MRI.

**Methods:** Patients undergoing CPM after a first diagnosis of unilateral breast cancer in a single centre in Johannesburg over a 10-year period were identified. All patients who had bilateral malignancies diagnosed prior to the definitive procedure (even if due to MRI findings) were excluded. Demographics and pre-operative radiological findings were recorded in addition to biopsy and final histology of bilateral mastectomy specimens.

**Results:** Over the 10-year study period 412 patients underwent bilateral mastectomy following an initial diagnosis of unilateral breast cancer; 199 were excluded from the study (30 had insufficient data, 24 had synchronous contralateral occult disease, 145 did not have an MRI scan). Two hundred and thirteen patients underwent mastectomy with CPM with pre-operative MRI and their records were subjected to further analysis.

Of patients who had an MRI scan, 48 had at least one high-risk lesion in the contralateral breast (increased risk ×2 - 8) and a further 28 had a low-risk occult lesion (risk ×2 - 8). Analysis to date of 125 of these patients revealed 60 of them to have concerning lesions on MRI on the contralateral breast. In these 60 patients, occult lesions were found in 24 pathlogy specimens.

**Conclusion:** While MRI may have a documented high false-positive rate, we have found that there is also poor concordance between MRI and occult pathology in the contralateral breast.
not amenable to curative resection were offered palliative stenting from November 2008 to March 2012 and were followed up until death. We compared patient survival and stent patency rates.

**Results:** Seventeen patients received 10 Fr plastic stents and 20 patients received expandable metal stents. The mean duration of hospital stay after stenting for both groups was 2 days (range 1 - 2 days). One patient in each group remained jaundiced despite adequate biliary drainage. Plastic stents blocked more frequently (74\% v. 10.0\%; *p* = 0.015). In the metal stent group 3 patients required re-admission to hospital (total 31 days) compared with the plastic group in which 5 patients required re-admission (total 54 days). Median survival was 116 days in the metal group compared with 105 days in the plastic group. Preliminary cost analysis showed similar costs per patient in both groups.

**Conclusion:** Plastic 10 Fr biliary stents block more frequently than SEMS. Metal stents have a better patency rate and are associated with fewer readmissions to hospital.

**SUCCESSFUL USE OF ENDOSCOPIC SELF-EXPANDING METAL STENTS (SEMS) TO PALLIATE MALIGNANT GASTRIC OUTLET OBSTRUCTION**

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**Background:** Enteral stenting has evolved over the past decade as an alternative to surgical bypass in the palliation of malignant gastric outlet obstruction. In particular, it offers a less invasive option in the management of patients who are often at significant risk for peri-procedural morbidity and mortality. This single-centre prospective study evaluated the success of enteral stenting for the relief of advanced malignant gastro-duodenal obstruction.

**Methods:** Between January 2006 and April 2012, 127 patients (74 men, 53 women; mean age 60.1 years) with clinical, radiological and endoscopic gastric outlet obstruction as a result of irremovable malignancy underwent endoscopic placement of a SEMS to relieve symptoms.

**Results:** The technical success rate of endoscopic SEMS placement was 96\%, and patients were able to be discharged a mean of 4 days (range 1 - 23) after stent placement. Fourteen patients (11\%) required placement of a second stent because of either a long, distal stricture or early technical failure (*n*=8), or as a result of delayed re-obstruction from tumour ingrowth (*n*=6). Complications included bleeding (*n*=2), perforation (*n*=1), early blockage from a food bolus (*n*=1), stent migration (*n*=1) and re-obstruction from stent shortening/deformation (*n*=1). One patient died after failed stent placement with tumour perforation.

**Conclusion:** Endoscopic SEMS placement can safely be used to relieve irresectable malignant gastro-duodenal obstruction, minimising hospital stay and peri-procedural morbidity. Technical factors influence its early success rate, while secondary stenting is effective in managing subsequent tumour ingrowth.

**THE EFFICACY OF SINGLE-AGENT INJECTION THERAPY IN ACHIEVING HAEMOSTASIS IN PATIENTS WITH ACUTELY BLEEDING PEPTIC ULCERS**

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**Background:** Endoscopic therapy is the standard of care in patients with bleeding peptic ulcer disease. This study was undertaken to determine the efficacy of injection therapy, using adrenaline/saline solution (ASS) alone, on the rate of rebleeding, need for surgery and death.

**Methods:** Over a 21-month period, data on patients presenting to Groote Schuur Hospital with acute peptic ulcer bleeding and treated with endoscopic therapy were prospectively collected. The rates of rebleeding, surgical or other intervention and death were recorded and analysed. In addition, demographic data, comorbidity, non-steroidal anti-inflammatory drug and aspirin use, length of hospital stay, transfusion requirements, endoscopic findings, Rockall score and aetiology of bleeding were recorded.

**Results:** Eighty patients (median age 54 years, range 22 - 91) were included, 51/80 (63.8\%) male; 61/80 (76.3\%) had successful primary haemostasis, and 19 (23.7\%) failed primary haemostasis and required either repeat endoscopy or surgical intervention. Seventeen (21.3\%) underwent second endoscopic therapy. Overall 6/80 (7.5\%) required surgical intervention, after failure of primary or secondary endotherapy. One patient underwent embolisation of the gastroduodenal artery Overall mortality was 9/80 (11.3\%): 8 patients died due to associated comorbidity (malignancy, ischaemic heart disease, chronic renal failure, cerebrovascular accident), and 1 death was due to bleeding and miliary tuberculosis (TB).

**Conclusion:** Single-agent endoscopic intervention controlled bleeding in 76\% of patients with acute peptic ulcer bleeding. In those who rebled, second endoscopic management controlled bleeding in 70\%; 8.8\% of patients required either surgery or embolisation. Although the overall mortality rate was 11\%, medical comorbidity rather than acute bleeding accounted for 89\% of these deaths.

**LAPAROSCOPIC GRAHAM PATCH FOR PERFORATED PEPTIC ULCER AT DR GEORGE MUKHARI HOSPITAL**

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Department of Surgery, University of Limpopo, Medunsa Campus

**Introduction:** Perforated peptic ulcer is a relatively common acute abdominal condition. Minimally invasive surgery has become a fundamental part of management of perforated peptic ulcer.
Aim: To report on our initial experience with laparoscopic Graham patch for perforated peptic ulcer.

Methods: Prospective data from patients who presented with acute abdomen as a result of perforated peptic ulcer were collected between November 2011 and April 2012. Those who had open surgery were excluded from the study. We looked at patient demographics, clinical condition, operative procedure and outcome. All patients had full resuscitation on admission and were operated on under general anesthesia. A three-port technique was used for most cases and an additional port was inserted when necessary. Peritoneal lavage was done with copious warm saline and the ulcer was closed with a Graham patch.

Results: During this period 11 patients were seen (10 males and 1 female; mean age 36 years, range 19 - 54 years). The average operative time was 120 minutes, and the mean hospital stay was 4 days. One patient spent 2 days in the intensive care unit (ICU) because she had associated comorbidity pre-operatively, and 1 patient had superficial wound sepsis.

Conclusion: Laparoscopic Graham patch is safe and feasible in our setting.

LAPAROSCOPIC APPENDECTOMY: THE DR GEORGE MUKHARI HOSPITAL INITIAL EXPERIENCE

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Introduction: The advantages of minimally access surgery cannot be overemphasised and include early return to work, fewer wound complications and fewer long-term complications. The unintended benefit of laparoscopy is introducing trainees to the technique of minimally invasive surgery. We share our experience with laparoscopic appendectomy.

Methods: Patient data including sex, age, operative findings, operative time, length of hospital stay and complications were recorded. Patients included had been diagnosed on clinical grounds using the Alvarado score and had had a laparoscopic appendectomy during November 2011 or April 2012. We excluded patients who had open appendectomy (i.e. ports unavailable, laparoscope unavailable).

Results: Seventy-four patients were included (51 males and 23 females, age range 12 - 64 years, mean age 27 years). Operative findings included inflamed appendix (44 cases, 59.45%), phlegmon (1, 1.35%), ruptured appendix (13, 17.56%), pelvic inflammatory disease (5, 6.75%), unexplained peritonitis (3, 4.05%) and normal (8, 10.81%). Mean operative time was 122 minutes (range: 45 - 230 minutes) and mean length of hospital stay 3.9 days (range 2 - 9 days). Twelve patients (16.21%) had complications including wound sepsis (3 cases), postoperative ileus (2), pelvic collection (1), pneumonia (1), bowel perforation (1), and other (incarcerated inguinal hernia) (1). Conversion to an open procedure was necessary in 3 cases. One patient died.

Conclusion: Laparoscopic appendectomy is a safe procedure in our setting and serves to introduce trainees to laparoscopic surgery.

AN OVERVIEW OF EXPERIENCE WITH LAPAROSCOPIC SPLENECTOMY AT TYGERBERG ACADEMIC HOSPITAL AND A REFLECTION ON COMPARABLE INTERNATIONAL LITERATURE

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Introduction: Laparoscopic splenectomy offers favourable postoperative morbidity and mortality rates and is currently recognised as the gold standard in patients requiring splenectomy as part of the management protocol for haematological disease.

Aim: The aim of this study was to show whether laparoscopic splenectomy as currently practised at our institution is a feasible, effective, and safe procedure and to compare our experience with available international publications.

Methodology: The study was a retrospective cohort study, reviewing all laparoscopic splenectomies done at our institution over a 5-year period. Data collected included patient demographics, indications for surgery, operative time, concomitant procedures, dissection devices, complications and postoperative outcome.

Results: During the 5-year period July 2006 - June 2011, 8 surgeons at our institution performed a total of 40 laparoscopic splenectomies. Of these patients, 10 were male (25%) and 30 were female (75%), with a mean age of 35 years. Idiopathic thrombocytopenic purpura was the most common indication for laparoscopic splenectomy (72.5% of cases). Other indications included hereditary spherocytosis, auto-immune haemolytic anaemia, Evan’s syndrome and metastatic disease. The mean operating time was 136 minutes. Seven patients had concomitant procedures at the time of the laparoscopic splenectomy (2 cholecystectomies, 1 bilateral oophorectomy, and additional splenic tissue removed in 4 cases). The intra-operative complication rate was 7.5% with a postoperative morbidity of 17.5%. There were no deaths, and the mean postoperative hospital stay was 3 days.

Conclusion: We have demonstrated that laparoscopic splenectomy can be performed safely and effectively in a tertiary setting such as ours. If cases are carefully selected, it is the procedure of choice when splenectomy is required. The morbidity and mortality in this study were low and comparable with international literature.

THE EFFECTIVENESS OF LAPAROSCOPIC APPENDECTOMY IN TEACHING DEXTERITY IN MINIMALLY INVASIVE SURGERY

M Z Koto
Department of Surgery; University of Limpopo, Medunsa Campus

Introduction: Minimally invasive surgery has become an integral part of our surgical repertoire, and the key challenge is how to maximise case mix for safety on the one hand and effective training on the other.
Aim: We investigated the role of laparoscopic appendectomy in registrar training.

Methods: All surgical registrars were exposed to laparoscopic appendectomy from November 2011 up to the time of writing. We looked at the steps involved in laparoscopic appendectomy. There were at least 12 steps involved in the procedure.

End points looked at were ability to do the procedure safely, declining operative time, ability to do other laparoscopic procedures, and complications.

Results: The 13 registrars involved did 75 procedures between them. All of them are now able to do appendectomies between average caseloads of 5 patients each. Operative times decreased. Complications were two iatrogenic bowel perforations (relook patients). No deaths were reported. Confidence levels rose significantly among the registrars, with a positive effect on the learning curve for other procedures.

Conclusion: Laparoscopic appendectomy is a very effective teaching procedure in minimal invasive surgery

LAPAROSCOPY IN TRAUMA: OUR EXPERIENCE
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Introduction: There has been huge scepticism about the use of laparoscopy in trauma patients. This has been attributed to data from the early 1990s, when laparoscopy was associated with a high rate of missed small-bowel injuries.

Aim: To collect data on all trauma patients treated with laparoscopy in our institution.

Methods: We prospectively collected the records of all patients treated at our institution using minimally invasive surgery between November 2011 and May 2012. We included all patients offered diagnostic laparoscopy for trauma (penetrating and blunt) and looked at the patients’ demographic data, operative findings, procedures and outcomes. We excluded all patients who were haemodynamically unstable and those who were offered open operations.

Results: There were 15 patients in the series (12 males and 3 females), ages 9 - 52 years (mean 32 years). Operative findings included small-bowel perforations (4 cases), colonic perforations (4), stomach perforation (1), gallbladder perforation (1), inferior vena cava injury (1) and diaphragmatic injury (1). Six procedures were non-remedial and 1 was converted to an open laparoscopy. The mean operating time was 127 minutes (range 37 - 240 minutes) and mean hospital stay was 12 days (range 2 - 30 days). Two cases were complicated by anastomotic leakage, and 1 patient died.

Conclusion: Laparoscopy in trauma patients is a safe modality in the haemodynamically stable patient, and it should be done under supervision.

LAPAROSCOPIC COMMON BILE DUCT EXPLORATION IN A RESOURCE-CONSTRAINED ENVIRONMENT
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Background: Laparoscopic common bile duct exploration (LCBDE) has been introduced as an alternative treatment option in the management of common bile duct stones. There has to date been no consensus on treatment choice for common bile duct stones and no guidelines have been published on whether a transcytic or choledochal approach is preferable, whether to leave a T-tube or close the duct primarily, and whether to use choledochostomy or intra-operative cholangiography. Most recommendations are based on local expertise or available resources.

Methods: From July 2010 to April 2012, 15 patients had an LCBDE at Chris Hani Baragwanath Academic Hospital. The data on these cases were collected retrospectively and the authors’ experience analysed. The mean age of this cohort was 59 years. Pre-operative ERCP with attempted stone extraction was performed in 14 patients, with an average of 1.8 attempts per patient. For access to the common bile duct the transcytic approach was chosen in 2 patients and choledochotomy in the remaining 13. Flexible choledochoscopy was used in 14 patients and intra-operative cholangiography in 4.

Result: One death occurred, related to T-tube manipulation 6 weeks after LCBDE after an attempt to remove retained stones. Retained stones were found in 13% of the patients. One patient sustained a bile leak with a pelvic collection that required repeat ERCP and stenting post LCBDE and pigtail drainage of the pelvic collection. Successful laparoscopic stone clearance was achieved in 87% of the patients. The mean duration of surgery was 238 minutes for all groups, 233 minutes for the transcytic approach, and 260 minutes when choledochotomy was used. T-tube placement was used in 38% of patients as opposed to primary closure of the choledochotomy in 54%. One patient had a distal common bile duct stricture and required a choledochochoduodenotomy for diversion of biliary drainage.

Conclusion: Although the number of patients in this retrospective analysis is small, we have learnt valuable lessons. This cohort had more complex stone disease than is quoted in similar reports; this is because only patients who have failed stone extraction after multiple ERCP attempts are considered for LCBDE. This explains the high percentage of choledochotomies performed as opposed to the transcytic approach. Choledochoscopy is preferred to intra-operative cholangiographic guidance and is associated with a good clearance rate. T-tube drainage is not necessary in most patients and the impact of primary closure of the common bile duct still needs to be clarified in longer follow-ups of patients undergoing LCBDE. LCBDE is feasible in resource-constrained environments, and is a valuable tool in the armamentarium in the management of choledocholithiasis.
SAJS

RIDING OUT THE BUREAUCRATIC STORM THE MINIMALLY INVASIVE WAY – YOU NEED A HELMET

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Introduction: Minimally invasive methods have revolutionised the way surgery is practised all over the world, but in resource-constrained environments it is still very challenging to fully embrace this modality of treatment. The reasons are many, but some of them are purely organisational and related to fear of the unknown. Our hospital has not been involved in the mainstream of minimally invasive surgery to any great extent for a long time, and we set out to change this.

Aim: We share our experiences and challenges of starting laparoscopic surgical services at our institution.

Methods: We prospectively collected all cases done laparoscopically at Dr George Mukhari Hospital over a 7-month period. The demographic data, the procedure done and operating time were noted. We noted the concerns, fears and limitations of the theatre staff.

Findings: A total of 153 procedures were done. The challenges were fear and very rudimentary to no knowledge about laparoscopic instruments and procedures, but there was great willingness to learn. The initial resistance to laparoscopy completely disappeared and was replaced with eagerness and enthusiasm.

Conclusion: Starting minimally invasive surgery requires tact, patience, diplomacy, gentleness and resolve. It is doable even in the most hostile environment.

SALIVARY MUCIN MUC5B INHIBITS HIV-1 SUBTYPES A AND C IN AN IN VITRO PSEUDOVIRAL ASSAY

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Motivation/problem statement: Sub-Saharan Africa is the world’s worst HIV-AIDS-affected region. More interventions to manage this pandemic are urgently required. Transmission of the virus through exchange of saliva is rarely known to occur. This project sought to further describe findings that crude saliva and its purified mucins inhibit HIV-1 using an in vitro pseudoviral assay. A robust assay is key to the identification of the mechanism involved in the inhibition of the virus by mucins. It could also help identify a peptide sequence in mucins that could be used as a basis for the development of a microbicide.

