Efficacy and Safety of Single 6mL Injection of Hylan GF 20 in Indian Patients with Symptomatic Knee OA - Interim Results

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INTRODUCTION: This interim analysis aims to evaluate the tolerability and six-month effectiveness of a single 6mL intra-articular (IA) injection of hylan G-F 20 in patients with symptomatic knee osteoarthritis (OA) in standard clinical practice.

METHODS: This prospective, open label study is being conducted at 36 Indian centers in patients with symptomatic, predominant tibio-femoral OA (Kellgren-Lawrence grade [KLG] I-III), aged ≥30 years with moderate to severe walking pain (WOMAC A1, baselineVAS score between 40-80mm). Patients received a single 6 mL IA injection of hylan G-F 20 at baseline and were evaluated at Weeks one, four, 12 and 26 for efficacy variables (Total WOMAC, SF-12 Health Survey, patient and clinician observer global assessments [PTGA and COGA respectively] and impact on concomitant OA medication) and safety variables (examination of injected knee and adverse events [AEs]). The primary endpoint was change from baseline in WOMAC A1 subscore at Week 26.

RESULTS: Out of 394 patients [mean age: 57.6±9.8 years; mean BMI: 27.66±4.48; female / male: 72.3/27.7%; KLG I: 5.1%; II: 38.3%; III: 56.3%] enrolled, 372 patients were evaluated at Week 26. The WOMAC A1 subscore decreased by 46.36% from 60.4±10.31mm at baseline to 32.4±18.88mm at Week 26 (p<0.0001). A significant walking pain reduction was observed as early as Week One after the injection and this significant trend persisted over 26 weeks. The WOMAC A score decreased by 46.27% from 56.14±13.08mm at baseline to 30.44±17.38mm at Week 26 (p<0.0001). The WOMAC B score decreased by 43.32% from 52.91±17.70mm at baseline to 29.99±18.84mm at Week 26 (p<0.0001). The WOMAC C score decreased by 41.70% from 54.24±15.24mm at baseline to 31.62±17.87mm at Week 26 (p<0.0001). The percentage of responders to treatment at Week 26 was 76.6%. PTGA and COGA significantly improved over 26 weeks (p<0.0001). The quality of life score (SF-12 scores) improved over 26 weeks. The usage of concomitant medication decreased in 8.9% of patients by Week 26. A total of 22 treatment-emergent target knee AEs were reported in 21 of 394 patients (5.3%). The most commonly reported treatment-emergent target knee AE was arthralgia (n=14; 3.6%). One patient had a treatment-emergent target knee SAE of arthritis.

DISCUSSION AND CONCLUSION: This interim analysis demonstrates that in Indian clinical practice a single 6mL IA injection of hylan G-F 20 is safe and effective in the treatment of symptomatic knee OA with significant improvement in patient outcomes.
Effectiveness of Video-based Home Exercise for Osteoarthritis of the Knee

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INTRODUCTION: It is well known that exercise therapy has beneficial effects on pain and physical function of the population with osteoarthritis (OA) of the knee. Exercise adherence has been shown to be an important predictor of long-term outcome in exercise therapy. Video media can be an effective means of delivering exercise instruction. We have hypothesized that video-based home exercise could enhance adherence to prescribed exercise program and produce substantial improvements in pain, physical function and quality of life in patients with knee OA and also prevent radiographic progression of knee OA compared with conventional home exercise without video media. The purpose of the present study was to test this hypothesis by a one-year prospective randomized controlled trial.

METHODS: A total of 107 subjects who fitted the following criteria were randomized to a DVD-based exercise (DVD) group or a control group. Entry criteria were defined as knee pain, age over 50 years old, and radiographic evidence of OA (Kellgren-Lawrence Grade 2, 3, or 4). Subjects in the DVD group received a DVD-based program encompassing range of motion (ROM) and muscle exercises and used it during home exercise. Subjects in the control group initially received detailed verbal and hands-on instruction in a home-based program of a quadriceps exercise program. Subjects in both groups were evaluated after three, six and 12 months. Measured outcomes were self-reported exercise adherence collected from diaries, WOMAC, SF-8 and radiographic OA parameters (i.e. medial minimum joint space width, medial osteophyte area and FTA) using the computer-aided measuring system.

RESULTS: Concerning exercise adherence, subjects in the DVD group performed the prescribed exercise 5.3, 5.0 and 3.8 times in a week at three, six and 12 months, while those in the control group performed the prescribed exercise 3.9, 3.7 and 4.1 times, respectively. The numbers of exercise times in the DVD group were significantly higher than those in the control group at three and six months, although there was no significant difference between groups at 12 months. The improvements in pain and physical function categories of WOMAC and SF-8 physical component summary were significantly greater in the DVD group than in the control group at all time periods. There were no significant differences in the SF-8 mental component summary. Regarding radiographic OA progression of the knee, the DVD group showed significant increase in FTA at 12 months compared with the baseline values, while we could not find significant progression in the medial minimum joint space width or medial osteophyte area. There were no significant differences between two groups in OA progression on any radiographic parameters at three, six or 12 months from the baseline.

DISCUSSION AND CONCLUSION: The present one-year prospective randomized controlled trial showed that video-based home exercise can enhance adherence to prescribed exercise program for six months and can produce substantial improvements in pain, physical function and quality of life in patients with knee OA at one year. However, this video-based home exercise cannot prevent radiographic progression of the knee OA.

Long Term Management of Knee Osteoarthritis with Hylan GF-20: Efficacy, Safety of Repeat Treatments Over Four Years

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Arup Dutta, FRCS
Geoffrey V. Johnson, FRCS, Hull, United Kingdom
Christopher Shaw, FRCS
Nicky Day

INTRODUCTION: Osteoarthritis (OA) is a chronic disease and its management is a constant process. Pain and symptom relief from viscosupplementation is variable ranging from three to 12 months necessitating repeat courses of treatment. The aim of this study was to assess the safety and efficacy of multiple repeat intra-articular injections of hylan GF-20 in the treatment of osteoarthritis of the knee METHODS: Patients with OA of the knee were offered initial treatment with hylan GF-20 and repeat courses after a minimum of six months from the previous injection(s). The inclusion criteria was pain score of 6 on a VAS (0-10) in the target knee. Patients with at least two treatment courses were included in the study. This is a prospective, longitudinal independent study over six years in the same institution, where all patients were reviewed by blinded assessors at pre injection, one week, six weeks, three months, six months after every treatment course. The primary outcome variable was knee pain on VAS at six months. Secondary outcome measures were WOMAC, Oxford knee score and SF-12. All adverse events (AE) were recorded. RESULTS: From our arthritis database, we identified 1,103 patients who had repeat treatments (two to eight courses, median-three) with hylan GF-20. The mean time to repeat treatment was 45.6 weeks (27-104, weeks). Knee pain on VAS improved from 6.6 to 3.7 at six months (p=0.02) over all courses. Mean improvement in knee pain was 51% after the first repeat course and 49% at the last repeat course. Significant improvements from the baseline in the WOMAC pain and function subscales and Oxford knee scores were observed during all repeat courses. Overall incidence of AE was 13.4% (11.9% in initial course) from the pooled data. The incidence of AE had no correlation to the number of repeat treatments. DISCUSSION AND CONCLUSION: Pain relief and improvement of function are consistently observed following repeat treatment of symptomatic OA of the knee with hylan G-F 20. Longevity and magnitude of symptom control are similar to the first course of treatment. Repeat courses are well tolerated with low adverse events. This study demonstrates that viscosupplementation with hylan GF-20 is an invaluable tool in the multimodal treatment and forms part of the armamentarium of OA management.
PAPER NO. 261
The Effects of Viscosupplementation on Knee Proprioception in Early Stage Osteoarthritis Osteoporotic Patients
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INTRODUCTION: A critical appraisal of the current evidence-based research offers no guidance in the treatment of early stages of knee arthritis disability in the elderly population. Furthermore, the progressive loss of the cartilage integrity compromises function of the diseased knee during everyday activities, resulting in different biomechanical strategies to compensate for the uncontrolled balance, thus favoring falls and fragility fractures. The purpose of this study was to analyze hyaluronic acid (HA) effects exerted in terms of pain relief and consequently improved balance in osteoporotic patients affected by early stage osteoarthritis.

METHODS: Sixty low-bone-density patients affected by knee osteoarthritis (stage 1), were randomly divided into two groups to respectively receive HA injection (Group A: 30) or not (Group B: 30). Inclusion criteria were: age > 65 years, good general health and cognitive status, early stage arthritis (confirmed by x-rays), normal or controlled blood pressure, no eye and/or ear problems, low-bone density at bone mineral density (BMD), VAS, satisfaction index and stabilometric pattern were evaluated before and after five injections of HA.

RESULTS: In Group A, VAS significantly reduced after HA injection (p<0.005). Furthermore, stabilometric parameters were significantly affected in terms of weight distribution (p<0.05) and center of balance (p<0.05).

DISCUSSION AND CONCLUSION: Even if osteoarthritis progression can't be stopped, reducing pain in short term, and globally improving balance, can significantly affect quality of life, reduce risk of falls and related-fragility fracture consequences.

PAPER NO. 262
Prediction of Prognosis in Conservatively Managed Early-Stage Spontaneous Osteonecrosis of the Knee
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INTRODUCTION: Conservative management is generally adopted as a primary option for patients with early stage spontaneous osteonecrosis of the knee (SONK). During the course of the treatment, the prognosis is variable from patient to patient and difficult to predict. There have been few reports regarding the natural course of this morbidity, and risk factors for progression have not been well clarified. If we can predict the prognosis at the beginning of the treatment for patients with early-stage SONK, this would greatly help construct effective treatment plans. In order to detect the factor influencing the prognosis, we followed up our patient population who underwent conservative treatment for early-stage SONK and examined the relationship between radiological progression and presence of potential risk factors.

METHODS: A consecutive series of patients with early-stage SONK located in the medial femoral condyle constituted the basis of this study. Early stage was defined by the time period (less than two months) from the onset of knee pain. The study population included 32 knees in 30 patients (11 men and 19 women) with the age at presentation ranging from 50 to 86 years (average: 66.5 ± 9.1). The criteria for diagnosis were clinical characteristics and MRI findings of well outlined subchondral lesion surrounded by bone marrow edema. For all patients, conservative treatment consisting of lateral wedge shoe insole, muscle exercise and administration of NSAID was adopted. Potential prognostic factors examined in this study were as follows: age, sex, body mass index, bone mineral density, coronal alignment (femoro-tibial angle: FTA) in an anterior-posterior weight-bearing radiograph and area of the focus as well as surrounding edema in MRI. The follow-up period ranged from seven to 60 months (average: 22.7 ± 16.7 months). During the follow-up period, the patient’s prognosis was deemed to be poor when progressive joint space narrowing and occurrence of collapse were detected in sequential radiographs.

The influence of each of the potential risk factors on the radiological progression was statistically assessed using logistic regression analysis.

RESULTS: At the time of final follow-up evaluation, the prognosis of seven of the 32 knees (21.9%) was deemed to be poor. Among these seven knees, four knees went on to surgeries. Based on logistic regression analysis, varus alignment at first examination was identified as the only predictor of poor prognosis (p=0.059, odds ratio 1.37). The other prognostic factors (age, sex, BMI, bone mineral density and findings in MRI) were not significantly related with the prognosis.

DISCUSSION AND CONCLUSION: In the previous studies, size of the lesion in radiograph has been shown to indicate the subsequent prognosis. However, size of the lesion does not clearly identify in the majority of knees with early-stage SONK. Although MRI is thought to be of value in early diagnosis and evaluation of the SONK lesion, a limitation is indicated in prediction of the prognosis. Among the examined factors, coronal (varus) alignment...
alone is shown to be a factor influencing the outcome.

PAPER NO. 263

Mechanical or Chemical Prophylaxis of Venous Thromboembolism During Elective Hip and Knee Surgery

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INTRODUCTION: Experimental evidence indicates that intermittent pneumatic compression (IPC) provides significant protection against the development of venous thromboembolism (VTE) in vulnerable patients. In high-risk groups, such as orthopaedic surgery, chemoprophylaxis is typically prescribed either alone or in combination with compression stockings and/or IPC. However, chemoprophylaxis is associated with side effects such as haematoma, surgical site oozing, blood loss requiring transfusion and heparin-induced thrombocytopenia which might be avoided if IPC alone was shown to be equally effective. This pilot phase, approved by the Ethics Committee, investigates the null hypothesis that there is no difference in VTE outcome for subjects undergoing elective total hip replacement (THR) or total knee replacement (TKR) surgery when prescribed either enoxaparin or IPC alone. The study will also determine the sample size required for a fully powered randomized control trial (RCT).

METHODS: Consenting subjects were randomly assigned (closed envelope) to either treatment arm: Group 1 control (enoxaparin 40mg daily by subcutaneous injection commencing pre-operatively until discharge and Group 2 experimental (IPC) with calf garment commenced on operative day (day 0) with IPC applied to the non-operative side during surgery and on both legs post-operatively until fully ambulant.) Subjects had duplex scan pre-op and day seven; D-Dimer analysis on days zero, five and 10; calf and thigh circumference measured on days zero, one, five and 10. Blood loss and transfusion rates were recorded.

RESULTS: A total of 149 subjects were recruited: 80 TKR and 69 THR; 68 subjects were randomized to Group 1; 81 subjects to Group 2. Both groups had similar BMI, family and personal history of VTE and relevant co-morbid disease. Groups were balanced in terms of operative approach and type of anaesthesia: spinal, regional or general. All 149 subjects completed the study; three subjects developed VTE (table 1):

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<td>TKR only</td>
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While intraoperative blood loss was higher in Group 2 (mean 259ml vs. 138ml), post-op bleeding was 20% lower and subjects required fewer blood transfusions (Group 1: eight subjects received 16 units; Group 2: four subjects received nine units). One subject in this latter group suffered considerable blood loss requiring transfusion and heparin-induced thrombocytopenia which might be avoided if IPC alone was shown to be equally effective. This pilot phase, approved by the Ethics Committee, investigates the null hypothesis that there is no difference in VTE outcome for subjects undergoing elective total hip replacement (THR) or total knee replacement (TKR) surgery when prescribed either enoxaparin or IPC alone. The study will also determine the sample size required for a fully powered randomized control trial (RCT).

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While intraoperative blood loss was higher in Group 2 (mean 259ml vs. 138ml), post-op bleeding was 20% lower and subjects required fewer blood transfusions (Group 1: eight subjects received 16 units; Group 2: four subjects received nine units). One subject in this latter group suffered considerable blood loss following the complication of a femoral fracture during surgery.

DISCUSSION AND CONCLUSION: We conclude that the data does not reject the null hypothesis and prophylaxis with IPC alone is a cost-effective and safe modality for patients undergoing elective hip and knee replacement associated with fewer side effects. Full statistical analysis will be undertaken when this pilot study completes at 200 subjects.