Methods: Mucus was extracted in 4M guanidinium hydrochloride, and a cocktail of protease inhibitors, pH 6.5. Sepharose 4B gel filtration was used to separate MUC5B and MUC7 in saliva and mucins were purified by density-gradient ultracentrifugation in caesium chloride. SDS-PAGE analysis and Western blotting determined the size, purity and identity of the mucins. The inhibitory activity of crude saliva and purified MUC5B and MUC7, from HIV-negative (n=20) and HIV-positive (n=20) donors, was tested by their incubation with subtype A and C HIV-1 pseudovirus and infection of susceptible epithelial tumour cells (genetically modified TZM-BL cells).

Results: Crude HIV-negative and HIV-positive saliva inhibited HIV-1 in an in vitro pseudoviral assay in a dose-response nature. Salivary MUC5B neutralises HIV-1 pseudoviruses CAP45 (KZN) and DU422 (Durban) of subtype C and Q168a.2 (Kenya) of subtype A, when purified from HIV-negative and HIV-positive individuals. The neutralisation capability of MUC5B IC_{50} 15.40 µg/ml appears greater than MUC7 IC_{50} 26.78 µg/ml for the HIV-negative group.

Conclusion: Crude saliva and its purified mucins from both uninfected controls and HIV-positive individuals inhibited HIV-1 in an in vitro pseudoviral assay. The different inhibitory capabilities are postulated to be due to altered glycosylation of the mucins. Further work using LC-MS to analyse glycosylation between HIV-negative and HIV-positive groups and mucins will reveal such differences.

MAGGOT DEBRIDEMENT THERAPY IN SOUTH AFRICA: GENETIC MAPPING OF LUCILIA SERICATA MAGGOTS

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Introduction: Maggot debridement therapy (MDT) is as old as recorded history. The first choice of fly remains a member of the Calliphoridae family, Lucilia (Phaenica) sericata, as the maggots from this do not invade normal, healthy tissue, but only absorb dead tissue. A close relative, L. cuprina, is associated with invasive miasis. Careful selection of the correct fly species is therefore necessary before maggot therapy can be used on patients.

Stellenbosch University expressed interest in acquiring a colony of maggots, and therefore had to verify our flies as to be the correct species, namely L. sericata.

Methodology: A few maggot specimens from both our fly colonies (known as Welkom 1 and Welkom 2) were sent to the Stellenbosch University DNA Sequencing Unit at the Central Analytical Facilities for DNA sequencing. They looked at the 28S marker, which has been used on a previous occasion to identify L. sericata.

Results: DNA sequencing confirmed that the colonies we have in Pretoria are genetically identical, but only for the 28S gene, as the rest of the genome was not tested. Furthermore, the gene is also identical to the previously tested L. sericata gene, the ideal fly to use for medicinal maggots.

Conclusion: With the genetic confirmation that our colonies (Welkom 1 and 2) are indeed L. sericata, we can confidently supply other regions in South Africa with maggots to use in the medical field for wound debridement. This will make the maggots accessible to more patients who need the therapy.
**HIGH-INTENSITY FOCUSED ULTRASOUND TO CONTROL BLEEDING FROM SOLID ORGAN INJURIES**

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**Introduction:** High-intensity focused ultrasound (HiFU) has been used experimentally to control bleeding from solid organs and blood vessels. Bleeding from the liver and spleen can be controlled by direct application to the injury, while injury to blood vessels can be controlled by percutaneous application of the energy source.

We want to develop a system that can apply HiFU percutaneously to control bleeding from injured solid organs.

**Methodology:** A transducer was developed by the CSIR that has the ability to adjust the focal depth of the energy beam, allowing application of the energy at different distances from the skin. We tested the new transducer on an anaesthetised pig. After induction of general anaesthesia, a laparotomy was performed, and a controlled incision was made on the outer surface of the liver. The liver was then packed against the abdominal wall, and the injury was identified with diagnostic ultrasound (US) percutaneously, and the depth measured. The therapeutic probe was then applied and after adjusting for the depth, the energy beam was activated for different time periods.

**Results:** We were unable to control the bleeding from the liver injury, as most (or all) the energy was absorbed by the skin, or lost on the interface between the energy source and the skin. When the probe was applied directly on the liver, we were able to create a lesion in the liver substance. It is unclear whether the problem lies in the probe or energy source, or whether the skin of the pig was too resistant (or dense) for the energy to penetrate to the liver substance.

**Conclusion:** We were unable to control bleeding from the liver by percutaneous application of HiFU. We need to develop the probe further, and also integrate the diagnostic and therapeutic probes into one handpiece.

**DEVELOPMENT OF A MULTICOLOUR FLOW CYTOMETRY PANEL TO PHENOTYPE NATURAL KILLER CELLS – IMPLICATIONS FOR LIVER TRANSPLANT RECIPIENTS**

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**Introduction:** Natural killer (NK) cells constitute 5 - 15% of peripheral blood mononucleocytes, but are greatly enriched in the liver, where they represent 30 - 50% of hepatic-derived lymphocytes. Studies show a potentially protective role of NK cells following liver transplantation, including acute and chronic rejection and recurrence of hepatocellular carcinoma (HCC) and hepatitis C (HCV). Further studies characterising the phenotypes of these NK subsets is required to identify correlates of protection and possible immunotherapeutics. As liver-infiltrating lymphocytes are difficult to access, the aim of this pilot study was to develop a multicolour flow cytometry panel to phenotype peripheral NK cells using influenza vaccination as a model.

**Methodology:** A 12-colour multicolour flow cytometry panel was developed to phenotype NK cells, with inclusion of fluorescent antibodies to allow for distinguishing a dump channel, phenotypic (CD3, CD4, CD8, CD16 and CD56), memory (CD27 and CD45RO) and select NK cell receptors (NKp46 and NKG2D). Markers able to differentiate between cytolitic (CD107a) and cytotoxic (IFNy) functions were also included. Six participants were bled 3 and 72 days after receiving a trivalent inactivated influenza vaccine. *Ex vivo* stimulations were performed on isolated peripheral blood mononuclear cells using the same vaccine preparation.

**Results:** When control NK cells were compared with *ex vivo* influenza-stimulated cells, there was a significant increase in CD16+ NK cells with a concomitant decrease in CD56dim NK cells 3 days post vaccination (*p*=0.028). CD27 expression on CD16+ NK cells was not affected by *ex vivo* influenza stimulation at day 3; however, at day 72 there was a significant increase in CD16+ NK cells expressing CD27 when compared with day 3. Importantly, despite inter-participant variability, all participants expressed the CD45RO memory marker 3 days post vaccination on NK cells. (This marker has not previously been reported on NK cells.) Further phenotyping revealed that CD45RO was only expressed on CD56dim NK cells not expressing CD16.

**Conclusion:** Studies have shown a role for CD56+ NK cells in post-transplant HCV recurrence and the potential immunotherapeutic role of donor NK cells in HCC liver transplant patients. Although still controversial, studies have indicated that the transfer of donor NK cells contribute to the relatively tolerogenic state experienced in liver transplant recipients (as compared with other solid organ transplants), but the phenotype of cells involved in these mechanisms remains to be fully characterised.

In this study using influenza vaccination as a model, differences were shown between NK cell phenotype 3 days and 72 days post vaccination, as well as differences in functional responses within NK subsets. In conclusion, the flow cytometry panel that was developed on peripheral lymphocytes can be applied to hepatic lymphocytes to further help elucidate the role of NK cells in liver transplantation.

**CHARACTERISATION OF MUCUS AND MUCINS IN RESPIRATORY DISEASE WITH A FOCUS ON TUBERCULOSIS**

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**Introduction:** Respiratory diseases are a major cause of death in South Africa, with TB being one of the major respiratory illnesses. The respiratory tract is lined by a layer of mucus that protects the airways and lungs against injury by foreign agents. MUC5AC and MUC5B are the predominant respiratory tract mucins. Little is known about the association between respiratory mucins and TB. The objectives of this study were to determine the type and role of respiratory mucus in TB.

**Methods:** Fifty-one sputum samples (of which 9 were TB-positive) and 58 broncho-alveolar lavages (BALs) (8 TB-positive) were collected in 6M guanidinium hydrochloride and inhibitors. Mucins were reduced and alkylated with DTT and iodoacetamide...
and purified by density gradient ultracentrifugation in caesium chloride. Identification of MUC5AC and MUC5B were determined by Western blotting. Differential protein expression patterns were determined using 2D SDS PAGE analysis.

**Results:** Western blot data showed higher secretion of MUC5AC than MUC5B in patients with TB, both in sputa and BALs. MUC5AC also showed distinct behavioural characteristics in its fractionation in a caesium gradient compared with MUC5B. There was more MUC5AC in TB sputa in patients who were HIV-positive. This seemed so for MUC5B also, although in far lesser amounts. A small group of TB patients had MUC7 in the sputa (and not in the lavage), and there were varying amounts of MUC2 in some TB samples and non-TB lung disease. The presence of MUC5AC and MUC5B in different fractions suggests varying glycosylation of the mucin.

Preliminary proteomic data show a greater expression of low-molecular-weight proteins in patients with TB, the implication of which is unclear at this stage.

**Conclusions:** Respiratory mucin expression differs in both sputa and BALs in TB compared with non-TB. Patients with TB who are HIV-positive secrete more of the respiratory mucins MUC5AC and MUC5B.

**THE ROLE OF HUMAN BREASTMILK AND MUCINS IN HIV/AIDS**

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**Introduction:** HIV in South Africa is transmitted predominantly through heterosexual sex, with mother-to-child transmission being the other main infection route. According to data published in 2010 by Statistics South Africa, an estimated 40 000 children in South Africa are infected with HIV each year, reflecting poor prevention of mother-to-child transmission. While human breastmilk is rich in components such as mucin that have been reported to protect against pathogens and viruses, breastfeeding is nevertheless a significant route of HIV transmission. The objectives of this study were to isolate, purify, characterise and investigate the anti-HIV-1 activity of crude breastmilk and its purified mucin components, namely MUC1 and MUC4, in HIV-positive patients (n=20) compared with those who were not infected (n=20).

**Methods:** Mucus was extracted and solubilised by stirring in 6M guanidinium chloride and a cocktail of protease inhibitors (1:5). The milk fat globule membrane was obtained after the human breastmilk was defatted by centrifugation at 3 000 g for 1 hour at 4°C. Following Sepharose CL-4B gel filtration, the identity of mucins was confirmed to be MUC1 and MUC4 by Western blotting. Amino acid composition was by high-performance liquid chromatography. The anti-HIV activity of the crude breastmilk, purified milk mucins, and heated milk from the HIV-positive (n=16) and HIV-negative (n=16) groups was tested against the Du422.1 pseudovirus using the reporter gene assay in TZM-bl cells.

**Results:** Sepharose CL-4B gel filtration, gave two large mucin-rich peaks in the void (V0) and included volumes (VI) for the HIV-positive samples and one small peak and another large peak for the HIV-negative samples. Western blot analysis of the semi-purified material eluting from the Sepharose 4B gel filtration column confirmed the presence of MUC1 and MUC4 in samples from both the HIV-positive and HIV-negative groups, with far more material in the HIV-positive group. There was no difference in the content of amino acid between the two groups. The crude breastmilk samples showed 60% neutralisation for the HIV-positive samples, while the HIV-negative milk neutralised 40%. The purified milk mucins from the HIV-positive group neutralised 50% of the viral activity, while the HIV-negative mucins had much lower neutralisation efficacy with 35% neutralisation. Increased neutralisation of viral activity was seen for the heated milk samples with neutralisation of 80% for the HIV-positive samples and 70% for the HIV-negative samples.

**Conclusions:** There was more MUC1 and MUC4 in the HIV-positive samples, of which the crude breastmilk and purified mucins gave more neutralisation of HIV-1 than the HIV-negative samples. Heated milk was more potent in neutralising the virus.

**DONOR KIDNEY EVALUATION USING 51Cr-EDTA TO DETERMINE GLOMERULAR FILTRATION RATE AND OUTCOME IN RECIPIENTS: PRELIMINARY DATA**

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**Background:** Kidney donation is the most successful modality of treatment for end-stage renal failure. In Johannesburg, measuring the glomerular filtration rate (GFR), as assessed by 51Cr-EDTA clearance with single or two blood samples, is often part of the donor workup. Although a GFR of 80 - 120 ml/min/1.73 m² is regarded as ‘normal’, GFRs of 60 - 80 ml/min/1.73 m² are not uncommon and are often associated with a vegan diet. Protein loading such patients with beef and fish for one week can result in a significant increase in GFR of >20%, i.e. their functional renal reserve is normal. Some of these patients have subsequently donated kidneys.

**Aim:** To review outcome of recipients receiving kidneys from protein-loaded donors and of those donors after the transplant.

**Methods:** GFR (51Cr-EDTA clearance) was determined on hydrated fasting patients with blood sampling at 2 and 4 hours or with a single 3-hour determination. Potential renal donors (PRDs) with below ‘normal’ GFR were requested to consume a diet high in beef and fish protein. GFR was re-measured after 1 week and after kidney donation where this was determined. Recipient post-transplant course was followed and compared with recipients receiving kidneys from non-protein-loaded donors with initially ‘normal’ GFR.

**Results:** The 228 PRDs (mean age 36.2 (SD 8.8) years; 138 females/89 males) screened had a mean GFR of 95.2 (SD 17.2) ml/min/1.73 m²
with 121 donating (GFR 98.8 (SD 16.3) ml/min/1.73 m²) and 93 not donating. PRDs with below ‘normal’ GFR were protein loaded with the GFR increasing in 8/14 from 71.3 (SD 7.1) to 91.5 (SD 11.5) ml/min/1.73 m² (21.1% (SD 10.2%) increase), and these PRDs donated. GFR did not increase in 3/6 of the remaining PRDs, who did not donate owing to apparent sub-optimal renal function.

Recipients (n=3/8) who received protein loading had functioning grafts surviving for 4, 11 and 15 years respectively, and those with initially ‘normal’ GFR, 48/76 with known functioning grafts, had median survival of 8 years (range 1 - 14 years). Limited data show donor that GFR decreased slightly following nephrectomy, and in 1 case GFR increased following protein loading.

Conclusions: GFR can be increased in donors with below ‘normal’ GFR by protein loading. PRDs with low GFR can be used as donors when their GFR increases at least 20% following protein load. Outcome in recipients receiving such kidneys can be good and limited follow-up data in these donors appear satisfactory.

THE COST OF ACUTE APPENDICITIS IN A DEVELOPING COUNTRY

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Introduction: Secondary prevention of appendicitis centres on early surgical intervention but requires an efficient healthcare system to provide adequate access. There is a paucity of research focusing on the cost of appendicitis in developing countries. This prospective study from a regional hospital in South Africa attempts to construct a robust cost model.

Methodology: A prospective audit of all cases of appendicitis from September 2010 to September 2011 was reviewed. The micro-costing approach was used and a cost model was constructed based on the estimated cost of operative intervention (operating theatre time), peri-operative intervention (analgesia and antibiotics), and length of hospital stay (including ICU admission).

Results: A total of 185 cases were reviewed and divided into four subgroups for cost analysis; 71 had uncomplicated appendicitis (total cost ZAR467 003, cost per patient ZAR6 578), 51 had perforated acute appendicitis with localised sepsis (total cost ZAR754 341, cost per patient ZAR14 791), and 63 had perforated acute appendicitis with four-quadrant sepsis. In this group the total cost for 43 patients who did not require ICU admission was ZAR1 497 583 and the cost per patient ZAR34 838, while the total cost for 20 who required ICU admission was ZAR1 363 010 and the cost per patient ZAR68 151. The total cost for all patients was ZAR4 081 937.

Conclusions: If treated appropriately, early uncomplicated appendicitis has little morbidity and is relatively inexpensive to treat. As the pathology progresses from localised perforation to generalised perforation with sepsis, so the cost of treating the diseases rises exponentially. Improvements in so-called secondary prevention of this disease process will reduce morbidity and provide major cost savings.

OUTCOME OF URBAN VERSUS RURAL PATIENTS PRESENTING WITH ACUTE APPENDICITIS

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Introduction: Acute appendicitis is common. Patients from rural areas often experience a significant delay in presentation, which is associated with a worse outcome. This prospective study aimed to review the outcome of patients who presented from either a rural or an urban setting.

Methodology: A prospective database was maintained and all cases of acute appendicitis from September 2011 to September 2012 were reviewed. Any patients from the Pietermaritzburg district were considered urban. All patients from outside the district (including peripheral hospital referrals) were considered rural.