PAPER NO. 264

Safety, Efficacy and Outcome of 4,400 Patients Treated with Viscosupplementation for Osteoarthritis of Knee

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INTRODUCTION: Viscosupplementation is used widely to provide symptomatic relief to patients with knee osteoarthritis (OA). This study is aimed to assess the safety, analgesic efficacy and functional outcome of hylan GF-20 in a large cohort of patients.

METHODS: This is an independent, prospective, blinded (reviewers), longitudinal cohort study over six years in a single institution. Inclusion criteria was OA knee pain of at least 60mm on a 100mm VAS; no prior intra articular (IA) injection. Patients received 3 x 2mL hylan G-F 20 or 1 x 6mL (from 2009). Follow up at one, six, 12 and 26 weeks by blinded reviewers. Analgesics prohibited for 24 hours prior to follow-up assessments and NSAIDs for 26 weeks.

All adverse events (AE) were recorded. Primary outcome measure: target knee pain (VAS) at 26 weeks. Secondary outcome measures included WOMAC, Oxford knee score, SF12, Euroqol Eq 5D.

RESULTS: A total of 4,400 patients were recruited from 2004-2010. All patients received hylan GF-20 (3 x 2 mL N=3352, 1 x 6mL N=1048). Mean age was 61.2 yrs and 71% had Grade III (K-L) disease. Injection and/or treatment-related AE in the target knee were reported in 11.2% (3 x 2 mL) and 9.8% (1 x 6 mL) of patients. Significant pain reduction (>40%) was observed in both groups at 26 weeks (3 x 2 mL: 57% (mean) decrease from baseline, 1 x 6mL: 51%). Overall knee pain on VAS improved from 69 to 37 at six months (p=0.02). Significant improvements from the baseline in the WOMAC pain and function subscales (65% improvement at 26 weeks) and Oxford knee scores at three and six months were observed. There were no significant differences between groups in demographics or for any of the primary or secondary outcome measures at 26 weeks.

DISCUSSION AND CONCLUSION: Viscosupplementation with hylan GF-20 is an efficacious and safe treatment option for patients with symptomatic OA of knees. Pain relief lasts for at least six months after a first course of treatment. Single dose of 6 mL hylan G-F 20 offers comparable safety and efficacy to 3 x 2 mL at 26 weeks. It provides both the patients and physicians a choice with the potential additional benefits of reduced operational costs.

PAPER NO. 265

Readmissions After Primary Total Hip Replacement: A Quality Measure?

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INTRODUCTION: Hospital readmission is currently considered a quality indicator. The primary purpose of this study was to determine hospital readmission rates in patients who underwent primary total hip replacement (THR) and to identify reasons for readmissions within 30 days (d), 90 d and one year after surgery.

METHODS: A total of 201 consecutive admitted patients (222 THR) were studied. Reasons and number of hospital readmissions, preoperative diagnosis, demographics, Charlson index score, BMI, ASA score and patient perceived outcomes were recorded. We compared these outcomes preoperatively
and at two-year mark between readmitted and non-readmitted patients. We also compared the mean costs of index-surgery-related readmissions to the mean costs of non-index-surgery-related readmissions. \( p < 0.05 \) was considered significant.

RESULTS: Readmission rates were 3.5\% (30 d), 6.7\% (90 d) and 21.3\% (one year). The most frequent reason for readmission within 30 and 90 days was surgical-site infection (57.1\% vs 38.4\%). Within one year, it was elective procedure of another joint (42.1\%). Non-index-surgery-related readmissions accounted for 14.2\% of all readmissions within 30 d; 23.0\% within 90 d; and 65.7\% within one year. Readmitted patients within 30 d, 90 d, and one year had significant higher preoperative Charlson scores compared to non-readmitted patients (mean 3.1 vs 1.7; 2.9 vs 1.6; 2.7 vs 1.5 respectively). Readmitted patients within one year had significant higher preoperative ASA scores. Patients readmitted within one year also had significant worst preoperative QWB-7 Total Score (mean 0.50 vs 0.53); Hip Harris Score (36.6 vs 44.2); Merle D'Aubigné-Postel score (8.9 vs 10.7); and WOMAC Pain Score (12.8 vs 11.3) when compared to non-readmitted patients. No significant differences were found between costs (mean \$73,398 vs \$69,338).

DISCUSSION AND CONCLUSION: A significant number of hospitalizations not related to the index procedure occur in this age group. Reduced payments could be unfairly applied to hospitals that focus heavily on complex cases. Readmission rates are a poor measure of quality in total hip replacement.

### PAPER NO. 266

**The Impact of Rapid Mobilization on Length of Stay for Post-Operative Joint Replacement Patients**

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INTRODUCTION: Physiotherapy after total joint replacement enhances post-operative recovery by promoting faster rehabilitation and improving functional outcomes. Implementing a pathway to include earlier post-operative mobilization can reduce the hospital length of stay as well as cost. This study investigated the benefits of starting physical therapy in the recovery room following a total knee or hip replacement.

METHODS: We prospectively followed 900 total hip and total knee arthroplasty patients. On the day of surgery, 235 patients participated in a hospital physical therapy program that began with early mobilization with physical therapists in the recovery room. The second group of 665 patients received a standard physical therapy protocol, where the first therapy session occurred on post-operative day one. Progression with rehabilitation was followed, and length of hospital stay was compared.

RESULTS: Total length of stay for the rapid rehabilitation group was statistically significantly less than patients who began therapy on post-operative day one, for both hip and knee replacement patients. In the early mobilization group, the average length of stay was 3.7 days for total hip patients and 3.7 days for total knee patients. In the standard protocol group, the average length of stay for total hip patients was 4.6 days (\(p<0.00001\)) and 4.2 days (\(p<0.001\)) for the total knee patients. Rapid rehabilitation resulted in a direct savings, considering fewer hospital resources were used due to the reduced length of stay. Further financial gains could be realized if unfilled hospital beds are utilized to care for additional patients who are able to undergo surgery due to the resulting increased bed availability.

DISCUSSION AND CONCLUSION: Rapid mobilization of total joint replacement patients in the recovery room reduces the overall length of hospital stay resulting in significant cost savings.

### PAPER NO. 267

**Anxiety Predicts Postoperative Pain Levels and Analgesic Use in Men but not in Women After Total Knee Arthroplasty**

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INTRODUCTION: Variability in pain ratings after surgery may be partially related to pre-existing differences in psychological characteristics of patients. Two factors that have been associated in prior research with variability in post-operative pain are anxiety and “catastrophizing.” Catastrophizing is a measurable mental set that a patient brings to bear in response to stress; it includes elements like rumination, magnification and perceived helplessness. It is perhaps most easily thought of as the opposite of “coping.” We hypothesized that anxiety and pain catastrophizing would be predictive of pain and opioid consumption after total knee arthroplasty (TKA).

METHODS: We studied 97 patients who underwent minimally invasive TKA. A standardized anesthesia and multimodal analgesia protocol was utilized. Immediately before surgery, patients completed an abbreviated state-trait anxiety index, which is a validated tool that quantitates both a patient’s acute anxiety in the face of a stressful circumstance like surgery (anxiety state), as well as a patient’s usual amount of anxiety (anxiety trait); patients also completed a validated pain catastrophizing questionnaire, and rated their preoperative pain. Other pain-related data were obtained over seven postoperative days.

RESULTS: Anxiety trait in men predicted maximal and average pain at 24 hours (\(r = 0.51\) and 0.56 respectively, \(p < 0.001\)); and analgesic use at 24 and 48 hours (\(r = 0.5\), \(p < 0.001\)); no significant correlations between pain outcomes to anxiety and analgesic use at 24 and 48 hours (\(r = 0.5\), \(p < 0.001\)); no significant correlations between pain outcomes to anxiety and analgesic use at 24 and 48 hours (\(r = 0.5\), \(p < 0.001\)).

CONCLUSION: Pain-related outcomes are critical determinants of patient satisfaction, and are important quality and safety metrics. JCAHO considers pain the “fifth vital sign”; numerous agencies track patient satisfaction and release their data to the public. In the present study, early post-operative pain was a strong driver of patient satisfaction in men and women. This study also identified pronounced gender differences in pain-related outcomes after TKA. Some of these were predictable based on pre-operatively identifiable parameters; specifically, anxiety trait was useful in predicting postoperative pain and analgesic use in men, but it was not a good predictor in women. Women were less satisfied with pain control after TKA than men. Identifying patients more likely to have difficulty with pain management will allow more intensive prevention efforts for those deemed higher risk. Future studies about pain-related behaviors and functional outcomes after surgery should evaluate men and women separately.
**Conservative Multidisciplinary Treatment in Patients with Persistent Pain After Total Hip and Knee Replacement**

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Haili Wang, MD, Heidelberg, Germany  
Marcus R. Streit, MD, Dossenheim, Germany  
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**INTRODUCTION:** Despite the great success of total hip (THA) and knee (TKA) arthroplasty, there is a subgroup of patients who remain dissatisfied with these procedures and develop persistent pain and functional limitations. Persistent pain of unclear etiology after total joint replacement is a great therapeutic challenge and data on potential therapeutic strategies and therapy outcomes is limited. Multidisciplinary pain therapy describes an integrated treatment concept in which somatic and psychotherapeutic procedures cooperate with physical and psychological training programs. The objective of the present study was to evaluate whether and to what extent patients with persistent pain after THA and TKA benefit from multidisciplinary therapy in the short- and mid-term.

**METHODS:** In a retrospective study, we reviewed a consecutive series of patients with persistent pain after THA and TKA who had undergone multidisciplinary pain therapy at our institution between April 2007 and April 2010. Prior to inclusion in the study, patients underwent a standardized diagnostic work-up to rule out active infection, instability, component malpositioning or loosening, mechanical implant failure or other somatic causes of pain requiring surgical treatment. Socio-demographic parameters, pain intensity (Numeric Rating Scale, NRS, 1-10), physical capability (Hannover Functional Ability Questionnaire, FFbHR) and psychological status (Hospital Anxiety (A) and Depression (D) Scale, HADS) were assessed before multidisciplinary treatment (t1), after four weeks of therapy (t2) and at a minimum of 12 months follow up (t3). Wilcoxon signed-rank tests were applied to evaluate differences in questionnaire scores at t2 and t3 compared to the baseline (t1). Non parametric correlation was performed to identify predictive factors on pain reduction during therapy.

**RESULTS:** Forty (40) patients (12 males, 28 females, mean age 61 years, range: 37-79) were included in the study and all patients reported failed previous monodisciplinary and/or outpatient therapies. Mean follow up was 32 months (range: 13-48). At final follow up, 10 patients were lost. At t2, all scores improved significantly compared to the baseline value at t1 (range of p-values: 0.000-0.001). At t3, NRS (p<0.001), FFbHR (p<0.001), and HADS-D (p=0.025) were still significantly better compared to baseline values (t1), however a slight deterioration compared to t2 was seen. HADS-A values deteriorated between t2 and t3 and showed no difference (p=0.093) to the baseline value (t1). There was a weak but significant correlation between duration of pain before therapy and pain reduction during therapy (r= 0.52, p=0.001).

**DISCUSSION AND CONCLUSION:** The present study suggests that multidisciplinary pain treatment has beneficial short- and mid-term effects on subjective pain intensity, physical capability and depression in patients with chronic pain after joint replacement and may potentially avoid unnecessary exploratory revision surgery. Our findings support the previously reported relevance of socio-economic factors on clinical outcome after joint replacement surgery. Prospective studies with larger patient numbers are needed to confirm the present findings.
Joseph A. Bosco
Ran Schwarzkopf
Steven Gould
infection, but the risk does not seem to be as high as previously
of bacterial contamination, with only one of 46 basins showing
study contradicts the belief that splash basins are a high source
as high as a 74% positive culture rate for splash basins. Our
DISCUSSION AND CONCLUSION: Previous studies have shown
from opening to wound closure was 240 minutes for this case.
was 180 min ± 45 min. One control culture was positive for
analyzed. Mean time between basin opening and wound closure
were taken with sterile culture swabs and sent to the lab for
taking cultures of sterile splash basins as soon as they are opened
(controls) and again at wound closure after instruments and debris
have come into contact with the sterile water during the case. All
cultures were taken with sterile culture swabs and sent to the lab for
aerobic, anaerobic and fungal culture, and all results were recorded.
RESULTS: A total of 92 culture samples from 46 cases were
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aerobic, anaerobic and fungal culture, and all results were recorded.
RESULTS: A total of 92 culture samples from 46 cases were
were analyzed. Mean time between basin opening and wound closure
was 180 min ± 45 min. One control culture was positive for
streptococcus Viridens (2.17%), and this was from a different
wound closure, only one was positive for coagulase negative
Streptococcus Viridens (2 of the 3-Heart disease, Lung disease, Diabetes)
Morbid Obesity (BMI >40)
Family History of thrombosis
Immobility (limited weight bearing) (surgeon
preference/over-ride)

INTRODUCTION: Maintaining optimal sterile conditions
in the operating room is important for reducing surgical site
infections. Splash basins are used routinely by surgical technicians
during arthroplasty cases to wash instruments, despite the
fact that several studies have suggested that these basins may
be a potential source of infection. This study examines the
sterility of operating room splash basins in order to assess the
risk of contamination and exposure for arthroplasty patients.
METHODS: A total of 46 random clean primary arthroplasty cases
(32 hips, 13 knees and one unicondylar knee) were studied by
during arthroplasty cases to wash instruments, despite the
fact that several studies have suggested that these basins may
be a potential source of infection. This study examines the
sterility of operating room splash basins in order to assess the
risk of contamination and exposure for arthroplasty patients.
METHODS: A total of 46 random clean primary arthroplasty cases
(32 hips, 13 knees and one unicondylar knee) were studied by
taking cultures of sterile splash basins as soon as they are opened
(controls) and again at wound closure after instruments and debris
have come into contact with the sterile water during the case. All
cultures were taken with sterile culture swabs and sent to the lab for
aerobic, anaerobic and fungal culture, and all results were recorded.
RESULTS: A total of 92 culture samples from 46 cases were
were analyzed. Mean time between basin opening and wound closure
was 180 min ± 45 min. One control culture was positive for
streptococcus Viridens (2.17%), and this was from a different
case suggesting the control culture was a false positive. The time
from opening to wound closure was 240 minutes for this case.
DISCUSSION AND CONCLUSION: Previous studies have shown
as high as a 74% positive culture rate for splash basins. Our
study contradicts the belief that splash basins are a high source of
bacterial contamination, with only one of 46 basins showing
a positive culture. Splash basins can be a potential source of
infection, but the risk does not seem to be as high as previously
cited in the orthopaedic literature.

Is Intra-operative Splash Basin Use a Source of
Bacterial Contamination in Arthroplasty Surgery?
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Ran Schwarzkopf, MD, Boston, MA
Joseph A. Bosco, III, MD, New York, NY
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INTRODUCTION: Maintaining optimal sterile conditions
in the operating room is important for reducing surgical site
infections. Splash basins are used routinely by surgical technicians
during arthroplasty cases to wash instruments, despite the
fact that several studies have suggested that these basins may
be a potential source of infection. This study examines the
sterility of operating room splash basins in order to assess the
risk of contamination and exposure for arthroplasty patients.
METHODS: A total of 46 random clean primary arthroplasty cases
(32 hips, 13 knees and one unicondylar knee) were studied by
taking cultures of sterile splash basins as soon as they are opened
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RESULTS: A total of 92 culture samples from 46 cases were
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from opening to wound closure was 240 minutes for this case.
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bacterial contamination, with only one of 46 basins showing
a positive culture. Splash basins can be a potential source of
infection, but the risk does not seem to be as high as previously
cited in the orthopaedic literature.
METHODS: Three orthopedic surgeons and three sports medicine physicians from a single multispecialty practice prospectively completed surveys on patients for whom they were ordering a knee MRI between June 2010 and January 2011. The pre-MRI survey recorded clinical history, symptoms, physical exam findings, diagnosis with confidence level and planned management. The post-MRI survey recorded diagnosis with confidence level and planned management. The frequency in change of primary diagnosis and management was calculated. Fisher’s exact tests and logistic regression with Holm’s correction for multiple comparisons was used to test whether any specific patient or physician characteristic affected the change in diagnosis or management. The change in the diagnostic confidence level was also calculated.

RESULTS: Surveys of 93 patients (48 females and 45 males, mean age 43.0 years) were analyzed. Fifty-five patients were evaluated by orthopedic surgeons and 38 patients by sports medicine physicians. MRI changed the primary diagnosis in 29.3% of cases (95% CI of [20.0%-38.6%]) (Figure 1). MRI changed patient management in 25.3% of cases (95% CI of [16.4%-34.2%]) (Figure 2). MRI changed management in 34.6% (18/52) of cases where a nonsurgical management was planned, usually to either surgery or referral to an orthopedic surgeon (17/18 cases). MRI obviated the need for surgery in 13.6% (three/22) of cases and changed the type of surgery in 12.5% (three/24) of cases. The change in diagnosis had a statistically significant correlation with findings of lateral joint line pain in patient history (p=0.026) and lateral joint line tenderness on physical exam (p=0.03), but change in management did not have a statistically significant correlation with any specific patient or physician characteristic. Overall, confidence levels in the primary diagnosis increased by 10.6% (95% CI of [6.9, 14.3]) after MRI. Confidence levels increased by 15.8% (95% CI of [6.9, 24.6%]) when the diagnosis was changed after MRI and by 8.7% (95% CI of [4.7, 12.7%]) when diagnosis was unchanged after MRI. When the diagnosis was changed, confidence in pre-MRI diagnosis decreased in all but three cases, usually to zero (mean decrease of 61.9% with 65% down to zero confidence).

DISCUSSION AND CONCLUSION: Knee MRI frequently changed clinical diagnosis (especially in the presence of lateral joint line pain and/or tenderness) and patient management while improving diagnostic confidence, even when a clinical evaluation is performed by a highly specialized physician.

PAPER NO. 378
The Prevalence and Costs of Defensive Medicine Among Orthopaedic Surgeons: A National Survey Study
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Hazel Natividad, Rosemont, IL
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INTRODUCTION: Defensive medicine is defined as medical practices that may exonerate physicians from liability without significant benefit to patients. Many studies have argued that defensive medicine is a major cost driver in healthcare; however, the national prevalence of defensive medicine in the field of orthopaedic surgery has not been investigated. The purpose of this study is to investigate the practice of defensive medicine and the resultant financial implications of such behavior by orthopaedic surgeons in the United States.

METHODS: In September of 2010, 2000 orthopaedic surgeons randomly chosen from the AAOS registry received invitations to answer a web-based survey on defensive medicine. Of these, 1,214 (61%) completed the survey. Cost analysis was performed using Center for Medicare and Medicaid (CMS) data, which were provided at the 2011 CPT code level and then aggregated to reflect the eight domains of care assessed in this study.

RESULTS: Of the 1,214 respondents, 1,165 (96%) reported having practiced defensive medicine by ordering imaging, laboratory tests, specialist referrals or hospital admissions mainly to avoid possible malpractice liability. On average, 24% of all ordered tests were for defensive reasons (radiography, 19%; CT scanning, 26%; MR imaging, 31%; ultrasound, 44%; referrals, 35%; laboratory tests, 23%; and biopsies, 18%). Defensive hospital admissions averaged 7% each month. Using the average national Medicare payment information from the 2011 CPT code reimbursement data, the cost of defensive medicine per respondent was calculated to be approximately $8,500 monthly or approximately $100,000 per year, which is roughly 24% of each physician’s spending. Given the U.S. Department of Labor’s statistic of 20,400 practicing orthopaedic surgeons in the United States, this study estimated that the national cost of defensive medicine for the specialty of orthopaedic surgery is $173 million per month and $2 billion annually.

DISCUSSION AND CONCLUSION: Defensive medicine among orthopaedic surgeons is a significant factor in healthcare costs and of marginal benefit to patients. Policies aimed at managing liability risk may be useful in containing such practices.

*The FDA has not cleared the drug and/or medical device for the use described in this presentation (i.e. the drug or medical device is being discussed for an off label use). For full information refer to page 14. An alphabetical faculty financial disclosure list can be found starting on page 19.
INTRODUCTION: Pay-for-performance initiatives are increasingly interested in linking hospital and surgeon compensation with outcomes for select procedures. Yet, this can't be done fairly without credible methods to account for differences in patients’ baseline health (i.e., risk adjustment). We developed a series of risk adjustment models for hip fracture procedures and evaluated them for accuracy and feasibility.

METHODS: We used prospectively collected data from the American College of Surgeons National Surgical Quality Improvement Program for 2005-2009 to identify elderly patients undergoing procedures for hip fractures (1,851 patients, >30 hospitals). We used stepwise logistic regression to create risk-adjustment models from a full complement of >50 variables, and more limited models of 10 and five variables. We compared the ability of full and limited models to predict patient complications at 30 days.

RESULTS: Full and limited models had similar discrimination with C-statistics of 83%, 80% and 79% for mortality using full, 10 and five variable models. Models for morbidity were also similar, but less predictive than for mortality with C-statistics of 70%, 69% and 68% respectively. The models showed good calibration. The most important risk adjustment variables were pre-operative ASA class, functional status, congestive heart failure, dyspnea and renal failure.

DISCUSSION AND CONCLUSION: Pay-for-performance initiatives linked to outcomes will be able to compensate hospitals and surgeons fairly using relatively limited information about hip fracture patients’ baseline health for risk adjustment. Collecting more limited data will also keep administrative costs of data collection low.

PAPER NO. 380
Strength is the Most Relevant Predictor of Shoulder Outcome Related to Quality of Life Perception
Carlos Torrens, MD, Castelldefels, Spain
Joan Miquel, Barcelona, Spain
Fernando Santana, MD, Barcelona, Spain

INTRODUCTION: Measuring outcomes of shoulder surgery is usually done by functional scores but pain, function and strength may have different impact on quality of life perception. The objective of this study is to determine which factor influences the most quality of life perception in shoulder disorders.

METHODS: A total of 415 patients were prospectively recruited: 221 females and 194 males. Mean age of 50.75 (18-85). Some 265 consulted because rotator cuff disorders, 72 because of gleno-humeral arthritis, 43 because of fracture sequel and 35 because of instability. All patients included fulfilled SF-36 quality of life and Constant shoulder functional Score (CS) that includes pain, activities of daily living (ADL), function and strength assessment.

Statistics: Pearson correlation test and multiple lineal regressions.

RESULTS: In a multivariate correlation, all items of the CS are significantly correlated to SF-36 (ρ<0.05) except forward elevation and external and internal rotations. Strength is the item with the strongest correlation with SF-36 (correlation of 0.44 and Beta STD coef: 0.30). If strength is removed from the correlation then forward elevation and internal rotation appear to be correlated with SF-36 (ρ<0.05). Strength is correlated with pain, ADL, forward elevation, abduction, external and internal rotation (0.28,0.35,0.54,0.50,0.53,0.49).

DISCUSSION AND CONCLUSION: Strength is the most relevant predictor of shoulder outcome when correlated to quality of life. Although most of the patients complain of pain, strength better reflects overall shoulder status because strength is needed to perform function and ADL and also just pain free shoulders are able to score in strength registers.

PAPER NO. 381
Systems-Based Safety Intervention: Reducing Falls with Injury and Total Falls on an Orthopaedic Ward
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INTRODUCTION: In-hospital falls can result in significant morbidity and even mortality, and, as of 2008, were declared “never events” by the Center for Medicare Services. Interventions intended to reduce the incidence of falls based on patient risk factors have not been successful in the acute inpatient setting. We hypothesized that a systems-based fall-prevention program targeting high-risk situations would result in fewer falls with injury.

METHODS: Since January 2005, all in-hospital falls have been reported in real-time using a clinical database that can be accessed by all physicians, nurses, aides and therapists. Analysis of the setting, patient factors and staffing circumstances associated with all falls on the hospital’s orthopaedic unit were evaluated during the pre-intervention study period. Based on the findings from this audit, four system-based nursing interventions were implemented. Prospective analysis of these interventions was then conducted. All falls were tracked though the clinical database and reviewed by the study investigators. The number of falls with injury and total falls in the pre- and post-intervention periods were compared.

RESULTS: The pre-intervention study period (May 2007 - September 2008) represented 11,082 patient days, during which time the fall with injury rate and total fall rate were 4.24 per 1,000 patient days, respectively. The post-intervention study period (September 2008 - May 2010) represented 12,267 patient days, during which time the fall with injury rate and total fall rate were 1.17 and 4.24 per 1,000 patient days, respectively. Reductions in the rate of falls with injury (p = 0.036) and total falls (p = 0.024) were significant.

DISCUSSION AND CONCLUSION: This systems-based fall-prevention program was effective in reducing falls with injury and total falls on an acute care orthopaedic ward. The approach taken used standard Continuous Quality Improvement methodology and should generalize well to other settings. Despite a thoughtful, multi-disciplinary, intensive approach to the problem, falls did occur. We believe it is unrealistic to consider all falls as preventable.

PAPER NO. 382
Methicillin-Resistant Staphylococcus Aureus (MRSA) Screening: Is it Worth it?
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APR Wilson, MRCP
Fares Haddad, FRCS, London, United Kingdom

INTRODUCTION: Approximately 5% of patients being considered for surgery are carriers of methicillin-resistant Staphylococcus aureus (MRSA) within the community. The role of MRSA screening is essential to eliminate MRSA infection in the post-operative period. S. aureus is one of the most common bacterial causes of infection after surgery and therefore, the cost of treating such infections is enormous.
Continuous Passive Motion after Hip Preservation Surgery in Adolescents: Efficacy and Cost Comparison

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Harish S. Hosalkar, MD, San Diego, CA

INTRODUCTION: The clinical concept of continuous passive motion (CPM) is based on the premise that post-operative stiffness in a joint can be avoided if full range of motion is applied to the joint immediately following surgery, and is continued until the joint is no longer at risk of developing stiffness. We hypothesized that use of CPM following femoroacetabular impingement (FAI) surgery in the pediatric population improves clinical outcomes in terms of Harris hip score. We further hypothesized that usage of CPM decreases the length of stay in the hospital (LOS), number of physical therapy visits, number of physician visits, need for pain medications and likely decreases the cost involved to the payer.

METHODS: Twenty-nine adolescents that underwent FAI surgery from all patients undergoing elective and emergency orthopaedic procedures within a teaching hospital. METHODS: In 2006, a screening program for MRSA was commenced whereby nasal swabs were obtained before surgery from all patients undergoing elective and emergency procedures, and screened for MRSA using a rapid molecular technique. In emergency admissions necessitating surgical intervention, patients were started on the suppression protocol and continued until a negative screen result has been reported. MRSA-positive patients were started on suppression therapy of 2% mupirocin nasal ointment and undiluted chlorhexidine gluconate bodywash. Additionally, contact precautions and adapted surgical prophylaxis were undertaken and patients were isolated where possible until treatment was completed.

RESULTS: A total of 4,060 samples were processed, of which 183 (4.5%) were MRSA positive. In comparison to the annual mean for the preceding six years, MRSA bacteraemia fell by 34% (P < 0.001), and MRSA wound isolates fell by 11.3% (P< 0.05).

DISCUSSION AND CONCLUSION: MRSA screening of elective and emergency orthopaedic admissions resulted in a significant reduction in staphylococcal bacteraemia during the screening period, although a causal link cannot be established.

PAPER NO. 384
The Bone Cefazolin Concentration: Comparison With MIC_{90} of MSSA and CRCoNS
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Kumiko Ono, Yokohama, Japan
Fumiaki Tokimura, MD, Tokyo, Japan
Sakae Tanaka, MD, PhD, Tokyo, Japan

INTRODUCTION: Cefazolin is still the first line recommendation for antimicrobial prophylaxis (AMP). Increasing coagulase negative Staphylococcus (CoNS) and cefazolin resistant CoNS (CRCoNS) infections are reported worldwide. But, there is no study comparing the bone concentration of cefazolin with minimum inhibitory concentrations (MICs) of CoNS considering their increasing resistance. The aim of this study was to evaluate the relation of bone concentration with the MICs of CRCoNS and methicillin-sensitive Staphylococcus aureus (MSSA).

METHODS: Cross-sectional study was conducted. Consecutive patients undergoing hemiarthroplasty (HA) for hip, total hip arthroplasty (THA) and total knee arthroplasty (TKA) were screened for study eligibility. Two grams of cefazolin was given intravenously before the incision. Two bone samples were collected from two different sites (femoral neck and trochanteric region in HA/THA, and posterior femoral condyle and tibial plateau in TKA) in all subjects. All samples in TKA were taken before the tourniquet deflation. Those who had chance of abnormal bone delivery, and who had additional dose before samples taken were excluded. Samples were transported and assayed at the same laboratory. MICs of MSSA and CRCoNS were derived from the nationwide surveillances.

RESULTS: A total of 175 bone samples were collected from 88 patients (mean weight of 50.4kg). The mean bone concentration ± SD (range) was 29.5 ± 19.1 (2.53-80.68) µg/g for HA, 32.3 ± 15.2 (11.4-70.0) µg/g for THA, and 17.0 ± 11.4 (6.27-53.3) µg/g for TKA. The mean time interval ± SD (range) of bone sampling after cefazolin administration was 48 ± 15 (18-96) min, 79 ± 33 (33-140) min, and 78 ± 19 (50-126) min, respectively. The MIC_{90} of MSSA and CRCoNS were defined as 1µg/mL and 100µg/mL, respectively. Comparing with the MIC_{90} of MSSA and CRCoNS, all samples exceeded MSSA, but none exceeded CRCoNS.