Results: A total of 200 cases were reviewed, 65% (130) from the urban region and 35% (70) from the rural region. Those from the rural group had a significantly longer duration of illness prior to presentation (7 days v. 4 days, p<0.001). Simple non-perforated appendicitis is more common in urban than rural patients (81.7% v. 18.3%, p<0.001). The rural group also had a higher perforation rate with four-quadrant sepsis (60.9% v. 39.1%, p<0.001) and need for intensive care admission (71.4% v. 28.6%). Hospital stay was also longer (8.2 days v. 5 days). There was no significant difference in overall mortality.

Conclusions: A significant proportion of patients from the rural areas present with a protracted course of illness and significantly higher adverse outcome. Effort must be focus in addressing access to appropriate surgical care in this group of patients.

EXPLORING RACIAL DIFFERENCES IN CLINICAL PRESENTATION AND GENETIC FEATURES OF COLORECTAL CANCER AT PRETORIA ACADEMIC HOSPITAL COMPLEX IN THE PERIOD 2010 - 2012: A CLINICAL AUDIT AND PROSPECTIVE STUDY

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Background: Adenocarcinoma of the colon occurs in a sporadic or a hereditary form. Smoking and a diet low in fibre and high in red meat have been implicated in the aetiology of colorectal carcinoma. The incidence of colorectal carcinoma is significantly lower in black South Africans. It is unknown how current trends in migration and urbanisation with associated dietary changes have influenced the presentation of colorectal carcinoma.

Aim: To investigate racial differences in age of presentation, clinical features such as histological grade, anatomical position of the tumour, stage at presentation, associated risk factors, and
environmental factors such as diet (fibre content) and background. This study also includes a prospective analysis of the genetic features (microsatellite instability) associated with colon cancer, comparing these features in different race groups. Understanding these variations might present an opportunity to define and address risk factors and alter clinical practice.

**Method:** All patients with colon carcinoma presenting to Steve Biko Academic Hospital and Kalafong Hospital between January 2010 and May 2012 were invited to participate in the study. Data were obtained by patient interview and from patient records. A blood sample was obtained from all patients for DNA analysis. Patients with polyposis syndromes were excluded from the study.

**Preliminary results:** Seventy-three patients were included in this audit; 29 were black, 37 white, 5 coloured and 2 Indian. The mean age of the black patients investigated was 6 years lower than that in the white group; 38% of black patients were under 55 years at diagnosis compared with only 26% of white patients. In black patients, 83% of cancers were in the left colon and rectum as opposed to 40% in white patients. Of the 5 coloured patients, 3 had cancer in the left colon (60%). Both Indian patients had cancer in the left colon and rectum. Only 1 black patient (3.4%) presented with stage II carcinoma. All the other patients in this group had stage III or IV disease. Of white patients, 35% presented with stage II disease. The rest of the patients in this group had stage III or IV disease. All the cancers were adenocarcinomas. Two black patients (6.9%) and 1 white patient (2.7%) had poorly differentiated cancer. Sixty-nine per cent of black patients, 83% of white patients and all of the Indian and coloured patients were from an urban as opposed to a rural background. On average, black patients consumed more than twice the amount of fibre (38.5 g, range 10 - 72 g) as white patients (17.4 g, range 11 - 30 g). Of the white patients, 27% had identifiable risk factors compared with only 3.4% of black patients; 37.8% of white patients were smokers compared with 13.7% of black patients. Results of genetic studies will be available for presentation in July 2012.

**Conclusion:** There are racial differences in the clinical presentation of colorectal carcinoma. Black patients present with colorectal carcinoma at a younger age and at a more advanced stage compared with white patients. Black patients are more likely to have a carcinoma in the left colon or rectum. Black patients with colorectal carcinoma consume a high-fibre diet, and in Pretoria the majority will be from an urban as opposed to a rural background.

**MORPHOLOGY OF THE FETAL SIGMOID COLON WITH SPECIAL REFERENCE TO THE AETIOLOGY OF SIGMOID VOLVULUS**

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**Introduction:** The adult sigmoid colon in the African population group has been shown to be elongated compared with other population groups, predisposing this population group to sigmoid volvulus.

Aim: To determine the morphological types of the fetal sigmoid colon and to establish whether the predisposition to sigmoid volvulus is present in fetuses.

**Method:** An inverted ‘U’-shaped incision was made to examine the abdominal cavity in 333 fetuses of gestational ages 17.27 (SD 3.63) weeks (range 11 - 38 weeks). The small intestine was displaced upwards and the descending and sigmoid colons were examined and categorised according to the position and type of the sigmoid colon loop. The fetuses were divided into three groups, group A (11 - 15 weeks), group B (16 - 20 weeks) and group C (>20 weeks).

**Results:** There were 296, 21 and 16 African, Indian and white foetuses, respectively (104 in group A, 159 in group B and 70 in group C). An elongated colon was seen in 63%, 24% and 6% of Africans, Indians and whites, respectively (African v. other population groups p<0.0001). The brim position occurred in 117 fetuses (30%, 60% and 95% of Africans, Indians and whites, respectively), whereas the suprapelvic position occurred in 191 subjects (63%, 20% and 6% of Africans, Indians and whites, respectively). Among Africans the suprapelvic position occurred in 31%, 67% and 88% of groups A, B and C, respectively. The opposite applied to the brim position.

Among Africans there was a higher proportion of suprapelvic position among males than females, whereas the brim position was more common in females (p=0.044). Among fetuses with the suprapelvic position the long-narrow loop type was more common in males than females, whereas the broad shape was more common in females (p=0.038).

**Conclusion:** The elongated sigmoid colon among Africans is present in utero and at birth. The suprapelvic position is more common in Africans, and it tends to occur more frequently in males. These features are congenital, and consequently so is the predisposition to sigmoid volvulus.

**THE MANAGEMENT OF RETROPERITONEAL HAEMATOMAS: FACTORS INFLUENCING OUTCOME**

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**Introduction:** Retroperitoneal haematomas (RPHs) occur in 6 - 44% of patients with abdominal trauma. This study assesses the outcome of the local management of RPH using data from one surgical ward in a tertiary hospital.

**Aim:** To review our local experience with presentation and management of RPH in a Durban tertiary hospital and to establish factors influencing outcome.

**Methods:** This was a retrospective analysis of prospectively collected data on patients presenting with retroperitoneal hematoma at King Edward VIII Hospital over a period of 7 years from January 1998 to December 2004. Data including demographics, clinical presentation, findings at laparotomy, management and outcome were documented. Prophylactic antibiotics were given at induction of anaesthesia. All zone I
injuries were explored. Zone II and III were explored selectively and injured organs within the retroperitoneum were managed on their merits. Patients who died underwent autopsy and cause of death was determined.

Results: Of a total of 488 patients with abdominal trauma, 145 patients (29.7%) were found to have sustained RPH from stabs (24), firearms (109) and blunt trauma (12). There were 136 males (male/female ratio 15:1) and the mean age was 28.8 (SD 10.6) years. Mean delay before surgery was 10.6 (SD 19.3) hours. The mean Injury Severity Score (ISS) was 13.39 (SD7.55). There were 41 zone I, 50 zone II, 34 zone III and 20 zone IV haematomas.

Fifty-two patients developed complications (36%) and 26 patients died (18%). The mortality rates for zones I, II, III and IV haematomas were 20%, 6%, 24% and 35%, respectively. Twelve of 24 patients who presented in shock died (50%) compared with 14 of 121 patients who did not present with shock (12%). Eighteen of 65 patients with <6 hours delay before surgery died (28%), compared with 8 of 79 with a delay of >6 hours (10%). The mortality rates for ISS ≤9, 10 - 20 and >20 were 12%, 18% and 47%, respectively. Mortality rates for stabs, firearms and blunt trauma were 4%, 20% and 25%, respectively. The mean hospital stay was 13 (SD 15.5) days. Fifty-six patients required ICU management, with a mean ICU stay of 5 (SD 5.5) days.

Conclusion: RPH occurred in 30% of patients with abdominal trauma, with a mortality rate of 18%. Shock on admission, high ISS, blunt and firearm injury and involvement of more than one zone were all associated with significantly increased mortality. Our current management algorithms for RPH are in keeping with acceptable norms and are safe and effective.

A CLINICOPATHOLOGICAL SPECTRUM OF ANAL CANCER IN KWAZULU-NATAL
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Introduction: Anal cancer accounts for 2% of all colorectal malignancy. Management has changed over time from surgical excision to chemoradiation.

Aim: To document our experience with the management of anal cancer presenting to the KwaZulu-Natal teaching hospitals.

Patients and methods: The data analysed in this study were extracted from an anal cancer database kept in the Department of Surgery at the University of KwaZulu-Natal and spanning a period of 8 years (2004 - 2011). All patients diagnosed with anal cancer were included in the analysis. The study was carried out in a tertiary colorectal referral unit. Data analysis included demographics, clinical presentation, site of tumour, treatment and outcome, as well as follow-up data.

Results: One hundred and thirty patients were included into the study (African 96, Indian 21, white 7 and coloured 6). There were 60 males and 70 females (male/female ratio 1:1). The mean age was 51 (SD 14.0) years (range 25 - 82 years). Thirty patients were HIV-positive, 10 were HIV-negative and the rest were of unknown status. The most common presenting symptoms were an anal mass (41 cases), bleeding (27), ulcer (24), loss of weight and/or appetite (19), anal pain (18), peri-anal abscess/fistula (16), change in bowel habit (14), warts (8) and incontinence (6). The duration of symptoms was 15.37 (SD 19.41) months. Histology was squamous carcinoma (95 cases), adenocarcinoma (33), melanoma (1) and neuro-endocrine tumour (1). There were 104 anal margin tumours and 26 anal canal tumours. Ten patients had distant metastases at diagnosis (8%). Ten patients were eligible for surgery (8%). The rest were managed non-operatively. Seventy-nine patients were lost to follow-up and the rest were followed up for 1 - 69 months, with a mean follow-up of 16 months (SD 17.0). Eleven patients have been confirmed dead so far.

Conclusion: Anal cancer affects all population groups with an equal sex incidence. Squamous carcinoma was three times as common as adenocarcinoma. Anal margin tumours were five times as common as anal canal tumours. Delayed clinical diagnosis leads to poor prognosis.

METASTATIC COLORECTAL CANCER IN KWAZULU-NATAL: A 12-YEAR EXPERIENCE
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Background: The liver is the most common site of colorectal metastases, followed by the lungs. Treatment options include surgery, palliative chemotherapy and/or radiotherapy.

Aim: To evaluate our experience with clinical presentation, management and outcome of metastatic colorectal cancer.

Methods: The data analysed in this study were extracted from a prospectively compiled colorectal cancer database kept in the Department of Surgery at the University of KwaZulu-Natal spanning a period of 12 years (2000 - 2011). All patients diagnosed with metastatic colorectal cancer were included in the analysis.

The study was carried out in a tertiary colorectal referral unit. Data analysis included demographics, clinical presentation, disease staging, treatment, outcome and follow-up.

Results: The database so far is constituted of 1 424 patients with colorectal cancer. Of these, 245 patients (17%) were diagnosed with stage IV colorectal carcinoma (mean age 57.5 (SD14.6) years and male/female ratio 1:1). There were 73 Africans, 102 Indians, 11 coloureds and 59 whites. The primary sites were ascending colon and caecum (31 cases), hepatic flexure (7), transverse (9), splenic flexure (4) descending (8), sigmoid colon (150) and rectum (122); the rest were unknown. The sites of metastases were liver (172 cases, 70%), lung (47, 19%), peritoneum (21, 9%), omentum (12, 5%), ovaries (8, 3%) and miscellaneous (9).

Ninety-five patients (39%) underwent resection of the primary tumour. All patients were referred to and attended the Oncology Clinic. Two hundred and twenty-five patients (92%) presented at the Oncology Clinic for follow-up and possible treatment. Forty-six patients were not given any treatment; 12 were deemed too
ill to receive palliative treatment and were referred to hospice, 2 refused treatment and the rest did not return for commencement of treatment. One patient had excision of a liver metastasis and 1 patient had excision of a lung metastasis. The mean follow-up was 15 (SD 17.3), range 1 - 105 months. Fifty eight patients have been confirmed dead (24%); 2 died in hospital following resection of the primary tumour, and 56 have been certified dead due to disease progression.

Conclusion: Metastatic colorectal carcinoma accounts for 17% of colorectal cancer in KwaZulu-Natal. We have reaffirmed the liver to be the most common site for metastases. Surgical intervention rate for metastatic disease is extremely low in our setting, and patient follow-up remains a problem. Not surprisingly there is an appreciable mortality.

INCIDENCE AND MANAGEMENT OF BILE LEAKS AFTER LIVER RESECTION: AN ANALYSIS BASED ON A PROSPECTIVE LIVER RESECTION DATABASE


Surgical and Medical Gastroenterology Units, Groote Schuur Hospital, and Departments of Surgery, Medicine and Radiology, Faculty of Health Sciences, University of Cape Town

Background: Bile leaks are a major cause of morbidity after liver resection. Our hypothesis was that knowledge of risk factors for bile leakage after liver resection could reduce its incidence. The aim of this study was to identify the peri-operative risk factors for postoperative bile leakage after hepatic resection.

Methods: The analysis was based on a prospective database of 374 liver resections performed in the hepatopancreatobiliary (HPB) surgical unit at Groote Schuur Hospital between January 1990 and April 2012. Peri-operative risk factors related to the development of bile leakage were identified. Data analysis included demographic information, extent of surgery, major or minor resections according to the number of segments resected (major >2 segments, minor ≤2 segments), duration of inflow occlusion, operative blood loss, peri- and postoperative blood transfusion, duration of hospital stay, clinical presentation of bile leaks, findings on ERCP, and outcomes after stent placement. Severity of bile leaks was graded as A, B or C according to the International Study Group of Liver Surgery classification. For statistical analysis Fischer’s exact test p<0.05 was regarded as significant.

Results: Bile leaks occurred in 18 patients (4.7%), who underwent 5 (n=5), 4 (n=6), 3 (n=4) and 2 (n=3) segment resections. Severity grades were A=1, B=14 and C=3. Significantly more bile leaks occurred in patients who had major resections with 4 or 5 segments resected, prolonged inflow ischaemic times and total operative time and increased operative blood loss (p<0.05). Bile drainage stopped spontaneously in 1 patient. In 17 patients percutaneous US-guided catheter drainage (n=11), endoscopic biliary stenting (n=6), percutaneous transhepatic cholangiography (PTC) drainage (n=2) and laparotomy (n=3) were used. Some patients required more than one type of intervention. Median hospital stay in the 356 patients without a bile leak was 8 days (range 1 - 98 days), compared with 17 days (range 7 -30 days) for those with bile leaks (p<0.05).

Conclusions: Biliary leaks occurred after complex or major liver resections with long operative times, prolonged inflow control and increased operative blood loss and resulted in significantly longer hospitalisation. Most were effectively treated non-operatively by percutaneous or biliary drainage.

BIOLOGICAL PROPERTIES AND REGENERATIVE POTENTIAL, IN VITRO AND IN VIVO, OF HUMAN CARDIAC STEM CELLS ISOLATED FROM THE ADULT HUMAN HEART


‘Liverpool Heart and Chest Hospital, Liverpool, UK; ‘Liverpool John Moores University, Liverpool, UK; ‘Laboratory of Molecular and Cellular Cardiology, Magna Graecia University, Catanzaro, Italy; ‘Cardiac Surgery Division, Second University of Naples, Catanzaro, Italy

Background and objective: The discovery that the mammalian heart harbours resident stem cells has opened a new and exciting field for cardiac biology and pathophysiology. However, many questions remain to be answered before the possibility of exploiting the clinical potential of these cells can realistically be contemplated.

Methods: Human myocardial samples were obtained during cardiac surgery or percutaneous left ventricular catheterisation from 19 patients (aged 43 - 65 years) with stable angina, troponin-negative unstable angina and mitral regurgitation. Biopsies were minced and cultured to allow migration of the cells from the explants. The cells in the ‘halo’ around the explants were then sorted to isolate CD45-negative, c-kit-positive (c-kitpos) human cardiac stem cells (hCSCs). These were analysed for expression of surface markers and ‘stemness’ genes by real time RT-PCR, Western blot, immunohistochemistry and FACS.

Results: All the clones of c-kitpos hCSCs obtained so far express high levels of c-kit, MDR-1, CD133, Oct-4, Nanog, Bmi-1, TERT, Wnt-1, β-catenin, Notch-1 and Hedgehog. Very few of these cells were Isl-1pos and they scored negative for CD34, CD45 and CD31. These cells cloned with high efficiency and some have undergone >62 passages without evidence of ‘crisis’ or culture senescence. A clone can therefore generate over 5×109 cells. After these passages, these cells remain TERTpos, and have normal telomere length. c-kitpos hCSCs form spheres, (marker of multipotency) and differentiate into cardiomyocytes, vascular smooth muscle and endothelial cells. When grown in cardiomyogenic differentiation medium, hCSCs down-regulate stemness genes and selectively differentiate into cardiomyocytes. Importantly, when injected into infarcted nu/nu rat hearts, they form histological and functional human myocardium.

Conclusion: The phenotype of hCSCs is similar to the one we have previously described for rodent CSCs. hCSCs can be
Introduction: University of KwaZulu-Natal

M Tomlinson, J Bruce, G Laing, D L Clarke

Service Electronic Database

The Pietermaritzburg Metropolitan Trauma

An Overview of the Initial 4 Months' Data from

Community Sample.

High-risk patients and randomly selected participants from a

and managed poorly in the primary healthcare setting, both in

Traditional vascular risk factors are identified

Conclusion:

Admission, all of whom required a major limb amputation.

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10.8% of patients with CLI and 11% of the community sample.

Undiagnosed diabetics accounted for

66% respectively in the community sample were not achieving

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Johannesburg by identifying and managing cardiovascular risk

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The aim of this study was to assess the spectrum of surgical pathologies encountered in central,

Regional and district state hospitals, and in the private sector.

Methods: The operating theatre logbooks at Groote Schuur Hospital (central/teaching), Somerset Hospital (regional),

G F Jooste Hospital (district), Victoria Hospital (district), and Kingsbury Hospital (private) were retrospectively reviewed, and the types of operations recorded. The study was undertaken over a 3-month period. Trauma surgery was excluded from the analysis.

Results: A total of 295 operations were performed at Somerset Hospital, 400 at G F Jooste, 320 at Victoria, 585 at Kingsbury and 696 at Groote Schuur. Cholecystectomy, mastectomy, appendectomy and hernia repair were undertaken at all the hospitals, whereas amputations and omental patch for perforated peptic ulcer disease were performed almost exclusively in the state sector. Surgery for haemorrhoids, varicose vein surgery, anti-reflux surgery (fundoplication), and surgery for rectal prolapse were performed almost exclusively in the private sector. Complex hepatobiliary, colorectal and vascular surgery was performed at the central and private hospitals only. Interestingly, thyroid surgery was performed mostly at the central hospital.

Conclusion: Many of the common general surgical procedures are being performed at all the hospitals, and complex surgery is available in both the state (central) and private sector. Of concern is the fact that certain common minor surgical procedures, such as for haemorrhoids and varicose veins, are only being done in the private sector.

Results: The demographic data were heavily weighted toward

African race and male gender. The average age was 28 years. Approximately one-third of patients were between 21 and 30 years of age. Blunt and penetrating trauma constituted 52% and 39% of cases, respectively. Assault is the most common form of blunt trauma and stab injuries the predominant form of penetrating trauma. Knives were the principal weapons implicated. Forty-one per cent of cases involved more than one anatomical area of the body, while the most common isolated injuries involved the head. The average ISS score of the cohort was 8. Twenty-seven per cent of patients required an operation. The majority of operations were emergencies, and 17% of emergency operations were damage control procedures. We recorded 21 deaths, equating to a mortality rate of 2.5%.

Conclusion: Pietermaritzburg Hospital Complex has a demanding trauma service, encountering a diverse spectrum of trauma-related pathology with acceptable outcomes.

Assessing the Burden of Surgical Disease in the Western Cape

A Aldera, T Chandauka, M Frost, D Kahn

Department of Surgery, University of Cape Town

Introduction: An assessment of the burden of disease is important for two reasons. Firstly, it determines whether limited resources are being utilised optimally, and secondly, it indicates whether healthcare needs are being met. The aim of this study was to assess the spectrum of surgical pathologies encountered in central, regional and district state hospitals, and in the private sector.

Methods: The operating theatre logbooks at Groote Schuur Hospital (central/teaching), Somerset Hospital (regional), G F Jooste Hospital (district), Victoria Hospital (district), and Kingsbury Hospital (private) were retrospectively reviewed, and the types of operations recorded. The study was undertaken over a 3-month period. Trauma surgery was excluded from the analysis.

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Results: We assessed 217 patients with CLI and 1 030 participants from the community. Among the known hypertensives and diabetics, 44.7% and 83.5% respectively with CLI and 59.9% and 66% respectively in the community sample were not achieving their therapeutic targets. Undiagnosed diabetics accounted for 10.8% of patients with CLI and 11% of the community sample. Of CLI patients with HIV, 40% were diagnosed during their admission, all of whom required a major limb amputation.

Conclusion: Traditional vascular risk factors are identified and managed poorly in the primary healthcare setting, both in high-risk patients and randomly selected participants from a community sample.

An Overview of the Initial 4 Months' Data from

The Pietermaritzburg Metropolitan Trauma

Service Electronic Database

M Tomlinson, J Bruce, G Laing, D L Clarke

University of KwaZulu-Natal

Introduction: Following the implementation of a digital trauma surgical database, a cohort of 839 patients was prospectively collected over a 4-month period. The demographics, mechanism of injury, spectrum of pathology, operative details and outcome were quantified.

Methodology: Eight hundred and thirty-nine cases were exported from the database and converted into a Microsoft Excel spreadsheet. The data were analysed in the aforementioned categories and illustrated by charts and graphs.

Successfully and routinely isolated from small myocardial samples, expanded to large numbers and maintained undifferentiated and/or differentiated in culture as desired.

Should Primary Healthcare Not Be

Incorporated into Tertiary Healthcare

To Prevent Further Mismanagement of Patients in South Africa?

M Brand, A J Woodiwiss, F Michel, H L Booyens, O H I Majane, M J Maseko, M G Veller, G R Norton

Departments of Surgery and Physiology, University of the Witwatersrand, Johannesburg

Background: Primary healthcare (PHC) is the foundation of a country's healthcare system. Without an efficient and cost-effective programme the level of healthcare that is offered across all levels of health management is adversely affected. This has been demonstrated in developed and developing countries worldwide.

Objectives: To determine the effectiveness of PHC in Johannesburg by identifying and managing cardiovascular risk factors according to recognised therapeutic targets.

Method: We evaluated two populations in Johannesburg: a high-risk group of patients presenting with chronic critical limb ischaemia (CLI) to our Vascular Surgery Department, and a randomly selected group of 'healthy' participants from Soweto, Johannesburg.

Results: We assessed 217 patients with CLI and 1 030 participants from the community. Among the known hypertensives and diabetics, 44.7% and 83.5% respectively with CLI and 59.9% and 66% respectively in the community sample were not achieving their therapeutic targets. Undiagnosed diabetics accounted for 10.8% of patients with CLI and 11% of the community sample. Of CLI patients with HIV, 40% were diagnosed during their admission, all of whom required a major limb amputation.

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THE SUCCESS RATE OF UCT SURGICAL REGISTRARS IN THE FCS (FINAL) EXAMINATION
M Liu, J Williams, D Kahn
Department of Surgery, University of Cape Town

Introduction: Interest in a career in general surgery, following a major decline in the early part of the last decade, has increased in recent years. Owing to concern about the high failure rate in the college examinations in those early years, we introduced a more structured training programme. The aim of this study was to review the success rate of our registrars in the college examinations.

Methods: All registrars writing the FCS (final) examination between 1999 and 2008 were included in the study. The data were obtained from the examinations office of the College of Medicine of South Africa. The number of candidates writing the examination and the success rate were recorded.

Results: A total of 349 registrars wrote the FCS (final) examination during the study period. There was a steady decline in the number of candidates per examination from a mean of 24 to 16. The overall success rate was 54%. There was a steady increase in the success rate from a mean of 44% early on, to 66%

A total of 77 UCT registrars wrote the FCS (final) examination. There was a steady increase in the number of UCT registrars writing the examination, from a mean of 3 early on, to a mean of 6. The mean success rate in the examination for the UCT registrars was 64%. There was a steady decline in the success rate from a mean of 84% early on, to a mean of 48%. Two-thirds of the UCT registrars passed at their first attempt and 14% took the exam on three or more occasions.

Conclusion: The success rate for the UCT registrars in the FCS (final) examination has been satisfactory, but the decline in recent years is concerning.

WHERE DO UCT REGISTRARS GO AFTER QUALIFYING?
M Liu, J Williams, D Kahn
Department of Surgery, University of Cape Town

Introduction: ‘Brain drain’ is a major problem affecting many developing countries. Although ‘brain drain’ usually refers to the loss of technical skills from one country to another, it also includes loss of skills from one sector to another (public to private) and from one level to the next (subspecialisation). UCT is regarded as one of the institutions that train doctors and specialists for the overseas market. The aim of this study was to assess where UCT surgical registrars go after completing their training.

Methods: All surgical registrars who completed their training between 1999 and 2008 were included in the study. The number of registrars who emigrated overseas and the number who entered the private sector were recorded. In addition the number of registrars who undertook subspecialist training was noted.

Results: A total of 47 registrars wrote the FCS (final) examination on 70 occasions. Two thirds of the registrars passed at the first attempt, and 14% had three or more attempts. A total of 44 registrars had passed the examination at the end of the study period. Of the latter, 10 (23%) are currently working overseas. If one excludes the foreign trainees (not supernumerary), then 16% are currently working overseas. Of the registrars who have remained in South Africa, 66% are currently working in the state sector. Of the 44 registrars who passed the FCS (final) examination, 21% (48%) elected to subspecialise in surgical gastroenterology, vascular surgery, trauma or paediatric surgery.

Conclusion: In conclusion, few UCT registrars emigrate overseas, most stay in the state sector, and a large proportion tend to subspecialise.

ARE UCT SURGICAL REGISTRARS EQUIPPED FOR FUTURE PRACTICE?
T Chandauka, A Aldera, M Frost, D Kahn
Department of Surgery, University of Cape Town

Introduction: The training of surgical registrars occurs to a large extent in the central teaching hospitals. As part of the training, most registrars will spend time in regional and district hospitals in the surgical platform. After completing their training, registrars may either stay in the state sector in a regional hospital or enter private practice. The aim of this study was to assess whether the spectrum of surgical pathology was equivalent to that seen at a regional hospital and at a private hospital.

Methods: The operating theatre logbooks at a teaching, a regional, a district and a private hospital were retrospectively reviewed and the types of surgical procedures recorded. The study was undertaken over a 3-month period. In this analysis, trauma surgery was excluded.

Results: Common general surgical procedures such as cholecystectomy, mastectomy, appendectomy and inguinal hernia repair were performed in large numbers at regional and private hospitals, and there was more than adequate exposure to these operations in the central teaching hospital. In contrast, other common general surgical procedures, such as surgery for haemorrhoids and varicose veins, were performed commonly in the private hospital, but there was no exposure to these operations in the central hospital. Furthermore, complex hepatobiliary, vascular and colorectal surgery was commonly performed in the central hospital, but these cases were not encountered in the regional hospital.

Conclusion: The training of surgical registrars in the central hospital does not equip them adequately to work in the regional hospitals or the private sector.

PROMINENT EARS: ANTHROPOMETRIC STUDY OF THE EXTERNAL EARS OF BLACK PRIMARY SCHOOL CHILDREN IN HARARE, ZIMBABWE
W Muteweye, G I Muguti
Department of Surgery, College of Health Sciences, University of Zimbabwe

Background: Prominent ear is the most common congenital ear deformity, affecting 5% of children in the Western world, and has
Background: Male circumcision (MC) was embarked on in Zimbabwe as a public health intervention measure after it was realised that it significantly reduces the rate of HIV transmission from an infected female to an uninfected male during heterosexual intercourse.

Aim: The aim of the study was to determine the complication rate and type of complications occurring during and after male circumcision at Spilhaus Clinic, Harare.

Methodology: Prospective MC patients presented to the male circumcision clinic. Counselling sessions were held with the patients. Issues of HIV prevention, MC and follow-up after MC were discussed. Healthcare workers recorded the complications on review of patients. A retrospective cross-sectional study was done. Records from May 2009 to October 2009 were retrieved. Data were analysed using STATA 10. Frequencies were calculated and statistical significance was measured at the 95% level of confidence.

Results: Five hundred and eight records of MC were retrieved and analysed. The median age of the MC patients was 28 years (Q₁=24 years, Q₃=33 years). The complication rate of male circumcision during and up to 48 hours after surgery was 1.8%. It rose to 21.9% from 48 hours to 1 month postoperatively. After 1 month post surgery the complication rate was 1.4%. Nearly 90% of patients had MC for the purposes of HIV prevention. About 66% of the patients had been referred to the MC centre from voluntary counselling and testing centres. Ninety per cent of patients seeking male circumcision were sexually active. Close to 11% of MC patients had had a sexually transmitted infection in the 3 months preceding MC. Eighty-seven per cent of the patients denied exchanging goods or money for sex in the preceding year. Almost 70% of the MC patients had not used a condom during their last sexual encounter. The vast majority of patients (97.2%) had an ASA score of 1. Slightly more than 1% of the patients were HIV-positive. The median operating time for each MC was 23 minutes (Q₁=18 minutes, Q₃=29 minutes). Excessive bleeding was the most common intra-operative complication (1.2%), and wound infection was the most frequent cause of morbidity (12.6%) from 48 hours to 1 month after MC. An ASA score of 2 (p<0.01) was associated with a greater number of complications.

Conclusion: The complication rate of MC in the peri-operative period was relatively high. Wound infection was the most common cause of morbidity. This rate could be significantly reduced by improving the aseptic technique and possibly training of doctors. However, on final review the complication rate was only 1.4%. Effort needs to be concentrated on circumcising populations with a high incidence of HIV infection. Most patients were circumcised in a bid to prevent HIV infection. The HIV-contracting risk profile of MC-seeking patients is relatively low. For now, it may be ill-advised to recruit less qualified members of the medical fraternity to do the surgical procedure.

AN AUDIT OF THE CASES DONE IN THE FIRST 6 MONTHS OF THE MALE CIRCUMCISION PROGRAMME IN HARARE: AN HIV INTERVENTION MEASURE

R Makota, G I Muguti
Department of Surgery, College of Health Sciences, University of Zimbabwe

Results: The mean ear height across the cohort was 56.95 (SD 5.00) mm (right ear) and 56.86 (SD 4.92) mm (left ear). Ear projection was 19.52 (SD 2.14) mm (right ear) and 19.59 (SD 2.09) mm (left ear). Gender-related differences were noted. Mean ear height was significantly greater in males (p=0.000), and ear projection was greater in males compared with females. A total of 6.89% had prominent ears (7.69% of males and 6.17% of females).

Conclusion: The prevalence of prominent ears among black African children is comparable to that of Caucasians. The study provides a set of biometric data of auricular dimensions for normal black African children aged 9 - 13 years.
Secondary objective: To assess whether the average therapeutic warfarin dose in HIV patients on antiretroviral therapy (ART) is higher than in HIV patients not on ART.

Tertiary objective: To assess the induction period of warfarin in HIV-negative patients, HIV-positive patients and HIV-positive patients on ARVs.

Methods: The study was in two parts. Part I was an analytical observational retrospective study recording the latest cross-sectional warfarin dose to assess the average therapeutic dose of warfarin. Part II was an observational retrospective and prospective study to determine the induction time to achieve the therapeutic warfarin dose. Inclusions: All patients with proven deep-vein thrombosis requiring anticoagulation; only patients on warfarin alone as an anticoagulant; and confirmed HIV status by routine HIV antibody test. Exclusions: Patients under 18 years of age (paediatrics); patients with unknown HIV status; and patients on other drugs with known anticoagulant or procoagulant effect.

Results: The mean therapeutic warfarin dose was 5.94 mg/day in 71 HIV-positive patients and 5.62 mg/day in 59 HIV-negative patients, a difference of 0.32 mg. A t-test produced a p-value of 0.48. Thirty-four HIV-positive patients on ART required 6.07 mg/day of warfarin and 37 HIV-positive patients not on ART required 5.84 mg/day, a difference of 0.23 mg. A t-test produced a p-value of 0.7.

The induction time to reach the therapeutic warfarin dose in 36 HIV-negative patients was 107 days, whereas in 22 HIV-positive patients it was 159 days, a difference of 52 days with a p-value of 0.18. Seven HIV-positive patients not on ART required 120 days to reach therapeutic dosages, compared with 177 days in 15 HIV-positive patients on ART, a difference of 52 days with a p-value of 0.26.

Conclusion: The results show a trend towards a higher warfarin dose in HIV-positive patients, and also in HIV patients on ART compared with HIV patients not on ART. However, the differences are not statistically significant. There is a trend towards a longer induction time in HIV-positive patients, and also in HIV-positive patients on ART compared with HIV patients not on ART. However, the differences are not statistically significant.

DETERMINANTS AND PATTERN OF UTILISATION OF ALLOGENIC BLOOD IN ELECTIVE GENERAL SURGICAL OPERATIONS
UN Kadumbo, G I Muguti
Department of Surgery, College of Health Sciences, University of Zimbabwe

Background: Auditing of blood utilisation in any hospital helps in improving blood ordering systems, which can reduce hospital costs and risks of allogenic blood exposure to patients.

Objectives: To determine the efficiency of allogenic blood utilisation for elective major general surgical operations performed in the Parirenyatwa Group of Hospitals (PGH).

To identify the blood ordering system currently being used by the general surgeons in the PGH.