DISCUSSION AND CONCLUSION: With two grams of cefazolin administered intravenously before surgery, bone concentration achieved enough level for MIC_{90} of MSSA, but not of CRCoNS. In 1999, CDC recommended consideration of vancomycin for AMP in institution with MRCoNS surgical site infections (SSI). Increasing scores. There were no differences in the scores between the control group and group I (two days CPM) at nine-month follow up. The results of this study suggest that the use of CPM had a positive impact on the costs to the payer primarily due to decreased LOS. Both CPM groups had an average LOS that was lower than the control.

DISCUSSION AND CONCLUSION: The results of this study suggest that post-operative CPM use for FAI patients decreases length of stay, as well as consumption of MD and PT visits, while simultaneously increasing clinical outcomes. Not only does post-operative CPM use appear to make a positive difference in clinical outcomes of adolescents; the improvement seems to be related to the dose of CPM. Those patients that had two weeks of CPM had higher hip scores than the patients that only had two days of CPM and the patients that had two days of CPM had higher hip scores than those that had no CPM. CPM usage had a positive impact on the costs to the payer.
MRCoNS and CRCoNS infections are reported worldwide, and these pathogens are one of the major pathogens cultured from surgical sites. Institutions using cefazolin as a first-choice agent for AMP, with CoNS as the main pathogens of SSI, should be aware of the possible failure using cefazolin described in this study.

PAPER NO. 385
Sterility of Lead X-ray Gowns Used in the Operating Suite
Sameer Jain, MD, Wexford, PA
Brian F. Moore, MD, Pittsburgh, PA
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INTRODUCTION: All surgical procedures carry the risk of wound infection, with multiple precautions being taken to lower this risk of contamination. One way to lower the risk of infection is to lower the overall bacterial load within the operating suite. One potential source of contamination that has not been fully evaluated is the lead X-ray gowns worn by operating room personnel during intraoperative fluoroscopy. The purpose of our study was to evaluate these gowns as a potential source of contamination, and evaluate a potential method for cleaning them.

METHODS: We used sterile culture swabs to collect samples from 40 randomly selected lead X-ray gowns. Each gown was swabbed on three separate instances in three separate locations on the gown. Sterile scrub tops from our hospitals laundry service were swabbed to serve as negative controls. The X-ray gowns were swabbed and cultured prior to any intervention. These gowns were then treated with a readily available cleaning agent and were re-cultured using sterile culture swabs immediately after treatment and again at eight hours after treatment (simulating a working shift). There were two runs of the study completed, one where swab samples were assessed for bacterial growth via traditional plating methods as well as with mass spectrometry and one where specimens were analyzed using just mass spectrometry. The plates were graded on a scale of 0 to 4+ based on the number of quadrants on each plate that showed positive growth. Any growth pattern of 1 or higher was considered consistent with contamination.

RESULTS: Contamination was observed on a majority of the X-ray gowns (20/20 on those specimens analyzed by mass spectrometry and 19/20 on those cultured with traditional plating methods) with a wide range of pathogens present. The most common organisms found were skin flora, staph. epidermidis and propionibacterium acnes. Some of the other virulent organisms cultured on agar plates were methicillian resistant staph epidermidis (MRSE), Neisseria and Streptococcus Viridans. Of the gowns analyzed by mass spectrometry, 25% (5/20) had methicillian resistant Staph epidermidis (MRSE) present prior to treatment. After treatment with the sanitizing wipe, all of the MRSE was eradicated. Immediately after treatment, all of the gowns showed significantly less bacterial contamination (0/20 showed contamination on the agar plates, 3/20 showed contamination via mass spectrometry), with some mild recurrence present at the eight hour mark (2/20 for plates, 8/20 for mass spectrometry). Most of the recurrent growth was consistent with Staph Epil and P. Acnes.

DISCUSSION AND CONCLUSION: Our results confirm our hypothesis that lead X-ray gowns are a harbor of harmful bacteria. Based on the results of our study some changes in practice are recommended. All lead X-ray gowns should be cleaned with a sanitizing wipe at the completion of each case. Our results show that a simple cleansing of the gowns can lower bacterial contamination/ load and prevent the introduction of virulent organisms within the operating suite, thereby potentially decreasing the risk of surgical wound infection. Our proposed method of cleaning is quick, effective, cost-efficient with little risk or downside.

PAPER NO. 386
Post-Splinting X-rays of Minimally Displaced Fractures: Good Medicine or Medicolegal?
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Edward M. DelSole, New York, NY
Kenneth A. E gol, MD, New York, NY

INTRODUCTION: Many institutions perform radiographic documentation following orthopaedic splint application even in the case when no manipulation has been performed. The purpose of this study was to evaluate the utility of post-splinting radiographs of acute minimally displaced fractures that do not undergo manipulation. Our hypothesis is that post-splinting radiographs do not demonstrate changes in fracture alignment or impact the management of the patient.

METHODS: After Institutional Review Board approval was obtained, consults performed by orthopaedic residents at a level I trauma center from September 2008 to April 2010 were reviewed. Of 2,862 consults, 1,321 involved acute fractures that were splinted. Radiographs revealed 342 (25.9%) fractures that were minimally displaced and angulated (defined as <5mm and <10 degrees, respectively). Consults were reviewed to ensure patients had not undergone manipulation prior to or during splinting. Consult notes and radiographs taken in the emergency department, as well as follow-up radiographs, were reviewed to assess ultimate outcome.

RESULTS: None of the 204 fractures changed alignment following splint application. Two splints were reapplied for undocumented reasons. Patients were subjected to an average of 10 radiographs (range 4-25) of their extremities. On average, three post-splinting radiographs (range 1-10) were performed. The mean time between initial and post-splinting radiographs was three hours and 30 minutes (range 9 minutes to 24 hours). ER visits were longer for patients with post-splinting radiographs compared to those without (p=0.06). All fractures demonstrated maintained alignment on follow-up radiographs.

DISCUSSION AND CONCLUSION: SPost splinting radiographs of non- and minimally-displaced fractures that do not undergo manipulation before or during immobilization result in longer waits, additional radiation exposure and increased healthcare costs without providing helpful information. While certain circumstances may call for additional imaging, the routine performance of post-splinting radiographs should be discouraged.

Fracture Distribution (Average and Range) for Patients Receiving Post-Splinting Radiographs

<table>
<thead>
<tr>
<th>Fractured Part</th>
<th>Frequency</th>
<th>Injury Films</th>
<th>Post-Splinting Films</th>
<th>Total Films</th>
<th>Time Interval Between Radiographs (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrist</td>
<td>67</td>
<td>8(1-18)</td>
<td>3(1-10)</td>
<td>11(5-20)</td>
<td>173(18-598)</td>
</tr>
<tr>
<td>Hand/ Carpus</td>
<td>55</td>
<td>4(2-12)</td>
<td>3(1-6)</td>
<td>7(6-16)</td>
<td>187(10-1020)</td>
</tr>
<tr>
<td>Foot/Antkle</td>
<td>44</td>
<td>8(2-20)</td>
<td>3(2-5)</td>
<td>11(4-23)</td>
<td>286(63-1380)</td>
</tr>
<tr>
<td>Elbow</td>
<td>21</td>
<td>7(3-18)</td>
<td>2(2-4)</td>
<td>9(6-20)</td>
<td>148(43-295)</td>
</tr>
<tr>
<td>Long Bone</td>
<td>17</td>
<td>3(1-10)</td>
<td>3(1-10)</td>
<td>11(7-20)</td>
<td>299(9-920)</td>
</tr>
</tbody>
</table>

* The FDA has not cleared the drug and/or medical device for the use described in this presentation (i.e. the drug or medical device is being discussed for an off label use).
For full information refer to page 14. An alphabetical faculty financial disclosure list can be found starting on page 19.
PAPER NO. 387
Prediction of Hip Fracture: Combination of WHO Absolute Fracture Risk Model (FRAX) and Proximal Femoral Geometry

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Ye-yeon Won, Prof, Suwon, Republic of Korea
Minjung Park, Suwon, Republic of Korea
Jean Kyung Bak, Suwon, Republic of Korea
Kyung-Hoi Koo, MD, Seongnam-Si, Republic of Korea

INTRODUCTION: Hip fracture is the most serious osteoporotic fracture because it incurs significant costs and causes substantial disability, morbidity and mortality. Although low bone mineral density (BMD) is a strong predictor of hip fracture, it is not the sole predictor. Geometric components of bone strength, evaluated by hip strength analysis (HSA) on dual-energy X-ray absorptiometry (DXA) images, are related to the presence of hip fracture. In addition, clinical factors contribute to the risk of hip fractures. They are included in the computer-based fracture risk assessment tool (FRAX) to estimate in the individual patient the 10-year risk of hip fracture. The purpose of this study was to compare femoral bone density, structure and strength assessments obtained from DXA measurements, fracture probability calculated with FRAX tool in a group of patients with and without hip fracture. METHODS: DXA measurements of the proximal femur were obtained from 88 patients with proximal femoral fracture aged 40 or older and lesser than 90, 34 with hip fracture and 54 controls. In addition to the conventional densitometry measurements, structural variables were determined using analysis program. Hip axis length (HAL), cross-sectional moment of inertial (CSMI) and the femur strength index (FSI) calculated as the ratio of estimated compressive yield strength of the femoral neck to the expected compressive stress of a fall on the greater trochanter. We calculated 10-year probability for the hip fracture using FRAX model. RESULTS: Demographic variables are listed in Table 1. Patients with hip fracture were significantly older than control. They were lighter and taller so that mean body mass index (BMI) values were smaller in fracture group. When these results were adjusted for age, they were significantly taller and slender. Femoral neck BMD was significantly lower and HAL higher in the fracture group compared with controls. When adjusted for age, HAL was significantly higher. Mean CSMI and CSA were not significantly different between fracture patients and controls after adjustment for age. Mean FSI was significantly lower in the fracture group. Mean 10-year probability for hip fracture was significantly higher in the fracture group. Odds ratios per standard deviation were 2.9 (1.6 - 5.1, p<0.001) for T score, 1.1 (1.0 - 1.1, p=0.069) for HAL, 2.3 (0.5 - 10.0, p=0.278) for FSI and 1.2 (1.0 - 1.3, p=0.008) for FRAX probability. The fracture discrimination ROC curves for both T score, and the logistic regression probability model incorporating FRAX probability, HAL and FSI are shown in Fig. 1. A closed gloving method involves keeping the hand completely inside the gown cuff while donning the glove. With an open gloving technique the fingers or entire hand extend beyond the gown cuff while glove donning. We also recorded whether the subject gloved themselves or were gloved by the scrub staff. Cultures of the gloved palm and gown sleeve were taken before the case began using...

DISCUSSION AND CONCLUSION: Fracture probability computed from the FRAX tool, structure and strength assessments from DXA measurements and BMD are independent predictors of hip fracture. This study was supported by a grant of the Korea Healthcare Technology R&D Project, Ministry for Health, Welfare & Family Affairs, Republic of Korea. (A084120)

Mean demographic values of the fracture and control populations

<table>
<thead>
<tr>
<th>Sex</th>
<th>Weight (kg)</th>
<th>Height (cm)</th>
<th>BMI (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fracture</td>
<td>Controls</td>
<td>Fracture</td>
</tr>
<tr>
<td>age-adjusted</td>
<td>0.973</td>
<td>0.001</td>
<td>0.010</td>
</tr>
<tr>
<td>unadjusted</td>
<td>&lt;0.001</td>
<td>0.09</td>
<td>0.001</td>
</tr>
</tbody>
</table>

PAPER NO. 388
Gloving Technique and Intraoperative Bacterial Contamination

William G. Ward, MD, Winston-Salem, NC
Kevin A. Shamburg, BS, Winston Salem, NC
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Robert Sherertz, Winston-Salem, NC

INTRODUCTION: Surgical site infections threaten all surgical procedures; there is currently a national initiative to decrease surgical site infections. Surgical team members’ gloves are in direct contact with the surgical instruments and the surgical wound. The objective of this study is to determine whether certain glove donning techniques affect the rate of intraoperative bacterial contamination. METHODS: We observed the gloving technique of operating room personnel for clean, non-contaminated, elective surgical cases. Surgical team members followed standardized scrubbing procedures and their glove donning technique was recorded. A closed gloving method involves keeping the hand completely inside the gown cuff while donning the glove. With an open gloving method the fingers or entire hand extend beyond the gown cuff while glove donning. We also recorded whether the subject gloved themselves or were gloved by the scrub staff. Cultures of the gloved palm and gown sleeve were taken before the case began using...
D/E Neutralizing Rodac agar plates. The plates were incubated for 48 hours at 37°C and checked for the presence of bacteria. RESULTS: We found that scrub staff assisted gloving using a closed technique resulted in significantly less bacterial contamination (2/173, 1.1%); closed scrub staff assisted gloving using an open technique (40/504, 7.9%, p<0.004). The closed assisted gloving technique also had significantly less contamination than that observed with a closed self gloving technique (26/303, 8.5%, p<0.003).

DISCUSSION AND CONCLUSION: A closed scrub staff assisted gloving technique should be employed by as many members of the operating team as possible. Open gloving should be avoided. Efforts to minimize the contamination rates observed with the self gloving technique seem prudent. Although the closed technique is slightly more difficult to perform, it appears to significantly reduce intraoperative bacterial contamination and may reduce the incidence of perioperative infections.

PAPER NO. 389

The Timing of Readmission for Surgical Site Infections
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Nicholas Ramos, BA, New York, NY
Spencer M. Stein, New York, NY
Joseph A. Bosco, III, MD, New York, NY

INTRODUCTION: The episode of care concept promulgated by the federal government requires hospitals to assume the cost burden for all care rendered up to 30 days after discharge. This includes all readmissions occurring within 30 days of discharge. Surgical site infections (SSIs) are a leading cause of readmission following total joint replacement and spine surgery. The purpose of this study is to analyze the timing of readmissions in a cohort of patients who developed SSIs following elective total joint and spine surgeries to determine how many of these occurred within 30 days of discharge.

METHODS: We reviewed our hospital data base beginning in 2007 and extending through 2010, and identified 94 patients who were readmitted following elective total joint and spine surgeries with a diagnosis of SSI. For each of these readmissions we determined the type of surgery, the length of time from initial discharge to readmission and the type of infecting organism.