Study design: A prospective cross-sectional study.

Setting: The PGH, which has a bed capacity of 950. The PGH is both a central and a teaching hospital located in the north of the capital city of Zimbabwe.

Materials and methods: The study population was drawn from all patients referred to the PGH for elective general surgical operations. Those who were scheduled for operations in which at least a group and retain blood order was recommended by Maximum Surgical Blood Ordering Schedule (MSBOS) were selected for the study. Patients who were scheduled for operations that would normally last for 60 minutes or longer if performed by an experienced surgeon were also included. All requests of allogenic blood for these elective operations were monitored. Information on comorbidities, pre-operative and postoperative haemoglobin levels and estimated blood losses was captured. Data analysis was done using STATA version 10.0 (STATACorporation, College Station, Texas, USA).

Sample size: A total of 151 patients participated in the study.

Results: Of the one hundred and fifty-one patients who were recruited for the study over the period September 2010 - June 2011, two-thirds (66%) were females. Fifty-one per cent (77/151) of the patients were referred from clinics and other health facilities from within Harare, while the rest were referred from various hospitals around the country. The crossmatch/transfusion ratio for the population under study was 1.54 with a probability of transfusion of 62.1% and a transfusion index of 1.69. Pre-operative anaemia (i.e. haemoglobin <10 g/dl) and comorbidity were the major predictors of allogenic blood transfusion. Mastectomy for cancer of the breast was the commonest operation done in the period under study, accounting for 30 of the cases (19.9%). Toilet mastectomy and preoperative haemoglobin of less than 10 g/dl and not excessive estimated blood loss were the only reasons for transfusing patients going for mastectomy. Patients going for wide local excision for sarcomas and melanomas (n=18) had the highest probability of transfusion (78.6%) following a crossmatch order by the surgeons.

Conclusion: Overall there was appropriate utilisation of allogenic blood among patients scheduled for general surgical elective major operations. However, there was over-crossmatching among patients going for mastectomy, thyroidectomy and closure of colostomy. To ensure more efficient utilisation of blood, clinicians at PGH should adopt the Maximum Surgical Blood Ordering Schedule.

REGULATORY B CELLS INDUCE LONG-TERM ALLOGRAFT SURVIVAL IN A MOUSE MODEL OF CHRONIC REJECTION
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Introduction: A significant hurdle faced by clinical transplantation is the rejection of organs in the late post-transplant
period. IL-10 secreting B regulatory cells (Bregs) have been shown in auto-immune models to halt disease progression. We studied the effects of Bregs in a well-characterised murine cardiac allograft model in order to investigate mechanisms by which chronic rejection may be abrogated.

Methods: The bm12 mouse strain differs from widl-type C57BI/6 mice by just three amino acids on the MHC class II molecule (I-Abm12 and I-Ab, respectively). Donor bm12 hearts transplanted heterotopically into C57BL/6 recipients reject with a median survival time (MST) of 51.5 days (n=6), and develop chronic allograft vasculopathy (CAV). Additionally, recipients generate circulating auto-, but not allo-, antibody post-transplant. Bregs were generated in vitro by culturing naïve C57BL/6 B cells with anti-CD40 monoclonal antibody for 3 days. IL-10 secretion was assayed by ELISA and Breg cell markers were measured on flow cytometry. We transferred Bregs into C57BL/6 recipients of bm12 hearts and monitored for allograft rejection and the development of CAV and autoantibody.

Results: Cultured B cells were shown to produce IL-10 and express a Breg phenotype. Breg-treated C57BL/6 recipients (n=4) demonstrated indefinite bm12 heart graft survival (MST >150 days) and markedly reduced auto-antibody and CAV when compared with untreated controls (n=4).

Conclusion: This is the first demonstration of Breg-mediated inhibition of chronic rejection in a vascularised solid organ allograft model. These findings may provide the basis of studies investigating the use of Bregs in humans. Ex vivo-generated Bregs can be used to prevent the long-term rejection of cardiac allografts in a mouse model; this may provide the basis for studies investigating the use of Bregs in humans.

STRAIGHT LEFT HEART BORDER – A NEW RADIOLOGICAL SIGN OF A HAEMOPERICARDIUM

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Background: The detection of a cardiac injury in a patient who is haemodynamically stable after a penetrating chest injury can be extremely difficult. A filling in of the aorto-pulmonary window, called the straight left heart border (SLHB), is a radiological sign that we have found to be commonly associated with the presence of a haemopericardium at surgery.

Aim: The aim of this study was to determine whether this is a reliable and reproducible sign of a haemopericardium.

Methods: All patients with a penetrating chest injury who were admitted to Groote Schuur Hospital Trauma Centre from 1 October 2001 to 28 February 2009, had an erect chest radiograph performed on admission, were easily resuscitable and had no indication for immediate surgery, and were taken to theatre for the performance of a subxiphoid pericardial window (SPW) were entered into the study. Statistical analysis was conducted using the chi-square test for categorical variables. A p-value of <0.05 was considered to be significant.

Results: There were 162 patients with possible cardiac injury after penetrating chest trauma who had an X-ray on admission to the trauma centre. The mean age of the patients was 27.7 years (range 13 - 62), 55 of the 162 patients (34%) were noted to have a haemopericardium at SPW (true positives), and there were 6 patients with an SLHB that were negative for blood at the time of performing a SPW (false positive). 75 patients had a haemopericardium at surgery but did not have features of an SLHB. The sensitivity of this radiological sign was 40% with a specificity of 84%. The SLHB was highly significant in predicting the presence of a haemopericardium (p=0.005).

Conclusion: The SLHB is a newly described radiological sign associated with penetrating thoracic trauma that is indicative of the presence of blood in the pericardial sac resulting in a straightening out and filling in of the aorto-pulmonary window. Although it is not very sensitive sign (40%) it is highly specific (84%) and when present should alert the surgeon to the presence of a haemopericardium.

THE J WAVE: A NEW ELECTROCARDIOGRAPHIC SIGN OF AN OCCULT CARDIAC INJURY

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Background: There is a definitive need for a simple diagnostic aid that can guide what is often a junior medical officer dealing with a penetrating chest injury in the decision whether it is necessary to refer a patient for further investigation of a possible cardiac injury. Changes in the electrocardiogram may be such a diagnostic aid.

Aim: The aim of this study was to identify the ECG changes that were present in easily resuscitable patients with possible cardiac injuries presenting to a level 1 trauma centre, and to outline what the features on an ECG should a warning sign of possible cardiac trauma.

Methods: This was a prospective study conducted on all patients admitted to the Groote Schuur Hospital Trauma Centre following penetrating chest trauma during the period 1 October 2001 - 28 February 2009, who did not have an indication for emergency surgery and who underwent an ECG and later an SPW for potential cardiac injury. All the patients were easily resuscitable with less than two litres of crystalloid. A standard 12-lead ECG was performed shortly after admission. A J wave was defined as the small wave on the R-ST junction.

Results: There were 174 patients in whom an ECG subsequent SPW for a possible cardiac injury were performed. The mean age of the patients was 28 years (range 11 - 65). The mechanism of injury was stab wounds in 167 patients and low-velocity gunshot wounds in 7. A J wave was present on the ECG in 65 (37%) of the 174 patients with a possible cardiac injury. The sensitivity of a J wave to detect a haemopericardium was 44% and the specificity was 85% (p<0.001).

Conclusion: This study demonstrates that presence of J waves on the ECG signifies a significant risk of a haemopericardium after
THE ROLE OF ULTRASOUND IN DETECTING OCCULT CARDIAC INJURIES
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Background: US has been shown in prospective studies to have a sensitivity of 83.8 - 100% in the detection of cardiac injuries and has become the investigation of choice worldwide. If US is to be the investigation of choice, it is essential that surgeons understand the limitations of the study so that appropriate decisions are made regarding patient management.

Aim: The aim of this study was to determine the sensitivity and positive predictive value of emergency room US in the diagnosis of occult cardiac injuries.

Methods: All patients presenting to the Groote Schuur Hospital Trauma Centre with a penetrating chest wound and a possible cardiac injury between October 2001 and February 2009 were prospectively evaluated. All patients were fully conscious and either stable or required less than 2 litres of crystalloid to achieve haemodynamic stability, and had no indication for emergency surgery.

Results: A total of 172 patients underwent SPW for a possible cardiac injury between October 2001 and February 2009 and had been investigated pre-operatively with an US scan of the pericardial sac. The median age of the patients was 26 years (range 11 - 65 years), and 168 (96%) were males. The mechanism of the penetrating chest injury was stab wounds in 166 (96%) and low-velocity gunshot wounds in 6. The sensitivity of the US scan to detect a haemopericardium was 86.7%, with a positive predictive value of 77%. There were 18 false negatives. Eleven of these patients had an associated haemothorax, 6 had a pneumopericardium detected, and 1 patient with two negative US examinations was discharged home only to return with a delayed symptomatic pericardial effusion.

Conclusion: There would appear to be two main factors that limit the screening sensitivity of US. The first is the presence of air in the pericardial sac, and the second a haemothorax. The presence of a haemothorax would warrant a repeat scan at 24 hours, and other clinical parameters suggestive of a cardiac injury need to be identified so that an occult cardiac injury may be detected.

MANAGEMENT OF A PNEUMOPERICARDIUM AFTER PENETRATING CHEST TRAUMA: A PROSPECTIVE ANALYSIS
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Background: A pneumopericardium presenting after penetrating chest trauma is a rare event. The surgical management of this clinical problem has not been well documented in the past.

Aim: The aim of this study was to document the mode of presentation and to suggest a protocol for the management of a pneumopericardium after penetrating chest trauma.

Methods: A prospective audit of patients presenting to the Groote Schuur Hospital Trauma Centre between October 2001 and February 2009 with a pneumopericardium on CXR after penetrating trauma, with respect to their presentation and surgical management.

Results: There were 27 patients in total who presented with a pneumopericardium. The mean age was 25 years (range 17 - 36). The mechanism of injury was a stab wound to the chest in 26 patients, and a single patient had sustained multiple low-velocity gunshot wounds. The mean revised trauma score (RTS) was 7.566 (range 4.094 - 7.841). Six patients (22%) were unstable and required emergency surgery. One of these patients presented with a tension pneumopericardium. Twenty-one patients were initially stable. Two of these (10%) patients later developed a tension pneumopericardium within 24 hours and were taken to theatre. The remaining 19 patients were managed with an SPW 24 - 48 hours after admission. Ten of these 19 patients (52%) were positive for blood. Only 4 of the 19 underwent a sternotomy and only 2 of these had cardiac injuries that had sealed. There were no deaths in this series.

Conclusion: Patients with a penetrating chest injury with a pneumopericardium who are unstable require emergency surgery. A delayed tension pneumopericardium developed in 10% of patients who were initially stable. It is our recommendation that all stable patients with a pneumopericardium after penetrating chest trauma should undergo an SPW. A sternotomy is not required in stable patients.

A NEW SCREENING REGIMEN FOR OCCULT CARDIAC INJURIES
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Background: US has become firmly established as the screening modality of choice worldwide. However, reports of false-negative results of US of the pericardial sac have recently appeared in the literature.

Aim: The aim of this study was to look at the role of additional clinical, radiological and electrocardiographic signs of a potential cardiac injury in patients presenting with penetrating chest trauma to see if these could improve the accuracy of the detection of a haemopericardium.

Methods: A prospective study conducted from October 2001 to February 2009 on all patients who presented to Groote Schuur Hospital with a suspicious penetrating chest wound and were haemodynamically stable, or easily stabilised with less than 2 litres...
of crystalloid. Patients were evaluated with a CXR, an ECG, a central venous line and an immediate US scan of the pericardial sac. The presence of any fluid in the sac was considered to be a positive US. A repeat scan was conducted 24 hours later if the initial scan was negative but clinical concern remained in the light of unexplained pre-hospital shock, elevated central venous pressure (CVP), an increased cardiothoracic ratio (CTR) or elevated ST segments or J waves on the ECG. The presence of an SLHB on the CXR was an indication for an SPW as was the detection of any fluid on the US scan. All patients included in this study underwent an SPW.

Results: One hundred and seventy-five patients presented to the Trauma Centre with penetrating chest trauma. The mechanism of trauma was a stab wound in 168 cases (96%) and a single gunshot wound in 7 (4%). All 175 patients had an SPW performed under general anaesthetic. A CVP ≥12 cm H₂O had a sensitivity of 68.4% and a specificity of 69.2% (p=0.39) in the diagnosis of a haemopericardium. The presence of shock in the pre-hospital phase (p=0.39) and a CTR of >50% (p=0.38) were not reliable indicators.

Conclusion: The presence of an effusion on pericardial US is an indication for surgery. In addition, the presence of; a CVP ≥12 cm H₂O, a J wave, an SLHB or pericardial air should prompt the surgeon to perform a subxiphoid pericardial window.

DELAYED IN-HOSPITAL CARDIAC TAMPOANDE
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Aim: The aim of this study was to determine the incidence of delayed cardiac tamponade in patients who were admitted to the high-care unit after penetrating chest trauma with the diagnosis of a stable haemopericardium and who developed features of cardiac tamponade while under observation and required emergency surgery.

Methods: All patients with penetrating chest trauma and a haemopericardium present on US who developed cardiac tamponade after initial admission to a high-care unit in a stable condition between October 2001 and February 2009 were included in the study.

Results: One hundred and fifty-eight patients with penetrating chest injury and suspicion of an occult cardiac injury were admitted to the high-care unit during the study period. Six of these patients (4%) became unstable during the period of observation in the high-care unit and required emergency surgery. They were all males, mean age 26 years (range 19 - 34), with stab wounds to the chest. The 6 patients were all clinically stable on admission with a mean RTS of 7.973 (range 7.550 - 7.841). The US scan confirmed the presence of a haemopericardium in all the patients. The time from injury to the development of delayed cardiac tamponade was 24 hours or less in 5 of these patients. Five of these patients developed the classic clinical signs of tamponade with distended neck veins and hypotension. The 6th patient's blood pressure dropped and he sustained a cardiac arrest on day 3 post admission.

At surgery all the patients had underlying cardiac injuries. One of the 6 patients died.

Conclusion: The results of this study clearly indicate that conservative management of the patient with a haemopericardium is not a viable option. These 6 patients were all stable with small effusions detected on US screening. There were no features to distinguish these 6 patients (4%) from the other 152 patients who remained haemodynamically stable awaiting SPW. An SPW should be performed on these patients at 24 hours post injury.

THE ROLE OF THE SUBXIPHOID PERICARDIAL WINDOW IN EXCLUDING OCCULT CARDIAC INJURY AFTER PENETRATING THORACO-ABDOMINAL TRAUMA
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Background: Patients with penetrating thoraco-abdominal injuries, where the tract is in close proximity to the heart, are at risk of a cardiac injury.

Aim: The aim of this study was to determine the incidence of occult cardiac injury in patients presenting with an acute abdomen after penetrating thoraco-abdominal injury and to determine the morbidity and mortality associated with a diagnostic SPW in this setting.

Methods: This study was conducted over 8 years on all patients with a penetrating thoraco-abdominal injury with an acute abdomen where there was concern about a potential cardiac injury because of the tract of the injury.

Results: Fifty patients with an indication for emergency laparotomy underwent as SPW to diagnose a possible cardiac injury. The incidence of occult cardiac injury in this group was 28% (14 patients out of 50). Nine cardiac injuries were identified at sternotomy, and in 5 patients (36%) sternotomy was avoided by performing the SPW. The overall mortality rate for this group of patients was 8%.

Conclusion: The incidence of cardiac injury in patients with penetrating thoraco-abdominal trauma in this series was 28%. The complication rate associated with performance of the SPW was 3%. The SPW identifies cardiac injuries and also prevents unnecessary sternotomy in 36% of confirmed haemopericardiums.

MANAGEMENT OF THE MISSED CARDIAC INJURY
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Background: All clinicians treating penetrating chest injuries have the real concern that they may miss cardiac injuries. The difficulty in making the diagnosis in haemodynamically stable patients presenting to the emergency units has been stressed. Yet there are no prospective series dealing with the issue of missed cardiac injuries.
Aim: The aim of this study was to determine the number and complications of missed cardiac injuries.

Methods: All patients admitted between November 2001 and February 2009 with cardiac injuries that were not initially identified were included in this study. The delay to diagnosis, site of injury, mechanism, RTS, clinical presentation, special investigations, surgical management, hospital stay and outcome were documented in each patient.

Results: During the 7-year study period, 11 patients with a missed cardiac injury were seen. The mechanism of injury was a stab wound in 10 cases and a gunshot wound to the precordium in 1. Two patients with cardiac injuries were missed at our own institution (one had a normal computed tomography (CT) scan of the pericardium and the other had two normal pericardial US scans), and 9 patients had been initially treated and discharged from surrounding hospitals (no US scans of the pericardium were performed).

The commonest presentation was a symptomatic pericardial effusion in (7 patients). Four had a septic pericarditis, with 2 of these patients demonstrating features of cardiac tamponade. Seven patients underwent subxiphoid window and drainage, 2 underwent subxiphoid window followed by sternotomy, and 2 had a thoracotomy with evacuation of large pleural collections and a pericardiotomy. There was no mortality.

Conclusion: All penetrating precordial injuries in haemodynamically stable patients must be evaluated with a CXR, ECG and a pericardial US scan. Other clinical signs such as a SLHB and J waves should be used in addition to pericardial US. Missed cardiac injuries may result in serious complications.

A RANDOMISED CLINICAL TRIAL COMPARING STERNOTOMY VERSUS SUBXIPHOID PERICARDIAL DRAINAGE ALONE IN THE MANAGEMENT OF THE STABLE PATIENT WITH A HAEMOPERICARDIUM AFTER PENETRATING THORACIC TRAUMA

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Background: The current international practice is sternotomy and exploration for a penetrating cardiac injury in a haemodynamically stable patient without evidence of bleeding or tamponade. The experience with performing a mandatory sternotomy in this group of patients at Groote Schuur Hospital in Cape Town was that sternotomy was unnecessary and the cardiac injury if present had sealed completely.

Methods: This was a single-centre parallel-group study with equal randomisation conducted at Groote Schuur Hospital/University of Cape Town between November 2001 and February 2009. All adult patients aged 18 years or older who had sustained penetrating chest trauma, were haemodynamically stable with a haemopericardium confirmed at SPW and had no signs of active bleeding at SPW were included in the study. This study was approved by the Faculty of Health Sciences Research Ethics Committee of the University of Cape Town.

Results: One hundred and eleven patients were confirmed at SPW to have a haemopericardium without any evidence of active bleeding. Fifty-five of these patients were randomised to sternotomy and 56 to pericardial drainage only. Fifty-one of the 55 patients (93%) who were randomised to sternotomy had either no cardiac injury or a tangential injury. There were only 4 patients with penetrating wounds to the endocardium, and in all of these the wounds had completely sealed. There was 1 death postoperatively in the 111 patients (0.9%) and this patient had been assigned to sternotomy. The mean ICU stay for the sternotomy group was 2.04 days (range 0.25) compared with 0.25 days (range 0 - 2) for the group treated with drainage only (p<0.001).

Conclusion: Pericardial drainage alone appears effective and safe in the management of haemopericardium in the stable patient after penetrating chest trauma, with no increase in mortality and a shorter ICU and hospital stay.

A 2-YEAR EXPERIENCE OF STAB NECK INJURIES IN POLOKWANE

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Introduction: The management of penetrating neck injuries that breach the platysma muscle has been widely discussed. Selective non-operative management (SNOM) of these injuries has become widely favoured owing to the high rate of negative findings in mandatory surgical explorations. The purpose of this study was to review the management of cases of stab neck injuries (SNIs) admitted to Polokwane Hospital over a 2-year period.

Patients and methods: This was a retrospective study in which all patients with SNIs admitted to Polokwane Hospital over a 2-year period (1 January 2010 - 31 December 2011) were included. The emergency department (ED) register was used to collect the data, and all patients who were discharged or died in the ED were excluded. The data were analysed for age, gender, zone and side of injury, management modality, investigations, length of stay (LOS) and outcome. The Mann-Whitney two-sample statistical method was used.

Results: During the study period, 49 patients were seen in the ED and only 33 male patients with SNI were included in this study. A total of 12 patients were discharged, 2 died in the ED and the records of 2 patients admitted were not found. The mean age was 26.3 years (range 16 - 49 years). The majority of injuries were on the left (60.6%) and in zone 2 (56.7%). After initial resuscitation, 6 patients (18%) were immediately taken for surgical exploration, and all had significant upper airway, oesophageal or vascular injuries. Only 1 patient (4%) in the observed group was later explored surgically for a haematoma that was not subsiding. Investigations were done in 54.5% of all the patients, chest radiography being the most used. There was 1 death (3%) and...
Cancer is significantly increased in the population exposed to ionising radiations in the course of investigations after a fall from height as per unit protocol compared with the general population. The lifetime risk of solid cancers may be significantly increased in these patients.

Our patients were exposed to 3.7 times higher radiation than the population. The average natural background and average investigations per patient was 7.2319. On average, patients' exposure was compared to the natural background exposure of the world population and atomic bomb survivors.

**Introduction:** Radiation hazards have always been a major concern in the healthcare environment. The increase in frequencies and quantities of ionising radiation administered per person has a strong correlation with an increased risk of developing malignancies. Various measures are employed to prevent or minimise the dosages of radiation exposure. Our patients may be exposed to excess amount of radiation through various investigations such as CT scans or X-rays.

**Aim:** To audit the amount of radiation exposure in fall from height patients presenting to Charlotte Maxeke Johannesburg Academic Hospital during the period 2004 - 2008.

**Methods:** Retrospective analysis of electronic trauma data and clinical notes over a 4-year period. Data retrieved included number of patients, and number of X-rays and CT scans done. The total amount of radiation exposure was calculated by multiplying the amount of radiation in millisieverts (mSv) per investigation by the average number of investigations done per patient. Patients' exposure was compared to the natural background exposure of the world population and atomic bomb survivors.

**Results:** During 2004 - 2008, 401 patients presented to our trauma unit. The total number of investigations (including X-rays and CT scans) was 2 900. Total calculated exposure per body mass was 3.635.1 mSv, average exposure per investigation was 1.2535 mSv, and average investigations per patient was 7.2319. On average, each patient received 9.0651 mSv. The average natural background source of radiation is 2.4 mSv. The lifetime risk of solid organ cancer is significantly increased in the population exposed to >5 mSv.

**Conclusion:** Our patients were exposed to 3.7 times higher ionising radiations in the course of investigations after a fall from a height as per unit protocol compared with the general population worldwide. The lifetime risk of solid cancers may be significantly increased in these patients.

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**INJURY PATTERNS, OUTCOME AND COSTS OF GENDER-BASED VIOLENCE AT A REGIONAL HOSPITAL IN SOUTH AFRICA**

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**Introduction:** Gender-related violence is a problem in South Africa. It has not been looked at previously in our environment.

**Patients and methods:** A prospective database of all victims of gender-based violence admitted to Edendale Hospital was maintained from June 2011 until January 2012. We used a bottom-up model to estimate the costs of these admissions.

**Results:** We admitted 100 female victims of assault during the 6-month period under review. The average age was 31.2 years. The ratio of penetrating to blunt injuries was close to 1:1. The vast majority of penetrating injuries were due to stab wounds, while the blunt assaults were likely to have been performed using some sort of object. In 7% of cases there was also a sexual assault. The perpetrators were past or present intimate partners in 50% of cases. An additional quarter of the perpetrators were family or close acquaintances. More than half of all the assaults occurred in or right outside the victim's home, and 82% of the assaults were by men only. The total cost of managing these patients was substantial, amounting to ZAR1 717 150.09, which averages ZAR17 171.50 per patient. Only 29% of the victims had opened a criminal case by the time of discharge. Over one-third did not intend to open a case.

**Conclusion:** Morbidity, mortality and costs due to gender-based violence are substantial. The majority of the victims of gender-based violence are assaulted by their male partners in their own homes.

**PATTERNS OF INJURY SEEN IN ROAD TRAFFIC ACCIDENT VICTIMS: DATA FROM A SOUTH AFRICAN TRAUMA CENTRE**

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**Background:** Road traffic accidents (RTAs) cause significant morbidity and mortality globally, particularly in developing countries. Prompt and accurate assessment is key to effective management of these trauma casualties. Identification of common patterns of injuries assists in this, and can indicate potential effectiveness of prevention strategies.

**Aim:** We aimed to identify the common patterns of injury seen in RTA victims admitted to our regional trauma centre.

**Method:** This was a prospective study of 100 consecutive patients admitted with injuries sustained in RTAs. Injuries were determined radiographically, surgically or biochemically. Soft-tissue injuries in conjunction with other injuries (e.g. lacerations and haematomas associated with underlying bony injuries) were not counted as two separate injuries.
Results: Fifty-nine motor vehicle occupants (MVAs) and 41 pedestrians (pedestrian vehicle accidents, PVAs) were admitted over 10 weeks. The majority of patients in both groups were aged 16 - 30 years, and the ratio of males to females was 66:34. The PVA group had a greater number of patients aged <15 years. PVA patients were more likely to have lower limb, head, facial, thoracic, radio-ulnar and clavicular injuries than victims of MVAs, who commonly had neck and intra-abdominal injuries. Only 17% of victims of MVAs were wearing seatbelts. In both groups the frequency of head injuries decreased with age. Thirty-seven patients had injuries in more than one body region. The mortality rate was 4%. The time between the accident and arrival to hospital was known in 30% of patients and was 9.2 hours on average (via ambulance in 91% of cases).

Conclusion: The patterns of injury seen can be explained by the mechanisms of injury. PVAs can be divided into bumper, windscreen and ground impact, injuring the lower extremities, head and torso, and upper limbs respectively. The high rate of neck and abdominal injuries in MVAs can be explained by rapid deceleration of the vehicle and impact with the dashboard and steering wheel, which potentially could have been reduced in 83% of cases if the patients had been wearing a seatbelt. We demonstrated a low number of chest and abdominal injuries compared with head and extremity injuries in all patients, a lower rate of multiple injuries and a lower overall mortality rate than shown in previous studies – this may be because patients with more severe or numerous injuries died at the scene or during transfer to hospital, particularly as we demonstrated such a long delay in transfer. Recognising these common patterns of injury should help with rapid assessment of these cases, in which definitive hospital care has already often been delayed.

DEVELOPING AN ELECTRONIC DATABASE FOR THE PIETERMARITZBURG METROPOLITAN TRAUMA SERVICE

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Introduction: Designing, developing and implementing a digital database for trauma surgical patients will theoretically improve the accuracy of audits and provide a foundation for observational studies.

Methods: A simple flat file (single table) surgical database was designed using Filemaker Pro 11. This is a cross-platform database development program. The database was implemented at two metropolitan state hospitals. Doctors were trained on the technique of data capture. The data were captured onto four separate computers and merged onto a single private computer. This process took place on a weekly basis.

Results: The project was successful in providing the ability to accurately audit 839 trauma surgery admissions collected over a period of 4 months. Limitations in this system of data acquisition were identified. These included incomplete data entry (due to either poor admission documentation or deficient data capture), 53 corruptions in the process of data merging and 108 duplications. Duplications were either accidental (on the part of the data capturer), or the result of a single patient requiring multiple admissions.

Conclusion: An accurate audit of surgical patients was possible, highlighting the success of the database. Limitations of this database were exposed, identifying areas requiring improvement.

PERITONEAL PELVIC PACKING FOR HAEMODYNAMICALLY UNSTABLE PATIENTS WITH COMPLEX PELVIC FRACTURES: A 5-YEAR REVIEW OF THE CMJAH TRAUMA UNIT EXPERIENCE

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Introduction: Despite multimodal approaches undertaken in international centres, mortality remains high for haemodynamically unstable patients with complex pelvic fractures. The mortality rate for these is 50% in the current literature. The evidence for preperitoneal pelvic packing (PPP) to control haemorrhage is predominantly retrospective; however, it may be an attractive operative intervention in the unstable patient in centres without rapid access to angio-embolisation. The role of PPP as an alternative or adjunct to angio-embolisation needs to be defined. The aim of this study is to review our centre's experience of PPP from 2008 to 2012.

Methods: Retrospective data review identifying all haemodynamically unstable patients with complex pelvic fractures during the period 2008 - 2012 in the Charlotte Maxeke Johannesburg Hospital Trauma Unit using the Trauma-Medibank database. Data collected included mechanism of injury, anatomy of presenting fractures, associated injuries, ISS, new injury severity score (NISS) and RTS, time in casualty, operative interventions and blood/component therapy. Outcomes were characterised by: (i) mortality; (ii) morbidity; and (iii) number of admission days. In addition, predicted (ISS, NISS) v. actual survival was calculated. The protocol of management in unstable pelvic fractures is a pelvic sheet tied in the casualty department followed by PPP.

Results (provisional): Four hundred and seventeen patients were identified with pelvic fractures, of which 63 (15%) were haemodynamically unstable pelvic fractures. Of these, 27 patients had PPP. They had an average age of 30.7 years (range 20 - 60 years) and mean scores in the ER as follows: ISS 28, NISS 36.6 and RTS 4.7. The mean admission blood pressure was 77 mmHg (range 0 - 156 mmHg). Blood component therapy in the first 24 hours was as follows: mean red blood cells transfused 5.5 units, fresh-frozen plasma 5 units, and platelets 0.8 megunits; cryoprecipitate and the Cell Saver were used in a limited number of cases. One patient received concentrated factor. Among those who had PPP there was a 55% mortality rate (15/27), with an average length of ICU stay of 13 days; 6 patients died on
the operating table. Injury to major vessels was recognised on autopsy in 4 of the patients who died. Two patients had dual therapy with external fixation on day 0 and 1 patient had angio-embolisation on day 1 due to ongoing haemorrhage. For the 12 patients who survived, the average length of admission was 23 days. Factors contributing to mortality are major abdominal arterial vessel injury, multi-organ failure and associated sepsis, respiratory complications, delayed transfers and associated injuries (on laparotomy 60% had intra-abdominal injuries).

Conclusion: Haemodynamically unstable polytrauma patients with complex pelvic fractures remain a therapeutic challenge. Further evaluation of patients managed with PPP needs to be undertaken to determine whether this is a suitable therapeutic modality to be used with or as an alternative to angio-embolisation in resource-limited centres.

HEPATOCYTE-DERIVED MICRO-RNAS IN HUMAN SERUM ARE SENSITIVE MARKERS FOR HEPATIC INJURY IN LIVER TRANSPLANTATION

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Background: Micro-RNAs (miRNAs), a class of small non-coding RNAs, are key regulators of many cellular functions by post-transcriptional suppression of gene expression. MiRNAs are emerging biomarkers for cancer, and recent studies in animal models have highlighted the potential of hepatocyte-derived miRNAs (HDmirs) in serum as an early and sensitive biomarker for liver injury. However, whether HDmirs are useful markers in humans remains unknown. The aim of this study is to investigate the utility of serum HDmirs in patients with liver disease and after liver transplantation.

Methods: Liver graft biopsies (n=50) and serum samples from healthy controls (n=12) and liver transplant recipients and candidates (n=70) were analysed. Hepatocyte-derived miRNAs, miR-122 and 148a, were quantified by RT-PCR.

Results: We found that the expression of miR-122 and miR-148a in liver tissue showed a significant reverse correlation with the duration of the graft’s warm ischemia time (r=0.31 and r=0.40 respectively, p<0.05). In patients, levels of serum HDmirs significantly correlated with transaminases (AST and ALT, r≥0.75, p<0.001) and were significantly elevated compared with healthy controls. Even in patients with serum transaminases below 50 IU/l, a significant increase of HDmirs was found (>8-fold, p<0.01), while control miRNAs (miR-133a and miR-191) remained unchanged. In patients experiencing an episode of acute rejection, serum HDmirs were 9-fold higher compared with levels 6 months after rejection was resolved (n=10, p<0.005). Interestingly, longitudinal analysis in 3 patients showed that the peak of serum miRNAs preceded the elevation of transaminases, suggesting that HDmirs are early markers for liver injury. Additional testing showed that repeated freezing and thawing of serum samples did not cause degradation of HDmirs.

Conclusion: This study demonstrates the potential application of miRNAs in serum as biomarkers in the setting of liver transplantation. Our results show that HDmirs represent novel candidates for stable, specific and sensitive biomarkers for liver injury in humans.

DO SMALL-BOWEL SEROSAL TEARS PERFORATE DUE TO RAISED INTRALUMINAL PRESSURE AND ISCHAEMIA?

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Introduction: It is generally accepted that small-bowel serosa contributes significant tensile strength to the bowel wall, and it is postulated that serosal tears may result in local ischaemia of the bowel wall by interrupting blood flow to the sub-mucosa and mucosal layers.

During re-operative abdominal surgery, serosal tears may occur. It is recommended that patients with large serosal tears (of >80% diameter) should have a segmental bowel resection due to risk of perforation. The practice of repairing serosal tears or performing bowel resections is not evidence based.

Aims: To determine (i) at which intraluminal pressure various lengths of serosal tears perforate in small bowel; and (ii) whether serosal tears result in local ischaemic changes of the small bowel.

Methods: (i) Mid-line laparotomy was performed under general anaesthesia in 12 rabbits. A segment of small bowel was isolated between two bowel clamps. To simulate raised intraluminal pressure during peristalsis, two cannulas were inserted into the segment, one for injection of saline, the other connected to a pressure transducer. Serosal tears of various lengths were created in the small bowel. Intraluminal pressure was sequentially increased until the bowel perforated. (ii) The above protocol was repeated in 6 rabbits in which 4 cm long or 100% circumferential serosal tears were created in individual small-bowel segments. The rabbits were observed for signs of bowel perforation and terminated at 72 hours.