RESULTS: There were 46 patients readmitted following spine surgery and 48 readmitted following total joint replacement. Readmissions before 30 days from initial discharge as a result of SSI occurred at a statistically higher rate following spine surgery (80.4% for spine, 58.3% for total joint; p=0.026. See figures 1 and 2). Within the total joint cohort, there was a trend toward readmissions occurring within 30 days of discharge more often in the total hip arthroplasty subset. There was no correlation between type of organism and timing of readmission.

DISCUSSION AND CONCLUSION: Payers, led by the federal government, are rapidly moving towards the episode of care paradigm. In this model, all care rendered to a patient up to 30 days after discharge, including readmissions, will be the financial responsibility of the hospital. In our analysis, readmissions within 30 days of discharge for SSI were significantly more likely to occur after elective spine surgery. However, the total joint group still had over half of its readmissions for SSIs within 30 days of discharge. This information will help the providers of care determine the financial risk assumed by participating in episode of care agreements.

PAPER NO. 390

Patient Variables Which May Predict Length of Stay and Hospital Costs in Elderly Patients with Hip Fracture
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Zach Yoneda, BA, Nashville, TN
Justin E. Richards, MD, Nashville, TN
Jesse Ehrenfeld, MD, MPH, Nashville, TN
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A. A. Jahangir, MD, Nashville, TN
William Obremskey, MD, Nashville, TN

INTRODUCTION: Operative fixation of low energy hip fractures in the elderly is a common orthopaedic procedure that is expected to increase in frequency as the population of older Americans increases. By 2025 incidence and cost of fractures is expected to increase by over 50% as the number of persons over 50 years of age increases by 60% as compared to 2000. In the era of significant healthcare reform aimed at decreasing healthcare costs and transforming reimbursement models, it is critical to identify factors that impact the prognosis and costs of this population. One parameter that can potentially result in increased healthcare costs is increased length of stay during the post operative period following surgical management of a hip fracture. The purpose of this study is to identify the factors which contribute to increased length of stay after hip fracture surgery, and therefore lead to increased overall costs in the treatment of the elderly hip fracture.

METHODS: From January 2000 to December 31, 2009, all patients over the age of 60 who presented to the only Level 1 trauma center in a large metropolitan area with an isolated low energy hip fracture were reviewed. These patients’ charts were reviewed and information was gleaned including gender, height, weight, body mass index (BMI), length of surgery, length of operative procedure, method of fixation, American Society of Anesthesiologists (ASA) classification and medical comorbidities. Analysis of the variance was conducted to determine significant trends. RESULTS: A total of 720 patients were identified of which 660 had complete records able to be analyzed. There was no significant correlation between body mass index or a specific medical comorbidity and the length of stay. However, ASA classification proved to be a reliable predictor of post-operative length of stay for patients undergoing operative fixation of a hip fracture. For every ASA increase of one, average subsequent length of hospitalization increases 2.053 days (p < .001). Utilizing the fact that the average total daily cost to the hospital was determined to be $4,530 per day for patients who had fixation of their hip fracture and an uncomplicated post-operative course at our institution, each increase in ASA classification resulted in an increase of $9,300 in hospital cost. Thus a patient who is an ASA of four will incur on average $27,900 more expense to the hospital than a patient with an ASA of one for the fixation of a hip fracture.

DISCUSSION AND CONCLUSION: This study demonstrates the usefulness of ASA classification in estimating the length of stay for patients undergoing operative fixation of a hip fracture, and subsequently, a predictor of the potential cost to a hospital for treating a patient with a hip fracture. Given that ASA classification

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and daily cost are universally collected data, this method can easily be employed in almost any hospital system. This study highlights a potential role for the ASA classification in the preoperative estimation of the elderly patient's cost to a hospital. Furthermore, as reimbursement systems change from a fee-for-service model to a more fixed-reimbursement for a specific diagnosis, this study highlights the need for a tiered reimbursement model for each diagnosis based on patient factors.

PAPER NO. 736

Level of Evidence: Does it Change Rate of Publication and Time to Publication of AAOS Presentations?

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Gwo-Chin Lee, MD, Philadelphia, PA

INTRODUCTION: The Annual Meeting of the American Academy of Orthopaedic Surgery (AAOS) is a major forum for scientific exchange and education. While the material presented at these meetings is often used to guide clinical practice, only about half of the corresponding manuscripts survive the scrutiny of peer review and go on to be published. One measure of scientific quality is the level of evidence (LOE) on which each presentation is based. The purpose of this study is to determine the relationship between level of evidence, rate of publication, and time to publication of presentations at an AAOS Annual Meeting.

METHODS: All 756 abstracts (468 papers and 288 posters) presented at the 2001 AAOS Annual Meeting were independently analyzed by three reviewers. The level of evidence of each paper and poster presentation was determined based on the evaluation system adopted by the AAOS. A comprehensive literature search of Medline and PubMed was performed to ascertain which of these studies were eventually published in the peer-reviewed literature. The rate of publication and mean time to publication for each level of evidence was calculated and compared. RESULTS: The overall publication rate for 2001 AAOS paper and poster presentations was 49% after five years and 58% after 10 years. By level of evidence, at five and 10 year intervals respectively, 77% and 85% of Level I presentations, 69% and 74% of Level II presentations, 58% and 66% of Level III presentations, and 39% and 51% of Level IV presentations were subsequently published in the peer-reviewed literature. Using odds ratios, Level I and II presentations were 2.9 times more likely than Level III and IV presentations to be published after five years (95% confidence interval 1.9 - 4.5) and 2.5 times more likely to be published after 10 years (95% confidence interval 1.6 - 4.0). The mean time to publication was 0.9 years for Level I studies, 1.4 years for Level II studies, 2.1 years for Level III studies, and 2.7 years for Level IV studies, with statistically significant differences between each of these means (p values < 0.05).

Level of Evidence, Rate of Publication, and Mean Time to Publication of 2001 AAOS Presentations

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Total Number of Presentations</th>
<th>Number of Presentations Published After 5 Years</th>
<th>Number of Presentations Published After 10 Years</th>
<th>Mean Time to Publication (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>13</td>
<td>10 (77%)</td>
<td>11 (85%)</td>
<td>0.9</td>
</tr>
<tr>
<td>Level II</td>
<td>113</td>
<td>78 (69%)</td>
<td>84 (74%)</td>
<td>1.4</td>
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<tr>
<td>Level III</td>
<td>165</td>
<td>96 (58%)</td>
<td>109 (66%)</td>
<td>2.1</td>
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<tr>
<td>Level IV</td>
<td>465</td>
<td>183 (39%)</td>
<td>235 (51%)</td>
<td>2.7</td>
</tr>
<tr>
<td>Overall</td>
<td>756</td>
<td>367 (49%)</td>
<td>439 (58%)</td>
<td>2.3</td>
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DISCUSSION AND CONCLUSION: The level of evidence of AAOS presentations is positively correlated with rate of publication and inversely correlated with time to publication. Presentations with higher levels of evidence are published in the peer-reviewed literature at a greater and faster rate than those with lower levels of evidence.

PAPER NO. 737

A Seven-Year Physician Scientist Residency Addressing the Shortage of Academic Orthopaedic Surgeons

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INTRODUCTION: In response to the current shortage of scientifically trained orthopaedic surgeons and to meet the increasing demand for high-quality studies and literature, an innovative seven-year Physician Scientist Training Program was implemented at our institution. Research-oriented residents are enrolled in two continuous years of mentored, protected basic science research time with an optional advanced degree to acquire the necessary knowledge and skills for an academic career, followed by a traditional five-year clinical residency. The study sought to identify orthopaedic faculty with MD/PhD degrees, residency programs with dedicated research tracks, recruiting mechanisms of MD/PhDs, and to assess the effectiveness of our seven-year program in training prospective academic orthopaedic surgeons.

METHODS: All 132 residency programs listed in the American Medical Association’s Fellowship and Residency Electronic Interactive Database Access System were searched for faculty with MD/PhD degrees and compared to the overall number of faculty. Data from the National Resident Matching Program was analyzed and research tracks were identified from each residency program’s website. Research activities of our seven-year residents were reported from 1999 and 2011. RESULTS: Physician Scientist (PhDs) accounted for 2.3% of all 3,408 orthopaedic faculty positions in U.S. residency programs. Of all 620 MD/PhD applicants for the 2009 match, only 17 MD/PhDs (2.7%) applied for orthopaedic surgery, which is less than average of all non-PhD applicants interested in orthopaedic surgery (5%). Each year, 1% of all orthopaedic residents are enrolled in available research tracks; three seven-year tracks and 23 six-year tracks. Our physician scientist residents produced 124 peer-reviewed publications and received $279,724 from 20 resident-authored extramural grants. All four current seven-year alumni practice orthopaedic surgery in an academic setting; three alumni are assistant professors.

DISCUSSION AND CONCLUSION: The physician scientist training program successfully develops clinically trained surgeon scientists with refined skills in basic science and clinical experimental design, grant proposals, scientific presentations, and manuscript preparation. Introduction of similar programs at other institutions may increase the number of academic orthopaedic surgeons that recruitment of MD/PhDs cannot provide. The institutional cost is justified by effectively addressing the shortage of surgeon scientists and producing future leaders in academic medicine.
Effectiveness of Orthopaedic Training in the 80-Hour Work Week: A Survey of Attending and Resident Perspectives

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INTRODUCTION: July 1, 2003, marked the beginning of the 80-hour work week in academic medicine. The effect of this change on patient safety, resident and faculty job satisfaction and the quality of trainee education is still being actively debated in the literature. We developed a survey designed to examine how practicing physicians and trainees perceive the effect of the 80-hour work week on the ability of a graduating orthopedic resident to practice surgery independently.

METHODS: We invited orthopaedic surgery trainees and attending surgeons from each of the residency programs in the U.S. to participate in an online survey. Data were collected using the Survey Monkey web-based survey tool from October 2010 through February 2011. Responses were analyzed and tabulated using the Survey Monkey system. When necessary, paired t-tests were performed using statistical software.

RESULTS: A total of 277 people responded to the survey, 167 trainees and 110 attendings. In general, residents are satisfied with their training. They believe they prepare for cases (83.4% read up on relevant anatomy) and are confident that they will pass their boards at the conclusion of their training. Some 89% of residents stated they will be competent to practice independently as a general orthopaedic surgeon. Residents report that the work hour restrictions do not negatively effect their training. They believe the 80-hour week gives them time to pursue interests outside of medicine and spend time with their families. Only 13.8% of residents said the 80-hour work week will limit their training; however, 25% of residents reported they have witnessed a morbidity or mortality that was the result of work hour restrictions.

Attendings are not as comfortable with the current training that residents receive. Although 71% of attendings feel that their residents will be able to pass their boards, only 20% would trust a newly graduating orthopaedic surgeon to operate on a family member. In contrast to the resident response, 22% of attendings feel that residents come to the OR having reviewed relevant anatomy (p<0.0001). Only 12.7% of attendings agreed that residents are more prepared as a result of the 80-hour work week. Also, 56.9% of attendings feel that the work week severely limits residents’ operative exposure, a significant difference compared to the resident response (p<0.0001). Two percent of attendings reported that the 80-hour work week results in better patient care. Twenty percent of attendings believe that the 80-hour work week is responsible for a morbidity or mortality in one of their patients.

DISCUSSION AND CONCLUSION: The 80-hour work week was implemented as a means of decreasing resident fatigue, increasing patient safety and providing more time for didactic education. While recent literature suggests that we have been able to achieve this goal in regards to safety, that mortality is decreased, other papers suggest that morbidity for orthopaedic surgery patients is increasing. Whether this is due to less competent surgeons or sicker patients is hard to determine. Regarding orthopaedic surgery education, while studies have suggested that operative case numbers have not been affected by work hour restriction, it is clear from our survey that attending surgeons are not comfortable with their residents’ surgical skills. In spite of the lack of evidence that our patients are safer as work hours are decreased, July 1, 2011, will mark yet another important milestone in academic medicine, as work hours are restricted even further. For the sake of our patients and the future orthopaedic surgeons who will care for them, we must critically examine the way in which we train residents to become independent and competent surgeons.
METHODS: We prospectively followed all 208 patients older than 50 years who were admitted for hip fractures during 2007 at eight hospitals. Thirty-four fractures in men and 174 in women were treated at the eight hospitals in 2007. Thirty-eight patients (18.3%) died during the follow-up period. During the study period, orthopaedic surgeons who worked at these hospitals attended two education sessions and received posters and brochures. Patients were interviewed six months after discharge using an evaluation questionnaire regarding their perceptions of barriers to osteoporosis treatment. The patients were followed for a minimum of one year. RESULTS: Ninety-four patients (45.2%) underwent DXA and 67 (32.2%) were prescribed medication for osteoporosis at the time of discharge. At last follow up the mortality rate was higher (p = 0.044) in the non-medicated group (31/141) than in the medicated group (7/67). According to the results of the questionnaire, the most common barrier to treatment for osteoporosis after a hip fracture was the thought that treatment was unnecessary. DISCUSSION AND CONCLUSION: The detection and medication rate for osteoporosis after hip fracture increased twofold after orthopaedic surgeons had attended the intervention program. Nevertheless, the osteoporosis treatment rate remained inadequate, and thus, additional efforts are required to further increase treatment rates.