All segments with serosal tears from both experiment phases were harvested for histological examination.

Results: No perforation of any serosal tear occurred at normal physiological pressures (6 - 8 cm H₂O). Bowel perforation occurred at the following pressures: no serosal tear (n=7): 26.4 cm H₂O (SD 6.6); 4 cm longitudinal tear (n=14): 23.3 cm H₂O (SD 4.2); 25% bowel circumference (n=23): 27.7 (SD 4.4); 100% (n=12): 25.4 cm H₂O (SD 6.9).

No bowel perforation occurred after 72 hours. There was no evidence of bowel wall ischaemia at histological examination in any of the specimens.

Conclusion: Serosa of the small bowel does not appear to provide tensile strength, and serosal tears do not interrupt mucosal blood supply significantly.
TEMPORARY PLACEMENT OF COVERED SELF-EXPANDING METAL STENTS FOR BENIGN GASTRODUODENAL PATHOLOGY
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Background: Palliation of malignant gastroduodenal obstruction by self-expanding metal stent (SEMS) placement is the accepted treatment of choice. While indications for SEMS have expanded, application for benign gastroduodenal pathology remains controversial. This study evaluated the efficacy of SEMS in patients with benign gastric outlet obstruction (GOO) and duodenal fistulation.

Methods: A prospective database documenting patients with temporary placement of retrievable covered SEMS for benign gastroduodenal pathology was analysed. Technical and clinical successes as well as short- and long-term complications were evaluated.

Results: Eleven patients (6 men, 5 women, median age 56.6 years, range 35 - 76 years) had endoscopic placement of covered retrievable duodenal SEMS under fluoroscopic guidance for GOO due to peptic ulcer disease (n=6), extrinsic compression by inflammation related to acute pancreatitis (n=3), pyloric stricture following repair of a perforated peptic ulcer (n=1) and a high-output traumatic duodenal fistula (n=1). Indications included significant patient comorbidity, recent surgery and patient preference. Ten stents (91%) were placed successfully; 1 misplaced stent was replaced within 48 hours. All stents had haemoclips applied to prevent migration. Early proximal stent migration in 1 patient required stent replacement after 4 days. Planned retrieval of the stents was at 6 weeks. Late stent migration occurred in 2 patients, and 1 stent was not removable. Four patients (36%) eventually required surgical intervention for recurrent GOO within 4 - 6 weeks. Seven patients (63%) remain symptom free 2 - 18 months after stent removal.

Conclusion: While surgery remains the standard of care for benign GOO, in selected patients temporary duodenal stenting may avoid surgery or improve nutritional status and comorbidity before surgical intervention.

IS ROUTINE COMPUTED TOMOGRAPHIC ANGIOGRAPHY MANDATORY IN PENETRATING NECK TRAUMA?
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Background: Although conventional angiography is still considered the gold standard to diagnose vascular injuries, computed tomographic angiography (CTA) has emerged over the past few years as a fast, minimally invasive and widely available screening modality for penetrating injuries to the neck. Various studies have suggested that arterial injuries can be reliably excluded on physical examination and chest radiography alone, but clinicians remain reluctant to follow this approach owing to the gravity of a missed vascular injury. This study aims to determine the outcome of selective CTA in patients with penetrating neck trauma in a high-volume, resource-restricted environment.

Methods: All patients with penetrating neck trauma at our institution are screened with CTA. Over a 40-month period, patients were retrospectively reviewed to determine the frequency of missed injuries if CTA was performed selectively, based on abnormal physical examination and/or CXR. Data collected included demographics, zone of injury, physical examination, CXR, CTA and other investigations, injuries identified and management. Arterial injury was defined as an injury to the aorta or to the brachiocephalic, subclavian, common carotid, internal carotid, external carotid or vertebral arteries.

Results: Five hundred and sixty-five patients with penetrating neck trauma were included, and 61 arterial injuries were identified in 59 patients. Findings on physical examination and CXR were normal in 6 (9.8%) of the 61 injuries. These included 4 vertebral, 1 common carotid and 1 internal carotid injury. Two (3.3%) of the 61 injuries were significant and required operative repair.

Conclusion: Screening of all patients with penetrating neck trauma with CTA seems valid even in a developing country, as in this study 9.8% of vascular injuries would have been missed if CTA had been performed selectively after abnormal physical examination or CXR.

COST OF ROAD TRAFFIC ACCIDENTS TO A REGIONAL SOUTH AFRICAN TRAUMA CENTRE
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Background: RTAs are the 9th leading cause of mortality and morbidity worldwide. More than 85% of the global deaths and injuries from RTAs occur in less developed countries. Economic data regarding RTAs are crucial to evaluate the cost-effectiveness of preventive measures, yet many developing countries lack costing data. Healthcare costs of RTAs in South Africa have not previously been researched using a bottom-up costing method.

Aim: We aimed to calculate the direct healthcare cost of RTAs to our trauma centre in order to demonstrate the magnitude of the problem.

Methodology: This was a prospective study of 100 consecutive patients admitted with injuries sustained in RTAs. Demographics and injury details were obtained from medical records, and patients were interviewed for details surrounding the accident. To calculate costs, patients were reviewed every 48 - 72 hours and all interventions were recorded on an individual basis. Costs were obtained from hospital price lists, except for the prices of radiological investigations which were obtained from the South African Board of Healthcare Funders’ National Health Reference Price List.
Road traffic accidents: the burden of disease to a regional South African hospital

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Background: The majority (90%) of the world’s RTA deaths occur in low- and middle-income countries, where only 20% of the world’s vehicles are owned. This is due to rapid urbanisation, poor city planning and low incomes contributing towards an incompatible mix of road users and inadequately maintained vehicles. However, primary preventive measures such as seatbelts, education and law enforcement regarding drink-driving have been shown to reduce RTA incidence, morbidity and mortality. Highlighting the magnitude of the problem would serve as an incentive to investment in primary prevention.

Aims: We aimed to determine the burden of disease in patients admitted to our regional trauma centre with injuries sustained in RTAs.

Methods: This was a prospective study of consecutive patients admitted to our hospital between November 2011 and January 2012. Patients were interviewed about the circumstances of the accident, and medical records were reviewed to obtain data on their injuries.

Results: Forty-one pedestrians (PVAs) and 59 motor vehicle occupants (MVAs) were admitted over 10 weeks. Sixty-six patients were male and 67 patients were of an economically productive age. The majority of accidents (58) involved a private vehicle. Thirteen pedestrians were crossing the road, but only 7 at official crossings. Eleven were walking on the side of the road. In only 17% of MVAs was the injured person wearing a seatbelt, 8 were allegedly drunk, 1 driver was unlicensed and 12 were driving over the speed limit. A total of 197 injuries were sustained. On average patients spent 19 days in hospital, and 62 patients required at least one operation. Twenty-four patients were students, who lost on average 16 days from study, and the 30 working patients lost on average 22 days from work due to hospitalisation. The mortality rate was 4%, and 2% were permanently disabled.

Conclusion: RTAs are increasingly considered less ‘accidental’, and the role of primary prevention is developing. Injury costing is crucial for stakeholders’ cost-benefit analyses of these preventive interventions. Gross output studies in to the unit costs of road collisions have been done using top-down methods. However, top-down costing is not considered an accurate reflection of direct healthcare costs – indeed we calculated the average cost of each inpatient to be R55 907, which is greater than the R4 762 attributed to these costs in a recent government report using top-down costing.

Interestingly, only 17% of motor vehicle occupants claimed to have been wearing a seatbelt at the time of the accident. Eight of the drivers were allegedly drunk and 12 were speeding. Primary prevention has the potential to reduce the number of road traffic ‘accidents’, and data such as ours, demonstrating the magnitude of this problem in terms of cost and burden to the hospital, should enable cost-effectiveness of primary prevention to be evaluated and lead to investment in more preventive measures.

Virtual worlds in trauma team training: an international South Africa and UK feasibility study

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Background: Trauma is a leading cause of death in the developing world. Simulation-based training, such as advanced Trauma Life Support (ATLS), is key to improving outcomes. However, in the developing world, training is costly and difficult to access, making the acquisition and upkeep of related technical and non-technical skills challenging. Virtual worlds (VWs) are online, multi-user, three-dimensional environments in which users interact by voice using personalised avatars. The feasibility, face and content validity of utilising VWs for trauma team training in the UK has recently been demonstrated. However, the use of VWs for collaborative international trauma training and skills assessment, where experts and trainees are situated on separate continents, has never been investigated.

Aim: To determine the feasibility of using a low-cost, interactive, online immersive VW environment (Second Life) for international trauma training and skills assessment.

Method: Within Second Life, a physiologically responsive trauma patient was created that could undergo simultaneous investigation and...
treatment by all trauma team members. Eleven South African-based clinicians participated in a prospective cohort feasibility study, each acting as the trauma team leader. The remainder of the trauma team was played by clinicians at Imperial College London, UK. An HP laptop (2005 model) and a Telkom Mobile 3G modem were used to connect the South African participants to the VW. Technical and non-technical (communication, leadership, etc.) performance was scored by trained assessors. Participants also self-assessed their performance and provided both qualitative and quantitative feedback.

Results: All scenarios were carried out to completion. Of the participants, 82% believed that the scenario and visual portrayal was realistic; 91% thought that they would act the same way in real life; and all thought that VWs were a useful method of training. The feasibility of technical and non-technical skills assessments was established, although self v. expert performance ratings correlated poorly (p>0.05).

Conclusion: This study has established the feasibility of using VWs for international trauma training and assessment. The technology is simple to use and is not reliant on expensive equipment or ultra-short latency Internet. VWs have real potential to become standard adjuncts to traditional trauma training, especially in the developing world where traditional simulation-based teaching modalities are limited. Future research to further establish the validity of the scenarios and assessment metrics used is planned.

EMERGENCY PANCREATICODUODENECTOMY FOR COMPLEX PANCREATIC INJURIES

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Background: Major injuries of the pancreatic head involving the ampulla and duodenum are difficult to manage and may require resection as the definitive treatment. This study evaluated the role of pancreaticoduodenectomy in the management of complex proximal pancreatic injuries.

Methods: The records of all patients treated for pancreatic injuries between 1982 and 2011 were evaluated. Demographic data, mechanism and extent of injury, Abdominal Trauma Index (ATI), Apache II score, operative procedure, postoperative course, complications and outcome were analysed.

Results: Eighteen of 440 patients with pancreatic trauma had complex proximal injuries that necessitated pancreaticoduodenectomy. Sixteen were men and 2 were women; their median age 26 years (range 14 - 53 years); 12 had gunshot wounds, 5 had blunt trauma to the abdomen and 1 had been stabbed in the epigastrium; and 9 were shocked on admission to the trauma unit. The median delay between injury and first operation was 2 hours (range 1 - 7 hours). The mean number of associated injuries was 3.4; 6 patients had associated inferior vena cava injuries and 3 had portal vein or superior mesenteric vein injuries. Five of the 18 patients required an initial damage control procedure with resection and reconstruction 11, 12, 15, 72 and 92 hours later once stable. Twelve patients had a pylorus-preserving pancreaticoduodenectomy and 6 in whom the injury involved the pylorus had a standard Whipple resection. Ten patients had a pancreaticojejunostomy and 8 a pancreaticogastrostomy. The mean ATI was 49 (range 33 - 79) and the median APACHE score was 0 (range 0 - 15). The median intra-operative blood replacement was 12 units (range 8 - 32) and the median duration of surgery was 5 hours 35 minutes (range 4 hours 20 minutes - 6 hours 45 minutes). Three patients died postoperatively of multi-organ failure. Five patients developed anastomotic leaks due to pancreatic (2), biliary (2) or duodenal (1) fistulas. Two had delayed gastric emptying and 3 required percutaneous catheter drainage of infected intra-abdominal fluid collections. Four patients had late complications: 1 required 3 admissions to hospital for alcohol-induced pancreatitis, 1 had malabsorption which resolved with pancreatic enzyme replacement, 1 required a revision hepaticojejunostomy for a hepatic duct stone, and 1 developed alcohol-induced cirrhosis and chronic pancreatitis. Factors complicating surgery were shock on admission, the number of associated injuries, coagulopathy, hypothermia, gross bowel oedema and traumatic pancreatitis. The mean APACHE II score for survivors was 2 compared with 15 for the 3 patients who died.

Conclusion: Pancreaticoduodenectomy is a life-saving operation applicable to a small cohort of patients with complex injuries of the pancreatic head and is feasible after initial damage control surgery.

LEFT VENTRICULAR SYSTOLIC DYSFUNCTION IN CHRONIC CRITICAL LOWER LIMB ISCHAEMIA

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Background: Patients with chronic critical lower limb ischaemia (CLI) are at risk of heart failure. A reduced left ventricular (LV) ejection fraction (EF) in these patients increases the chances of a decreased patency of endovascular interventions. The extent to which patients with CLI have asymptomatic decreases in EF and the cause of these decreases in EF is unclear.

Methods: We performed echocardiography in 93 sequentially recruited patients with CLI without symptoms of heart failure and in 698 randomly recruited participants from a community sample.

Results: Compared with the community sample, patients with CLI had a markedly reduced multivariate-adjusted EF (EF in CLI 53 (SD 67) v. 67 (SD 9) in community participants), cardiac output (CO), stroke volume and LV midwall fractional shortening (p<0.0001 for all) and an increased total peripheral resistance (TPR) (p<0.0001), but a similar LV end-diastolic diameter and LV mass index (p>0.05). In contrast to only 1/698 community participants with an EF <40%, 26/93 (28%) patients with CLI had a reduced EF, of whom only 7 had a previous myocardial infarction (MI), and CLI was associated with a reduced EF independent of MI and additional confounders (odds ratio (OR) 5.67 (1.32 - 24.31), p<0.05). Pro-brain natriuretic peptide concentrations (pg/ml) were markedly increased in patients with
Background: Although an increased aortic pulse wave velocity (PWV) may be employed to predict cardiovascular risk, the extent to which this may be limited by decreases in PWV in peripheral arterial disease (PAD) is uncertain.

Methods: Applanation tonometry (SphygmoCor software) and vascular B-mode US were employed to assess carotid-femoral PWV and carotid IMT respectively in 1 030 randomly selected healthy adults and in 217 patients with CLI.

Results: Patients with CLI had a marked attenuation of age-related increases in aortic PWV (slope of the multivariate adjusted age-log PWV relationship: CLI group 0.23 (SD 0.07), controls 0.54 (SD 0.03), p=0.0001 for comparison of slopes) and multivariate adjusted aortic PWV (m/s) (CLI group 4.48 (SD 0.20), controls 6.77 (SD 0.08), p<0.0001). Compared with the community sample, carotid IMT was greater in patients with CLI (p<0.0001). Carotid IMT was correlated with aortic PWV in the community sample (r=0.50, p<0.0001), but not in patients with CLI (r=0.06, p=0.37). In a multivariate model with both carotid IMT and aortic PWV in the same model, both an increased IMT (standardised β-coefficient 0.18 (SD 0.04), p<0.0001) and a reduced PWV (standardised β-coefficient -0.23 (SD 0.03), p<0.0001) were independently associated with CLI.

Conclusions: A marked decline in age-related increases in aortic PWV occurs in CLI and a reduced aortic PWV is associated with CLI independent of the extent of atherosclerosis, as indexed by carotid IMT. The presence of PAD may therefore limit the sensitivity of the use of an increased aortic PWV as a risk predictor and a decrease in aortic PWV may herald the onset of advanced PAD.

CLINICAL PREDICTORS FOR THE NEED FOR RE-LAPROTOMY IN COMPLICATED APPENDICITIS

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Introduction: Complicated appendicitis associated with severe intra-abdominal sepsis is common in the developing world. There is currently limited evidence in predicting which patients will require relaparotomy for control of ongoing sepsis in the setting of complicated appendicitis. This prospective study aimed to construct a clinical prediction model to aid the decision making process.

Methodology: A prospective database was maintained and all cases of acute appendicitis from September 2010 to March 2012 were reviewed. ‘Simple’ was defined as any non-perforated appendix, while ‘complicated’ denotes perforation, with associated intra-abdominal contamination. Logistic regression analysis was carried out and a clinical predictive model was constructed using clinical parameters available (basic demographics, clinical presentation, laboratory results and operative findings).

Results: A total of 300 cases were reviewed, of which 120 required relaparotomy while the remaining 170 did not. Both samples were
statistically comparable for the purpose of analysis. The most significant factors predictive of the need for relaparotomy were female gender and intra-operative finding of four-quadrant sepsis. The overall predictive success was 90.7% (sensitivity 82.5% and specificity 96.1%). The receiver operating characteristic curve indicates an area under the curve of 0.949 (95% CI 0.923 - 0.975) with a p-value of <0.001.

Conclusions: Patients with complicated appendicitis often require relaparotomy for control of ongoing sepsis, but delay in decision making is common due to the uncertain clinical course of the condition. Our proposed model may be useful in selecting those at high risk in whom a mandatory relaparotomy is absolutely essential as a part of the definite management.

OUTCOME IN DECOMPENSATED ALCOHOLIC CIRRHOTIC PATIENTS WITH ACUTE VARICEAL BLEEDING: A PROSPECTIVE EVALUATION OF 448 CONSECUTIVE PATIENTS TREATED WITH EMERGENCY ENDOSCOPIC INTERVENTION DURING THE INDEX HOSPITAL ADMISSION

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Background: Variceal bleeding (VB) is the leading cause of death in cirrhotic patients with portal hypertension and oesophageal varices. This prospective single-centre study evaluated the efficacy of emergency endoscopic intervention in the control of acute variceal bleeding and the prevention of rebleeding and death during the index hospital admission in a large cohort of consecutively treated alcoholic cirrhotic patients after the first variceal bleed.

Methods: From January 1984 to August 2011, 448 alcoholic cirrhotic patients (349 men, 99 women; median age 50 years) with VB underwent 805 endoscopic treatments (556 emergency, 249 elective) during their index hospital admission. Injection sclerotherapy was used to control bleeding until 1990 and subsequently variceal banding was used. Child-Pugh C-P class and score, endoscopic control of initial bleeding, variceal rebleeding and survival after the first hospital admission were recorded.

Results: Endoscopic intervention alone controlled VB in 394 patients (87.9%), while 54 patients also required balloon tamponade. Fifteen patients rebled within 24 hours and 61 rebled after 24 hours (total 76; 17%). Ninety-three patients (20.8%) died in hospital. No C-P class A patients died, while 16 (8.9%) C-P B and 77 (35.8%) C-P C patients died. Mortality increased exponentially as the C-P score increased, reaching 80% when the C-P score exceeded 13.

Conclusion: Despite initial endoscopic control of variceal haemorrhage, 1 in 6 patients (17%) rebled during the first hospital admission. Survival was 79.2% and was influenced by the severity of liver failure, with most deaths occurring in C-P grade C patients.

ENDOSCOPIC MANAGEMENT OF BILE LEAKS AFTER LAPAROSCOPIC CHOLECYSTECTOMY

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Background: A bile leak is an infrequent but potentially serious complication after biliary tract surgery. Endoscopic intervention is widely accepted as the treatment of choice. The aim of this study was to assess the effectiveness of endoscopic retrograde cholangiography, sphincterotomy and biliary stenting in the management of postoperative bile leaks.

Methods: An ERCP database was retrospectively reviewed to identify all patients with bile leaks after laparoscopic cholecystectomy. Patient records and endoscopy reports were reviewed.

Results: One hundred and thirteen patients (92 women, 21 men, median age 47 years, range 22 - 82 years) with a bile leak were referred for endoscopic management at a median of 18.1 days (range 1 - 226 days) after surgery. Predominant symptoms included pain (13 cases, 11.5%), abnormal liver function test results (22, 19.5%), bile leak (25, 22.1%), intra-abdominal collections (45, 39.8%) and sepsis (8, 7%). During cholangiography 29 patients (25.7%) were found to have a major bile duct injury without duct continuity and were referred for surgical repair. Of 84 patients, 44 had a cystic duct leak, 26 a cystic duct leak and common bile duct stones and 14 patients had a common bile duct injury amenable to endoscopic stenting. In the 70 patients with cystic duct leaks (group A), 24 underwent a sphincterotomy only (including 8 stone extractions), 43 had a sphincterotomy with stent placement (including 18 stone extractions) and 1 patient had only a stent placed, while 2 patients with previous sphincterotomies required no further intervention. The average number of ERCPs in group A was 2.3 (range 1 - 7). Of the 14 patients with bile duct injuries treated endoscopically (group B), 7 had a class D injury, 3 an E5, 3 a class B and 1 a biliary stricture. Thirteen patients underwent sphincterotomy and stenting and 1 had a sphincterotomy only. Group B required a mean of 3.6 ERCPs (range 2 - 5). The 113 patients underwent a total of 269 (mean 2.4, range 1 - 7) ERCPs. Ten patients had complications related to the ERCP: 3 acute pancreatitis, 2 cholangitis, 2 sphincterotomy bleeds, 1 duodenal perforation and 1 impacted Dormia basket, the latter 2 requiring operative intervention.

Conclusions: Three-quarters of bile leaks after laparoscopic cholecystectomy were due to cystic duct leaks (with or without retained stones) or lesser bile duct injuries and were amenable to definitive endoscopic therapy. A quarter of the patients had major injuries that required operative repair; ERCP in these patients could have been avoided by performing postoperative magnetic resonance cholangiopancreatography.

MORBIDITY FOLLOWING STAB WOUNDS OF THE PANCREAS: A UNIVARIATE ANALYSIS

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Background: Penetrating injuries of the pancreas may result in serious complications. This study assessed the factors influencing morbidity after stab wounds of the pancreas.

Methods: A retrospective univariate cohort analysis of all patients with stab wounds of the pancreas between 1982 and 2011 was done. Demographic data, RTS, presence of shock on admission, anatomical location and grade of the pancreatic injury, associated intra- and extra-abdominal injuries, injury-to-operation interval, surgical procedure used, duration of hospital stay, and presence of type of pancreas-related and other complications and mortality were assessed.

Results: Seventy-eight (74 men) patients, median age 26 years (range 16 - 62 years), median RTS 12 (range 3 - 12) had 18 proximal pancreatic injuries (head/uncinate process n=16, neck n=2), 36 injuries of the body of the pancreas, and 24 injuries involving its tail. All 78 patients underwent laparotomy. Sixty-five patients had American Association for the Surgery of Trauma (AAST) grade I or II pancreatic injuries and 13 had grade III, IV or V injuries. Only 4 patients had an isolated pancreatic injury. The remaining 74 patients had a total of 98 associated intra-abdominal injuries, and 18 also had vascular injuries. Eight (10.3%) of the 78 patients had an initial damage control operation. Sixty-nine patients (84.6%) had drainage of the pancreas after haemostasis and 4 had a distal pancreatectomy as the primary procedure. Three patients underwent a secondary pancreatic procedure once stable which included a Whipple resection, distal pancreatectomy and splenectomy, and distal pancreatectomy alone. Median (range) ICU and total hospital stay were 4 (1 - 41) and 8 (5 - 149) days. Thirty-seven patients (47.4%) had a Whipple resection, 15 had a modified Whipple resection, and 14 had a distal pancreatectomy alone. Thirty-three patients (42.3%) with abdominal injuries and 2 had anastomotic leaks. Four patients (5.2%) died. The site of the pancreatic injury (head and neck v. body v. tail) was not significant with regard to development of general complications (p=0.673). Using univariate analysis, grade of pancreatic injury (AAST grade I - II v. grade III - V injuries; p<0.001), RTS (p<0.007, OR 5.01, 95% CI 1.46 - 17.19), presence of shock on admission (p=0.022, OR 3.31, 95% CI 1.16 - 9.42), need for transfusion (p<0.001, OR 6.46, 95% CI 2.40 - 17.40) and repeat laparotomy (p<0.001) had a significant influence on the development of general complications.

Conclusions: Although mortality was low after a pancreatic stab wound, morbidity was high. Grade of injury, RTS, shock on admission to hospital, need for transfusion and repeat laparotomy were significantly related to morbidity.

MORBIDITY AND MORTALITY AFTER LIVER RESECTION FOR COLORECTAL LIVER SECONDARIES

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Background: Liver resection is the treatment of choice for patients who have localised liver secondaries amenable to resection, but is associated with significant postoperative complications. This study evaluated the incidence and causes of morbidity and mortality in patients undergoing hepatectomy for colorectal liver secondaries. The hypothesis is that knowledge of the factors related to complications will improve results.

Methods: The study was based on a prospective database of all liver resections performed in the HPB surgical unit at Groote Schuur Hospital between January 1990 and December 2011, during which 380 elective liver resections were done. The 173 patients who underwent resection for colorectal liver secondaries were evaluated. Data analysis included demographic information, extent of surgery, major or minor resections according to the number of segments resected (major >2 segments, minor ≤2 segments), duration of inflow occlusion, operative blood loss, peri- and postoperative blood transfusion, duration of hospital stay, complications and mortality. Complications were graded according to the Dindo-Clavien classification. For statistical analysis p<0.05 was regarded as significant.

Results: Of the patients 122 (70.5%) had major resections which included 8 trisectionectomies (4.6%), 67 right lobectomies (38.7%) and 47 left lobectomies (27.2%). Minor resections included 40 patients (23.1%) who had 2 segments resected. Eleven (6.4%) had segmental resections or non-anatomical resections. Thirty-three patients (19%) had 51 postoperative complications (n=30 (58.2%) non-hepatic complications, n=21 (41.2%) hepatic complications, which included 5 patients (2.9%) with liver failure). In hospital mortality was 2.9% (n=5). Hepatic complications occurred predominantly in patients who underwent major resections with prolonged inflow control (p<0.05).

Conclusion: Extent of liver resection and total ischaemic time were associated with increased morbidity and mortality. Morbidity was uncommon in patients who had a minor resection. Half the complications in patients who had a major resection were liver related. Identifying these high-risk patients pre-operatively may be useful in minimising complications. Future evaluation should assess liver histology and chemotherapy effects.

DOES THE INDIVIDUAL SURGEON’S EXPERIENCE AFFECT OUTCOME AFTER PANCREATICO-DUODENECTOMY?

PROFESSORIAL MORBIDITY AND MORTALITY COMPARSED WITH CONSULTANTS AND FELLOWS – AN ANALYSIS OF A PROSPECTIVE DATABASE

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Background: Localisation of tumours in the head of the pancreas, peripancreatic or non-pancreatic structures makes resection of the pancreas and duodenum necessary, the procedure being known as pancreaticoduodenectomy. It is a technically challenging operation with a high rate of complications. The aim of this study was to compare the outcome of resection between consultants and residents. The hypothesis is that the outcome of pancreaticoduodenectomy is affected by the experience of the surgeon, and the comparison of these two groups will be useful in future studies.

Methods: The study was based on a prospective database of all pancreaticoduodenectomies performed at Groote Schuur Hospital between January 1990 and December 2011, during which 380 elective liver resections were done. The 173 patients who underwent resection for colorectal liver secondaries were evaluated. Data analysis included demographic information, extent of surgery, major or minor resections according to the number of segments resected (major >2 segments, minor ≤2 segments), duration of inflow occlusion, operative blood loss, peri- and postoperative blood transfusion, duration of hospital stay, complications and mortality. Complications were graded according to the Dindo-Clavien classification. For statistical analysis p<0.05 was regarded as significant.

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Conclusion: Extent of liver resection and total ischaemic time were associated with increased morbidity and mortality. Morbidity was uncommon in patients who had a minor resection. Half the complications in patients who had a major resection were liver related. Identifying these high-risk patients pre-operatively may be useful in minimising complications. Future evaluation should assess liver histology and chemotherapy effects.
Background: Outcomes after pancreaticoduodenectomy are reported to be better in high-volume centres. It is less clear what effect the experience of the primary surgeon has on outcome in a high-volume unit.

Aim: We set out to determine whether there was a difference in outcome after pancreaticoduodenectomy based on the experience of the operating surgeon. We compared the results of the most experienced surgeons with the other surgeons in the unit.

Methods: The analysis was based on a prospective database of pancreaticoduodenectomies performed in the HPB surgical unit at Groote Schuur Hospital. The most recent 76 pancreaticoduodenectomies were evaluated. The patient cohort was divided into two categories according to surgeon category: group A – 46 patients who had supervised surgery with fellows and junior consultants as the primary surgeons, and group B – 30 patients who had surgery by senior staff as primary surgeons. All patients who had a Whipple resection were included regardless of the indication. Data collected included demographic information, pre-operative comorbidities, indication, duration of surgery, intra-operative blood loss, tumour size and resection margin, duration of hospital stay, complications and mortality. Complications were graded according to the Dindo-Clavien classification. For statistical analysis p<0.05 was regarded as significant.

Results: There was no significant difference in the demographics, estimated blood loss (400 v. 425 ml) and tumour size between the two groups. The median duration of surgery in group A was significantly longer than in group B (367.5 v. 300 minutes), with a higher rate of positive resection margins (24.2% v. 16.0%). Cumulative postoperative morbidity (60% v. 47.8%), pancreatic fistula rate and the total LOS were comparable.

Conclusions: Analysis of the data show that supervised Whipple resection by fellows and junior consultants is safe with similar outcomes as the professorial group except for longer operations with higher positive resection margins.

REPAIRING MAJOR LAPAROSCOPIC BILE DUCT INJURIES: WHAT DOES IT COST?
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Background: A major bile duct injury is an infrequent but potentially life-threatening complication after laparoscopic cholecystectomy. Few data exist on the financial implications of duct repair. This study calculated the costs of operative repair in a cohort of patients who underwent reconstruction of the bile duct after major ductal injury.

Methods: A prospective database was reviewed to identify all patients referred to UCT Private Academic Hospital between 2002 and 2011 for assessment and repair of major laparoscopic bile duct injuries. The detailed clinical records and billing information were evaluated to determine all costs from admission to discharge. Total costs for each patient were adjusted for inflation between year of repair and 2012.

Results: Thirty-four patients (25 female, 9 male, median age 49 years, range 32 - 71) with a major bile duct injury were referred for management at a median of 21 days (range 1 - 280) after initial surgery. Patients were admitted to hospital for a median of 13.5 days (range 6 - 52 days). The mean cost of repair was R182 400 (range R70 112 - R395 515). The contributors to cost were hospital bed costs (27.4%), theatre costs (27.2%), radiology costs (16.1%), specialist fees (9.9%), consumables (8.1%), pharmacy costs (5.2%), endoscopy costs (3.3%) and laboratory costs (2.9%).

Conclusion: The cost of repair of a major laparoscopic bile duct injury is substantial owing to prolonged admission to hospital, complex surgical intervention and intensive imaging requirements.

A SINGLE-INSTITUTION EXPERIENCE OF TYPE 1 MULTIPLE ENDOCRINE NEOPLASIA-ASSOCIATED GASTRINOMA
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Background: Multiple endocrine neoplasia (MEN-1) is a rare autosomal dominant disease affecting the parathyroids, pancreas and pituitary glands.

Patients and methods: We report single-institution experience over a 32-year period of 8 patients with MEN-1 identified from 48 patients with Zollinger-Ellison syndrome (ZES). One was female and 7 were males. The mean age at diagnosis was 38 years. Only 1 had a positive family history.

Results: Seven patients presented with ZES or its complications, and 1 patient initially presented with hypercalcaemia. The average delay from onset of symptoms to diagnosis of ZES/MEN-1 was 6.5 years. Prior to establishment of the diagnosis 8 patients had surgery for peptic ulcer complications and 2 had parathyroidectomy. Prolactin was raised in 8 patients, abnormal pituitary/cella turcica was seen on CT in 6 patients, and 1 patient had acromegaly. Five patients underwent parathyroidectomy after diagnosis with immediate normalisation of calcium in 4, and repeat surgery was required in 1 patient.

After diagnosis 3 patients had no further surgical intervention for ZES. One had total gastrectomy, 1 had distal pancreatectomy and total gastrectomy, and the remaining 3 patients each had two debulking procedures for a variety of pancreatic neuro-endocrine tumours.

No clinical or biochemical cure was achieved in this cohort. The median survival was 18 years. There were 4 deaths during the study period, 3 patients were lost to follow-up at 8, 18, 24 years, and 1 is alive and well at 21 years.

Conclusion: This study confirms that surgery does not cure MEN-1-associated ZES. Screening for MEN-1 is required in all patients.
with ZES even in the absence of family history. Long-term survival is the rule, so follow-up to detect metachronous neuro-endocrine tumours is important.

**SINGLE-INSTITUTION EXPERIENCE WITH ZOLLINGER-ELLISON SYNDROME: CAUSES OF DEATH AND SURVIVAL PATTERN**

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**Background:** The mortality in ZES is not clearly established. We report a mortality analysis in a tertiary institution cohort.

**Patients and methods:** Forty-eight consecutive ZES patients were managed at Groote Schuur Hospital between 1978 and 2012. Thirty-five males (73%) and 13 females (27%) were diagnosed, at a mean of 40 years. Forty (83%) had sporadic disease and 8 (17%) had MEN-1.

**Results:** Nineteen patients died during the study period with a mean follow-up of 10.4 years, 4 of whom had MEN-1-associated gastrinoma. Nine patients are still attending follow-up (mean 19.7 years). Twenty patients had variable follow-up with a mean of 8.5 years. Five deaths were related to ZES, 2 patients died from duodenal ulcer haemorrhage, 2 died from postoperative septic complications following repeated surgery, and 1 died of tumour progression; 14 deaths were unrelated to ZES.

**Conclusion:** ZES is compatible with long-term survival. The majority of deaths are unrelated to ZES. Death from tumour progression is rare. Patients undergoing recurrent surgery are at increased risk of complications related to death.

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