PAPER NO. 741
MA Healthcare Reform: Its Effect on the Reimbursement for Provider Services at a Level One Trauma Center
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Mark S. Vrahas, MD, Boston, MA
Mitchel B. Harris, MD, Boston, MA

INTRODUCTION: According to U.S. Census Bureau data, 15% of the population, or nearly 45 million people, were uninsured in the United States in 2005. On a state by state level, the percentage of uninsured people varied from 8% in MN to 23% in TX. On April 12, 2006, the MA legislature approved its landmark healthcare reform law to provide health coverage for all of its residents (also known as Chapter 58 of the Acts of 2006). At the time, the MA uninsured population was estimated to be between 530,000 and 657,000 people (or 8% to 10% of the state population). The 2006 MA healthcare law sought not only to provide the uninsured residents with coverage, but also to serve as a step towards curbing spiraling costs imposed on medical providers. The purpose of this study is to evaluate the effect of Chapter 58 on the trauma population of a level 1 trauma center. We hypothesized that the law would result in a decreased number of uninsured patients presenting with fractures and dislocations. Furthermore, due to the newly enacted universal coverage we anticipated an overall rise in revenue received for treatment of all fractures and dislocations treated by our service. METHODS: We performed a retrospective review of all fracture and dislocation cases performed by the orthopaedic trauma service of an ACS (American College of Surgeons) certified level 1 trauma center from 2003 to 2010. Institutional Review Board approval was not necessary given that no patient identifying data was needed for our analysis. In addition, all out-of-state patients were excluded since they are not under the jurisdiction of Chapter 58. We also excluded patients aged 65 and older as they may be covered under Medicare and not a MA plan. The final study included 1,680 patients encompassing 2,384 cases. The population was divided into two groups. The first, Group 1, included all cases from January 2003 to December 2005. They comprised the patients treated for fractures and dislocations prior to the enactment of Chapter 58. The second, Group 2, consisted of the patients from January 2008 to December 2010 who were treated for fractures and dislocations subsequent to the passing of Chapter 58. The years 2006 and 2007 are excluded to remove the effects from volatility in the insurance market and to allow for an enrollment period. RESULTS: There was a total of 911 cases in Group 1 that fit our inclusion criteria, and 1,473 in Group 2 (62% increase). When converted to relative value units (RVU), treatment of patients in Group 1 represented 11,170 RVUs and Group 2, 17,099 RVUs. This amounted to a 53% increase in RVUs. The percentage of uninsured patients decreased from 13.1% in Group 1, to 9.2% in Group 2, a 3.9% decrease. Group 1 collections per RVU were $88.98, whereas Group 2 collections per RVU were $87.93. This represents a net decrease in collections per RVU of $1.05. Concurrent with this decrease in collections per RVU, the estimated free care burden to the trauma service increased from 5% to 6% of total charges in Group 1 and Group 2, respectively. DISCUSSION AND CONCLUSION: MA healthcare reform successfully resulted in a 3.9% decrease in the number of uninsured patients treated for musculoskeletal trauma at our level 1 trauma center. However, despite having a larger percentage of insured patients during this same time period there was not a commensurate rise in dollars collected per RVU. [i] http://www.census.gov/hhes/www/hlthins/data/historical/index.html [ii] McDonough JE, Rosman B, Phelps F, Shannon, M. The Third Wave of MA Health Care Access Reform. Health Affairs, 25, no.6 (2006): w420-w431 [iii] http://www.cms.gov/apps/physician-fee-schedule/overview.aspx

PAPER NO. 742
Designing an iPhone and iPad-based Interactive X-ray Library for Orthopaedics Interns
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Patrick Hamel, St-Bruno, QC, Canada
Simon Brisebois, MD, Sherbrooke, QC, Canada
Alain Dumont, MD, Sherbrooke, QC, Canada
Christian Iorio-Morin, PhD, Sherbrooke, QC, Canada

INTRODUCTION: Radiographs constitute a cornerstone of the usual investigation process in orthopaedics and their rigorous interpretation is a skill critical to appropriate management. While orthopaedics interns have usually no trouble identifying a highly displaced humeral shaft fracture, most diagnoses are not so obvious and require a more thorough analysis often involving various angle and length measurements. Because teaching systematic X-ray interpretation is time-consuming and often impractical in the busy clinical setting, interns are expected to learn on the fly whenever attending looking at an X-ray. METHODS: To address the need for a structured learning path, we created an X-ray library covering the most common and important diagnoses at the clerkship level and designed an iPhone and iPad-based viewer to access the database. Radiologic studies, selected based on their relevance and representativeness, were first extracted from our hospital PACS and converted into Photoshop files using OsiriX. Appropriate measurements were performed and then drawn, along with the findings, on layers superimposed on the original radiograph. Each annotation was individually drawn

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using a unique color, enabling the concomitant highlight of up to 10 annotations on a single image. A short explanation of each annotation was written for every case and entered into a specially built MySQL database securely stored in the cloud. Patient age and mechanism of injury were included with our studies to complement the X-rays. Upon completion of the database, a PHP script was run to convert the MySQL data into a series of XML files that were then fed to a custom built Objective-C iOS application. The application, which can run on iPhones, iPod Touches and iPads - devices owned by most of our students - lists our cases both by diagnosis (e.g. coxarthrosis) and by radiologic finding (e.g. joint space reduction), a feature meant to facilitate the learning of differential diagnosis.

RESULTS: Qualitative satisfaction comments from our users found our inclusion of multiple examples of each important diagnoses very helpful to the rapid development of disease “pattern recognition” skills. After a brief technical test period, short flashcard-type articles were written about the most important diagnoses included in the program and linked to all relevant cases. This additional material allowed the students to further associate various findings and measurements results to the actual management plan, integrating the learning of radiology with that of patient management.

DISCUSSION AND CONCLUSION: The breathtaking pace at which our students are adopting mobile devices such as phones and tablets highlight the need for a modernization of teaching practices. Multimedia allows for the creation of highly interactive material that has the potential to be not only more interesting, but also more effective. Studies are currently being designed to assess the impact of this new learning tool on a clerk’s performance, but the incredible enthusiasm displayed by our interns is certainly encouraging.

PAPER NO. 743

◆ The Impact of Marketing Strategies on the Registry Performance of New Devices

Philip C. Noble, PhD, Houston, TX

INTRODUCTION: One of the potential attractions of joint registries is early identification of defective implants. However, new technologies are often associated with a learning curve which necessarily leads to inferior early results. This study examines the effect of different methods of introduction of a new implant on its early survivorship.

METHODS: We modeled a database of 6,000 operations performed using a new implant over a five-year period. We assumed an average revision rate of 3.4% based on survivorship for hip resurfacing. Four different scenarios were modeled corresponding to the manner of introduction of this device to the community. The “Standard” scenario assumed that 165 surgeons gradually adopted the device over a five-year period based on the initial favorable experience of a small pilot group. Alternative scenarios were modeled, including limited release of the device (65 surgeons/64 cases each), increased distribution (310 surgeons/20 cases), and rapid early promotion (250 surgeons/24 cases). Computer routines were utilized to predict the expected failure rate of each procedure using a standard survivorship curve based on surgeon experience.

RESULTS: The method of introduction of the implant had a significant effect on its survivorship. Limited distribution to a smaller number of higher volume surgeons reduced the revision rate by 10% from 3.43% to 3.09% at five years. Conversely, early use of the device by twice the number of surgeons reduced survivorship by 4%. The greatest effect was observed with rapid early promotion of the new implant which led to a 23% increase in revisions at five years.

DISCUSSION AND CONCLUSION: This approach, using a “synthetic” database, predicts that the rate of commercial introduction of new devices can affect the survivorship data reported by joint registries. Because of the effect of the learning curve on implant survivorship, staged introduction of new devices is recommended to reduce adverse effects of inevitable early failures.

PAPER NO. 744

Transitioning from ICD-9 to ICD-10: What Should You Be Doing Now to Be Ready?

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Patricia Schmitter, Indianapolis, IN
James M. Kerpsack, MD, McCordsville, IN

INTRODUCTION: ICD-10 will have a substantial impact on the way physicians document patient encounters. If your current documentation only contains enough detail to reach an unspecified diagnosis code in ICD-9, you will be significantly challenged with ICD-10 and can expect major delays in reimbursement due to rework. Orthopedic providers will face some of the biggest changes in the detail required and without adequate documentation even your billers/coders will not be able to choose a diagnosis for you. Diagnosing of fracture care will require documentation to include cause of fracture (stress/pathologic/traumatic); specific location (lower/upper end, proximal/distal radius); laterality (right/left/bilateral); episode of care (initial/subsequent/sequela); status of healing (normal/delayed/malunion/nonunion); type of fracture (open/closed, type I, II, IIIA, IIIB or IIIC); where and how fracture occurred. Considering the structural differences between ICD-9 and ICD-10, let’s look at specific orthopedic examples and discuss how to make the transition from ICD-9 to ICD-10 easier so you can minimize loss of revenue and productivity.

METHODS: Developed by the World Health Organization, ICD-10 stands for International Classification of Disease, Tenth Revision. There are two components to ICD-10: the first is ICD-10-CM (Clinical Modifications). This will replace ICD-9-CM Volumes 1 and 2 and will be used to report diagnosis coding in all clinical settings. The second is ICD-10-PCS (Procedural Coding System). This will replace ICD-9-PCS Volume 3 and will be used to report hospital inpatient procedures only. It will not replace CPT (Current Procedural Terminology) for outpatient services. By January 1, 2012 all computer systems must be upgraded from 4010 and be ready to submit 5010 transactions to allow for expanded data fields for the longer codes. Payers, clearhouses

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and billing systems all have to be upgraded to accommodate the new codes. Now is the time to evaluate and test your current systems for the 5010 conversion. October 1, 2013 compliance with ICD-10 code sets will be mandatory. Despite popular opinion, there will be no delays and no grace period. ICD-9 CM will NOT be accepted for services on or after 10/1/2013 and ICD-10 will NOT be accepted for services prior to 10/1/2013. Both code sets will run simultaneously until your old claims are processed.

RESULTS: A decrease in revenue during the transition period is inevitable when providers and staff are learning new payer guidelines. All payer policies, local coverage determinations and national coverage determinations will need to be revised to accommodate new covered diagnoses. The Advisory Board estimates a 20% decrease in productivity during the transition with a long-term increase of 10%-20% time spent documenting, coding and reworking denied claims. The impact on revenue is inevitable, so we need to be prepared.

DISCUSSION AND CONCLUSION: How much time will it take to learn ICD-10? Studies indicate anywhere from 24 to 40 hours of training will be needed. Physicians can start now with more specific ICD-9 documentation to ease the transition from ICD-9 to ICD-10. If you train too late you will be overwhelmed with the transition to the new code set; if you train too early you may not retain codes that you cannot use yet. The first step is assessing your practice for ICD-10 readiness. Have your charts reviewed for ICD-9 accuracy and see where greater specificity could be documented and billed. Consider how much training your staff will need for precertification, prescriptions, labs, orders, scheduling and billing. Don’t let payers hold you hostage with denied or delayed payments.

Start now and plan for a smooth transition by being prepared for ICD-10.

PAPER NO. 745

Conflict of Interest in Controversial Topics: Is Author Disclosure Associated with Positive Study Outcomes?

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Gwo-Chin Lee, MD, Philadelphia, PA

INTRODUCTION: Conflict of interest (COI) increases the potential for research bias that can compromise true study outcomes. The American Academy of Orthopaedic Surgeons (AAOS) and major orthopaedic journals currently require all presenters and authors to disclose potential financial conflicts in order to increase transparency. It is unknown whether COI has influenced the reporting of positive and/or negative results. Therefore, the objective of our study is to determine if authors with COI are less likely to report negative study outcomes in a controversial topic that is heavily associated with industry, specifically metal-on-metal (MoM) total hip arthroplasty (THA). We hypothesized that authors with COI are less likely to report negative study outcomes than authors with no COI.

METHODS: We performed a systematic review of three major orthopaedic journals, Journal of Bone and Joint Surgery American Volume, Journal of Bone and Joint Surgery British Volume, and Journal of Arthroplasty, for all articles related to MoM THA between October 1999 and May 2011. Two reviewers identified 421 abstracts pertaining to MoM THAs. A total of 64 studies reported survivorship, failure, and revision rates and were analyzed in the study. The titles and abstracts were randomized and blinded. Two reviewers assigned a positive or non-positive label to each blinded abstract based on preset criteria. Kappa statistics were utilized to assess agreement between reviewers. Spearman correlation was used to analyze non-positivity trends over time. Studies were separated into two comparison groups, “COI” and “No COI” and Pearson chi-square analysis compared study positivity/non-positivity between groups.

RESULTS: Inter-rater reliability revealed substantial agreement with a kappa coefficient of 0.78. There was a significant trend from positive to non-positive study outcomes over time (p=0.015). In addition, a similar negative trend was seen when analyzing the subset of studies written by authors with financial disclosures (p=0.021). Thirty-six studies (56.3%) reported a COI and 36 (56.3%) reported a positive outcome, but there was no significant association between COI and positive outcome (p=0.263). The majority (58%) of studies that had a non-positive outcome reported conflict of interest with an implant company.

DISCUSSION AND CONCLUSION: These results do not support our hypothesis that authors with COI are less likely to report negative study outcomes than authors with no COI. Authors with financial conflicts contributed significantly to the increase in negative outcomes reported in the MoM THA literature. While these results are encouraging and speak to the integrity of scientific reporting, models for increasing data transparency and establishing more robust disclosure programs should continue to be pursued.

PAPER NO. 746

Financial Analysis of Career Choice and Investment in Orthopaedic Training

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Richard C. Mather, III, MD, Traverse City, MI

INTRODUCTION: Career choice is strongly influenced by relative income. Policies regarding reimbursement can incentivize shifts to alternative careers and potentially reduce access to care. Previous reports have compared the expected financial return of medicine to other professions; however, there are no published reports comparing orthopaedic surgery training specifically to other possible career choices. This study aimed to directly compare the value of the lifetime stream of income for orthopaedic surgeons relative to other professions.

METHODS: Median educational expenses, work hours, and income by years post-training for orthopaedic surgeons, lawyers, dentists, certified registered nurse anesthetists (CRNAs), and nurse practitioners was collected from published nationally representative surveys. Using standard financial techniques, the net present value and cumulative earnings were determined in absolute terms and adjusted for hours worked throughout a career ending at 65, and compared directly at each age across professions.

RESULTS: In absolute terms, orthopaedic surgeons realize a greater relative net present value and net earnings at approximately age 34 relative to nurse practitioners and lawyers, age 39 relative to dentistry, and age 42 relative to nurse anesthetists. However, when adjusted for hours worked, orthopaedic surgeon nurses break even with nurse practitioners at age 38, but relative to dentists, nurse anesthetists, lawyers, never realize the same cumulative net present value or absolute earnings per cumulative hours worked.

DISCUSSION AND CONCLUSION: The absolute discounted value of the stream of income of an orthopaedic surgeon is similar to other professions, with relative break-even on educational investment occurring in the first decade following training. However, when considered in terms of earnings per hours worked, which more accurately reflects value, lawyers, dentists, and CRNAs significantly surpass orthopaedic surgeons in terms of expected financial return. This suggests that in economic terms, it would
in fact be a better financial investment both in absolute and hour adjusted terms to enter a career in law, dentistry, or nurse anesthesia if working as hard as an orthopaedic surgeon. Our study, the first direct comparison of the financial return of orthopaedic surgery to other professions, highlights the point that there is a relatively lower financial value incentive for qualified individuals to enter orthopaedics compared to several other professions, which could potentially have far-reaching implications on career choice and subsequent access to care for patients.

### Absolute and Hour-Adjusted Net Present Value and Cumulative Income

<table>
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<tr>
<th>Profession</th>
<th>NPV</th>
<th>Hour-adjusted NPV</th>
<th>Lifetime Cumulative Income</th>
<th>Lifetime Cumulative Income per Cumulative Hours Worked ($/hr)</th>
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PAPER NO. 747

**Fracture Clinic Redesign Improving Standards in Patient Care and Interprofessional Education**

Odhran Murray, Glasgow, United Kingdom
Kate Christen, MB, ChB, Stirling, United Kingdom
Andrew Marsh, MB, ChB, Glasgow/Scotland, United Kingdom
Jens H. Bayer, FRCS (Tr & Orth), Dunblane, United Kingdom

**INTRODUCTION:** Traditional fracture clinic models in the U.K. involve patients being reviewed by either a consultant or trainee of varying experience. This limits consultant input into patient care and trainee education. The introduction of the European Working Time Directive has highlighted the importance of maximizing educational opportunities. To address these issues we designed a new model of fracture clinic involving an initial consultant led case review focused on patient management and education of the multidisciplinary team.

**METHODS:** Outcomes for all new patients attending the redesigned fracture clinic over a three-week period in 2010 (n=240) were compared with those of new patients attending the traditional clinic in the same three-week period in 2009 (n=296). Trainees attending the fracture clinic completed a Likert questionnaire (1 [strongly disagree] - 5 [strongly agree]) assessing the adequacy of education, support, staff morale and standards of patient care, before and after introduction of the clinic redesign.

**RESULTS:** The percentage of cases given consultant input increased significantly from 33% in 2009 to 84% in 2010 (p<0.0001), while the proportion of patients requiring physical review by a consultant fell by 21% (p<0.0001). Return rates were reduced by 14.3% (p<0.013) and utilization of the nurse led fracture clinic improved by 10.1% (p<0.0028). These improvements were most marked in the target group of junior staff (24.2% & 22.3% respectively). There were significant improvements in staff perception of their education from 2 to 4.75 (p<0.0001), provision of senior support from 2.38 to 4.5 (p=0.019), morale from 3.68 to 4.13 (p=0.0331) and their overall perception of patient care from 3.25 to 4.5 (p=0.0016). Emergency room staff found the new style clinic educational, practice changing and that it improved interdisciplinary relations, but did not interfere with their daily duties.

**DISCUSSION AND CONCLUSION:** The redesigned fracture clinic model has optimized consultant input into the management of patients without the need for additional funding. Our data suggests this has significantly improved surrogate markers of patient care. In addition, we have demonstrated increased service efficiency.
Reducing and Recycling in Joint Arthroplasty
Rushyuan J. Lee, MD, Baltimore, MD
Simon Mears, MD, Baltimore, MD

INTRODUCTION: Each year, 4 billion pounds of waste are produced by healthcare facilities in the U.S., second in production only to that of the food industry. Up to 70% of hospital waste is produced in the operating room, and waste output is increasing approximately 15% annually, partly because of a rise in single-use items. Case reports have shown that a large portion of this waste is clean, noncontaminated material, and does not require the additional processing of contaminated waste which could be 10 times more costly. With the annual number of total hip arthroplasties (THA) and total knee arthroplasties (TKA) at 700,000 and climbing, any reduction in contaminated waste production can reduce hospital overhead and any increase in recycling can have a considerable environmental impact. Our hypothesis was that THA and TKA produce a portion of waste that does not require the costly processing of contaminated waste and can potentially be recycled.

METHODS: From March 2011, to April 2011, we prospectively identified patients undergoing primary THA or primary TKA by one surgeon in the same operating room at our institution. After excluding patients undergoing revision procedures, complicated primary cases, and unicondylar knee arthroplasties, our study group consisted of 10 consecutive cases of primary THA and 10 consecutive cases of primary TKA. For each case, operating room waste, excluding liquids from suction canisters and irrigation, was collected and sorted as it was produced. Contaminated material was grouped together. Clean material sorted into potentially recyclable plastic and paper, and miscellaneous nonrecyclable materials. All material was weighed in the operating room at the end of the case, with a scale accurate to 1/10 lb. The group and overall weights were recorded.

RESULTS: We found that the 10 THAs and 10 TKAs produced an average of 30.0 (27.1-32.5) and 33.2 (30.9 - 35.2) lbs of waste, respectively, of which 20.9 (18.4-22.9) lbs and 23.4 (21.2-25.4) lbs, respectively, consisted of contaminated material and 9.1 (7.8-11.2) lbs (30.3%) and 9.9 (7.2-11.6) lbs (27.4%), respectively, consisted of clean, uncontaminated material. Of that clean waste, almost three quarters was potentially recyclable paper, or plastic packaging: 6.8 (6.0-7.8) lbs (22.8%) and 7.3 (5.4-8.7) lbs (22.0%), respectively.

DISCUSSION AND CONCLUSION: THAs and TKAs produce potentially recyclable waste such as clean, uncontaminated packaging material. With the number of annual joint arthroplasties on the rise, these procedures will continue to add to the rising total of medical waste and hospital operating costs. However, with almost a third of arthroplasty operating waste, somewhere in the range of 7 million lbs, being clean, uncontaminated material, there is a potential to reduce costs with waste segregation, and a potential to benefit the environment with recycling. With hospital efforts to decrease costs, coupled with the movement to become green, improved waste management in total joint arthroplasty has the margin to meet both goals of cost savings and environmentally friendly waste reduction.
pervasive and variable. Fatigue modeling can be conducted non-invasively in the hospital setting. Our approach allows the identification of time-periods, individuals, and rotations at risk for resident fatigue and consequent medical error, thus enabling targeted interventions to reduce patient harm from medical error.

PAPER NO. 750
Multi-investigator Collaboration in Orthopedic Surgery Research Compared to Other Medical Fields
Robert H. Brophy, MD, Chesterfield, MO
Matthew Smith, MD, Town and Country, MO
Christian Lattermann, MD, Richmond, KY
Morgan H. Jones, MD, Cleveland Heights, OH
Emily K. Reinke, PhD, Nashville, TN
David C. Flanigan, MD, Columbus, OH
Rick W. Wright, MD, Saint Louis, MO
Brian R. Wolf, MD, Iowa City, IA

INTRODUCTION: There is an increasing emphasis on evidence based medicine which has led to a shift toward higher level studies such as randomized trials and prospective cohort studies across medicine. Historically, clinical research in orthopedic surgery has been dominated by studies with low patient numbers from a limited number of surgeons. The purpose of this study was to test our hypothesis that orthopedics has fewer multi-center collaborative studies and multi-authored published manuscripts as compared to other medical disciplines. METHODS: We chose three leading journals from general medicine, a leading journal from the surgical subspecialties of obstetrics and gynecology, ophthalmology and otolaryngology, and three leading journals from orthopedic surgery based on highest impact factor. We compared the percentage of collaborative studies as well as the number of contributing institutions and authors in original research manuscripts published in 2009 between general medical, surgical subspecialty and orthopedic surgery journals. RESULTS: We reviewed the following medicine journals: New England Journal of Medicine, Journal of the American Medical Association and Lancet. The following surgical subspecialty journals were reviewed: Obstetrics and Gynecology, Ophthalmology and Journal of the Association for Research in Otolaryngology. From orthopedic surgery, we reviewed the Journal of Bone and Joint Surgery American, the American Journal of Sports Medicine and Spine. A significantly higher percentage of manuscripts resulted from multicenter collaborative efforts in the general medical literature (p<0.000001) and the other surgical subspecialty literature (p<0.000001) compared to the orthopedic surgery literature. Manuscripts published in the general medical journals had authors from significantly more institutions than those published in the orthopedic surgery journals (p<0.00001) as did those published in other surgical subspecialty journals (p=0.001). Manuscripts published in the general medical journals had significantly more authors than those published in the orthopedic surgery journals (p<0.000001) while those published in other surgical subspecialty journals did not (p=0.08). Based on median and interquartile range, the distribution of authorship was shifted towards a larger number of authors in the medical journals compared to the orthopedic surgery journals. The bottom quartile of authorship in the NEJM was greater than the highest quartile for all of the orthopedic surgery journals we reviewed. DISCUSSION AND CONCLUSION: There is an opportunity to stimulate greater multicenter collaborative research, which correlates with increased patient numbers, a higher level of evidence and more generalizable findings, in the orthopedic surgery community. That is not to say that all research, particularly all orthopedic surgery research, can, or should, be large, multicenter investigation, but larger scale collaborative research should be encouraged and fostered within orthopedic surgery going forward as a complement to, not a competitor of, more traditional research approaches. These efforts can be supported through increased funding, surgeon participation and appropriate expansion of authorship for multicenter studies in orthopedic journals.

POSTERS

POSTER NO. P261
ALTERNATE PAPER: PRACTICE MANAGEMENT/REHABILITATION I
Predictors of Total Joint Arthroplasty Utilization in Rural America: The Influence of Payer Type
Devraj Banerjee, MD, Springfield, IL
Wendy Novicoff, PhD, Charlottesville, VA
Steven L. Scaife, MS, Springfield, IL
Khaled J. Saleh, MD, MSc, FRCSC, FACS, Springfield, IL

INTRODUCTION: The purpose of this study was to explore the effect of payer type on utilization of total joint arthroplasty (TJA) in rural and urban population. METHODS: We used the National Inpatient Sample database to analyze the discharge data on 182,232 primary total knee and hip arthroplasty from 2007-2008. Patient location was based on National Center of Health Statistics classification. Uni- and multi-variate analysis was done using payer type (Medicare, Medicaid, Private, Other), gender, age, race, length of stay, total charges, Charlson co-morbidity index, income quartile, hospital region, and type. RESULTS: We found that rural patients who underwent TJA were more likely to be male, over 65 years of age and have Medicare as the primary payer compared to their urban counterparts. Moreover, rural residents under 65 years of age were less likely to utilize TJA. Furthermore, we found that rural females, Blacks and Hispanics, were less likely to utilize TJA compared to their urban counterparts. Rural residents receiving a total knee arthroplasty (TKA) tended to have a longer hospital length of stay. We found no differences in the utilization pattern of total knee compared to total hip arthroplasty (Table 1).
DISCUSSION AND CONCLUSION: A greater proportion of the aging population and those with Medicare payer status drives the greater frequency of TJA utilization in rural America. TJA utilization is lower among rural females, those less than 65 years of age, and Black and Hispanic patients when compared to their urban counterparts.
INTRODUCTION: One of the key areas of focus of many of the healthcare reform initiatives, including those referenced in recent legislative activity, is the need for providers to be accountable, and rewarded, for the quality of care delivered. One quality metric that has received increased attention is readmission rates. Readmission rates should be a major goal of quality initiatives. Patients who required readmission within 30 days usually had a complex index clinical course with failure of treatment and/or recurrence of the index problem. Patient co-morbidity, index procedure type, disposition on discharge, and index length of stay all appear to be important predictors of the probability of a 30-day readmission. Better systems of care designed to foster improved deployment of resources to manage patients with complex clinical courses offers the promise of addressing this high priority issue.

POSTER NO. P262

Thirty Day Orthopaedic and Rheumatologic Readmissions: Retrospective Analysis at a Tertiary Care Medical Center

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David Kovacevic, MD, Cleveland, OH
Keith Bachmann, MD, Shaker Heights, OH
Deanna Trihas, Cleveland, OH
Mary Lograsso, RN, BSN, Cleveland, OH
Mark I. Froimson, MD, Cleveland, OH

RESULTS: Two-hundred-and-eight (7.2%) of 2,898 inpatient admissions during a 12-month period required re-admission within a 30-day period. One-hundred-seventy-one (82.2%) of the readmissions were unplanned, with 83 (48.5%) unplanned readmissions occurring within seven days from index discharge. Most readmissions were in patients who had been discharged to home and then presented to the outpatient orthopaedic clinic with ongoing problems (58/171, 33.9%). Outside hospital and skilled nursing facility direct transfers accounted for 23.4% (40/171) of unplanned readmissions. Revision and primary total hip/knee arthroplasty-related index admission DRG codes were most commonly associated with readmission, comprising 51.5% (88/171) of readmissions. The index admission average length of stay (ALOS) for readmitted patients was 6.26 days, compared to 3.60 days for those not requiring readmission. One-hundred-thirty-three (77.8%) of readmitted patients were admitted for an orthopaedic diagnosis to a primary orthopaedic service, with the remaining admitted for new onset or poorly controlled medical conditions. The most common diagnosis responsible for readmission was failure of treatment of a preexisting surgical site infection, followed by new onset infection or suspicion of infection.

DISCUSSION AND CONCLUSION: Identifying patients at high-risk for hospital readmission can provide insight into the factors that predispose to this costly and undesirable outcome. Reallocation of resources to identify and provide increased level of services aimed at optimizing patient’s co-morbidities in a way that decreases readmission rates should be a major goal of quality initiatives. Patients who required readmission within 30 days usually had a complex index clinical course with failure of treatment and/or recurrence of the index problem. Patient co-morbidity, index procedure type, disposition on discharge, and index length of stay all appear to be important predictors of the probability of a 30-day readmission. Better systems of care designed to foster improved deployment of resources to manage patients with complex clinical courses offers the promise of addressing this high priority issue.

POSTER NO. P263

Content Factor: A Better Method for Assessing Orthopedic Journals

Chancellor F. Gray, MD, Philadelphia, PA
Joseph Bernstein, MD, Havertford, PA

INTRODUCTION: Medical journals are traditionally measured by their Impact Factor, representing the mean citations per paper from the past two years. Citations to papers three years and older garner no credit. Further, Impact Factor rewards efficiency over total contribution: a journal that publishes 100 papers each cited three times has a far lower Impact Factor than one that publishes 10 articles each cited 10 times, despite 200 more citations. These issues are germane to orthopedics, where many of the leading journals have lower Impact Factor than peer journals in sister disciplines for precisely these reasons. In this study, citation patterns of journals were assessed. A new metric, Content Factor, was developed to recognize journals that make substantial contributions to knowledge, independent of time frame and efficiency considerations. Content Factor was then validated by correlating it to “Importance Scores” assigned by experienced orthopedic writers to 10 orthopedic journals.

METHODS: The total citations and Impact Factor were assessed for a cohort of orthopaedic journals as well as the top journals in ophthalmology, otolaryngology, dermatology, anesthesiology and urology (“sister fields” of comparable size). A Content Factor was then calculated for each journal, defined as the total number of citations to the journal, divided by 1,000 (to present units comparable to Impact Factor). In addition, a survey was then sent to 107 contributors to OKU-11 asking them to rate 10 orthopedic journals.

RESULTS: The comparison of Content and Impact Factors is shown in table 1. The ratio of Content Factor to Impact Factor for orthopedic journals was 3.7, compared to a ratio of 2.5 for leading journals in other fields, demonstrating that many more orthopedic citations are not captured by Impact Factor. Importance Scores

PAPERS, POSTERS & SCIENTIFIC EXHIBITS

PRACTICE/REHAB
for orthopedic journals were provided by 75 contributors to OKU-11. The correlation coefficient between importance scores and Impact Factor was only 0.28. By contrast, the correlation between Content Factor and Importance Score was 0.69.

DISCUSSION AND CONCLUSION: The top orthopedic surgery journals are cited as many times, if not more, than the leading journals of sister fields, but boast Impact Factors that are half as large, if not smaller. As such, Impact Factor gravely underestimates the true “impact” of orthopedic surgery journals. If the mission of orthopedic journals is to add knowledge, and if citation is a reasonable means of measuring how much knowledge has been added, Content Factor better reflects that value. Moreover, in the modern era of search, where many papers are found via PubMed, Google Scholar and the like, the reward for efficiency implicit in Impact Factor becomes secondary: what matters is whether a journal adds knowledge, and not the average contribution of a single paper over two years. Further, by emphasizing total citations, journal assessment based on Content Factor will encourage editors to publish all valid studies, even those perhaps lacking immediate appeal to a large audience.

Impact Factor, Content Factor and Importance Scores

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<tr>
<th>Journal</th>
<th>Impact Factor</th>
<th>Content Factor</th>
<th>Importance Score (Orthopedic Surgery Journals Only)</th>
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POSTER NO. P264

Bilateral Knee Replacement: Costs and Reimbursement
Carlos J. Lavernia, MD, Coral Gables, FL
Jesus M. Villa, Miami, FL
Juan S. Contreras, Miami, FL

INTRODUCTION: The proper timing of bilateral total knee arthroplasty (BTKA) in patients with end-stage arthritis of both knees remains controversial. Our objective was to compare hospital expenditures and reimbursement in a cohort of patients that had bilateral total knee replacements (BTKR).

METHODS: A total of 598 consecutive TKAs were studied. Subjects were stratified into four groups: Simultaneous BTKA (SIM) (n=48), BTKA same admission, one-week apart (1-WK) (n=162), BTKA different admissions (>1-WK) (n=130), and a control unilateral TKR group (UNI) (n=258). Hospital expenditures and reimbursement, length of stay (LOS), discharge disposition, transfusion rates, and complications were compared between groups. ANOVA and Chi-square tests were used. P<0.05 was considered significant.

RESULTS: SIM compared to 1-WK and >1-WK had significantly less gross revenue ($118,128 vs. $155,788 vs. $152,702), direct costs ($22,464 vs. $25,628 vs. $25,251); indirect costs ($5,618 vs. $9,600 vs. $8,752); and operating costs ($28,082 vs. 35,229 vs. 33,957). However, net revenue was lower for SIM compared to >1-WK ($20,134 vs. $27,224; p<0.001). Indirect cost differences between 1-WK and >1-WK were also significant (p<0.013). LOS was significantly different between SIM (2.08 days per knee), 1-WK (4.77d), and >1-WK (4.09d) (p<0.0001). There were significant differences in percentage of patients discharged home between SIM (16.7%) or 1-WK (10.5%) compared with >1WK (74.6%) or UNI (73.7%). Significantly more patients were also transfused in SIM (70.8%) or 1-WK (72.8%) compared with >1-WK (18.6%) or UNI (18.4%). Complications were not significantly different.

DISCUSSION AND CONCLUSION: BTKA performed one-week apart in the same admission had more hospital expenditures, longest LOS, decreased probability of home discharge, and increased risk of transfusion. Our data suggests that staged BTKA performed >1-week apart on different admissions is associated with lower hospital expenditures and better perioperative outcomes.

POSTER NO. P265

Hospitalization among Patients with Cerebral Palsy in the United States: An Exploration of 37 Years of Inpatient Care
Hiroko Matsumoto, MA, New York, NY
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Benjamin D. Roye, MD, New York, NY
Joshua E. Hyman, MD, New York, NY
Michael G. Vitale, MD, Brooklyn, NY
David P. Roye, Jr, MD, New York, NY

INTRODUCTION: Although patients with cerebral palsy (CP) often require hospitalization, there is no literature on the trends within this inpatient population. This study aims to report incidence rates and characteristics of hospitalized CP patients in the U.S. from 1970 to 2007 to better understand the healthcare needs of these patients.

METHODS: This is an exploratory retrospective study to examine the characteristics of hospitalization among CP patients in the United States during a 37-year period. The National Hospital Discharge Survey was utilized to abstract incidence rates and characteristics of hospitalized CP patients. Values were normalized to the population distribution in the U.S. census to yield the incidence of hospitalized CP patients per 10,000 individuals of comparable demographics. Procedures, length of hospital stay, and disposition at discharge were also obtained.

RESULTS: The incidence of hospitalization per year increased from 1.3 cases in 1970 to 2.7 in 2007. Average patient age increased from 21 to 26 years in this 37-year period. Patients between the ages of 0 and 9 years were consistently hospitalized more than any other age group, followed by patients between the ages of 10 and 20 years. The general trend among patients up to age 60 was increased incidence of hospitalization over the observed time period. In contrast, patients aged 60 and older showed an initial increase between 1970 and 1984, reMEd relatively constant until 1999, and then began to decline through 2007. Males were more likely to be hospitalized than females, and both groups had increased incidence over time (1.6 to 3.4 in males, 1.1 to 2.0 in females). Blacks had a higher incidence of hospitalization than whites for nearly every year across this study, and had the highest incidence among all races for the majority of this time (1.7 to 3.0 in blacks, 1.2 to 2.1 in whites from 1970-2007). The percent of orthopaedic procedures to the total number of annual procedures declined from 66% in 1970 to 14% in 2007. Other specialties whose percentages decreased include urology, OB/GYN, and ophthalmology. In contrast, GI, cardiovascular, and PT procedure percentages increased, and neurosurgery showed
considerable fluctuation. The average length of hospital stay decreased from 12.8 days in 1970 to 5.0 days in 2007. Mortality rates among patients fluctuated between 0.4 and 4.4 during this period, with a downward trend beginning to appear around 2000.

**DISCUSSION AND CONCLUSION:** These data show an increased incidence of hospitalization among CP patients in the United States over the three decades studied. During this time, length of stay and death rate among hospitalized patients decreased, while average patient age increased. The total number of orthopaedic procedures decreased during this period, which can possibly be attributed to increased outpatient surgical procedures. Total annual procedures became progressively more evenly distributed across specialties over time. National data sets are essential tools to obtain epidemiologic estimates, which help establish healthcare policy and to allocate healthcare resources. The results of this study provide valuable information that will help healthcare professionals better understand and accommodate the medical needs of this complex and growing population.

**POSTER NO. P266**

**Self-Perceived Severity of Illness and Hospital Expenditures in Arthroplasty**

Carlos J. Lavernia, MD, Coral Gables, FL
Jesus M. Villa, Miami, FL
Juan S. Contreras, Miami, FL

**INTRODUCTION:** Patient perceived outcomes have been widely accepted as a quality standard in total joint replacement (TJR). The purpose of this study was to determine the association of self-perceived general health and hospital expenditures in patients who underwent primary TJR.

**METHODS:** A total of 763 consecutive TJR (621 patients) performed in a single institution by a single surgeon between July 2005 and June 2008 were studied. Patients were divided into two groups based on the results of a preoperative self-administered questionnaire: 1) patients with good or excellent general health; and 2) patients with poor or fair general health. Hospital cost, Charlson score, ASA, patient perceived outcomes (QWB-7, WOMAC, SF-36) were compared between groups. Chi-square and t-tests were used. *p*<0.05 was considered significant.

**RESULTS:** The Cronbach's α internal consistency of the survey was assessed using Cronbach's α. A signed-rank test was utilized for the comparison of pre and post electronic casting and splinting manual utilization. Wilcoxon signed-rank test was used for the comparison of pre and post survey statements and total score. A *p*-value of less than 0.05 indicated a statistical significance. SAS 9.2 was used for data analysis. Internal consistency of the survey was assessed using Cronbach's α.

**RESULTS:** The Cronbach's α demonstrated good internal consistency of the survey. Agreement with each statement improved from 43.52±6.55 to 63.48±13.77 with an overall change of 19.97±10.47 (*p*<0.0001). Total score improved from 43.52±6.55 to 63.48±13.77 with an overall change of 19.97±10.47 (*p*<0.0001). We accounted for all surveys.

**DISCUSSION AND CONCLUSION:** Perceived lack of standardized education on splint techniques was addressed by a follow-up survey was given after six months of portable electronic casting and splinting manual utilization. Wilcoxon signed-rank test was utilized for the comparison of pre and post survey statements and total score. A *p*-value of less than 0.05 indicated a statistical significance. SAS 9.2 was used for data analysis. Internal consistency of the survey was assessed using Cronbach's α.

**Figure 1. Comparison of the Percent Distribution of Procedures by Specialty in 1970 and 2007**

**POSTER NO. P267**

**Evaluation of a Novel Educational Resource: Digital Casting and Splinting Manual**

Coy A. Wright, MD, Temple, TX
Mark D. Rahm, MD, Temple, TX
Daniel L. Stahl, MD, Tampa, FL
Kindyle L. Brennan, PhD, Temple, TX

**INTRODUCTION:** In ACGME competency based education, residents are expected to advocate for quality patient care, use information technology to optimize patient care, and participate in the education of other health professionals. As part of a quality improvement project, orthopedic residents at our institution created and implemented a novel digital casting and splinting manual to standardize the teaching and improve the quality of immobilization techniques. The use of portable digital reference media is becoming increasingly popular in modern resident education; however, the usefulness of such a resource has not been studied. After six months, we found a significant improvement in provider confidence, perception of orthopedic patient care, and ability to teach standardized immobilization techniques.

**METHODS:** A digital “how we do it” splinting and casting manual was developed and distributed to 22 emergency room residents and seven junior level orthopedic residents at our institution. Prior to obtaining the manual, the residents were given a 16 statement Likert scale survey which evaluated the domains of provider confidence, patient care, teaching skill, and user friendliness of the manual. Each statement required the resident to rate agreement with the statement on a scale from 1 (strongly disagree) to 5 (strongly agree). A follow-up survey was given after six months of portable electronic casting and splinting manual utilization. Wilcoxon signed-rank test was utilized for the comparison of pre and post survey statements and total score. A *p*-value of less than 0.05 indicated a statistical significance. SAS 9.2 was used for data analysis. Internal consistency of the survey was assessed using Cronbach’s α.

**RESULTS:** The Cronbach’s α demonstrated good internal consistency of the survey. Agreement with each statement improved from 43.52±6.55 to 63.48±13.77 with an overall change of 19.97±10.47 (*p*<0.0001). Total score improved from 43.52±6.55 to 63.48±13.77 with an overall change of 19.97±10.47 (*p*<0.0001). We accounted for all surveys.

**DISCUSSION AND CONCLUSION:** Perceived lack of standardized education on splint techniques was addressed via resident development of an institutional casting manual. Portable electronic media provided a useful means for delivery of the manual, and residents had a significant improvement in confidence, perception of patient care, and teaching ability after utilization.

*The FDA has not cleared the drug and/or medical device for the use described in this presentation (i.e. the drug or medical device is being discussed for an off label use). For full information refer to page 14. An alphabetical faculty financial disclosure list can be found starting on page 19.
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POSTER NO. P268

Analysis of 149 Surgical Site Infections: Implications for Adjusting Prophylactic Antibiotic Choice

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INTRODUCTION: Limited recent data exist for guiding peri-operative antibiotic prophylaxis in the era of emerging antibiotic resistance.

METHODS: We prospectively collected all arthroplasty and spinal fusion surgeries performed at a 190 bed orthopedic specialty hospital from January 1, 2008 to July 31, 2010, complicated by surgical site infections (SSIs), as defined by CDC NHSN criteria. Cases were identified by review of daily microbiology culture reports, review of readmissions and daily Infection Control rounds. Infections were stratified by NHSN case definition, surgery type, and anatomical location.

RESULTS: Sixty-nine arthroplasty SSIs (31 hip, 37 knee, and one shoulder) and 80 spine SSIs (10 Cervical, 27 Dorsal, and 43 Lumbar) were identified. Nineteen percent of arthroplasty SSIs were superficial and 81% were deep, whereas among spinal SSIs, 25% were superficial and 75% were deep. Among arthroplasty SSIs, 55 (80%) cases were infected with Gram positive bacteria and 21 (30%) yielded Gram negative bacteria (seven cases grew at least one of each). Of 68 Gram positive isolates, 42 (62%) were staph species. Seven (33%) S. aureus isolates were MRSA (86% deep infections), while 16 (76%) coagulase negative staph isolates were MRSE (81% deep infections). Among 27 Gram negative isolates, 12 (44%) were resistant to cefazolin (75% deep infections) and two (7%) were resistant to gentamicin (50% deep infections). Among spine SSIs, 64 (80%) cases were infected with Gram positive bacteria and 20 (25%) yielded Gram negative bacteria (four cases grew at least one of each). Of 75 Gram positive isolates, 55 (73%) were staph species. Eight (26%) S. aureus isolates were MRSA (88% deep infections), while 16 (67%) coagulase negative staph isolates were MRSE (75% deep infections). Among 21 Gram negative isolates, 12 (57%) were resistant to cefazolin (83% deep infections) and two (10%) were resistant to gentamicin (100% deep infections).

DISCUSSION AND CONCLUSION: Review of antimicrobial susceptibilities of pathogens causing SSIs at our institution indicates peri-operative cefazolin may be inadequate for SSI prevention. In the setting of these bacterial resistance trends, peri-operative vancomycin and gentamicin may provide enhanced prophylaxis for arthroplasty and spine SSIs at our institution.

POSTER NO. P269

Elective Total Hip and Knee Arthroplasty in the U.S. from 1999-2008: Nonmedical Factors Influencing Utilization

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INTRODUCTION: Over the last decade the frequency of total hip arthroplasty (THA) and total knee arthroplasty (TKA) procedures performed in the U.S. has more than doubled. During this period, unprecedented federal investigation of the orthopaedic device industry was initiated in March 2005 by the Department of Justice resulting in implementation of strict oversight regulations. To test for any interdependence of these parallel developments, we analyzed utilization trends of these devices in the U.S. before and after federal scrutiny.

METHODS: Data were obtained from the Nationwide Inpatient Sample. International Classification of Disease, Ninth Edition codes were used to identify primary and revision THA and TKA procedures performed in the U.S. has more than doubled. During this period, unprecedented federal investigation of the orthopaedic device industry was initiated in March 2005 by the Department of Justice resulting in implementation of strict oversight regulations. To test for any interdependence of these parallel developments, we analyzed utilization trends of these devices in the U.S. before and after federal scrutiny.

RESULTS: Total discharges (7,022,581) for primary and revision THA and TKA increased steadily from 1999-2008. Mean annual increases in overall THA and TKA were observed in nearly every year, with the exception of 2002-2003 and 2005-2006. From 2002-2003, utilization was essentially flat for primary THA with a modest decline in THA revisions. THA performed on private insurance patients decreased while hip procedures in Medicare, Medicaid, and the uninsured increased modestly. Notably, utilization of primary and revision TKA continued to increase during this period. From 2005-2006 all categories of THA and TKA decreased, marking the only period that the number of Medicare procedures declined for both; under private insurance TKA increased while THA declined minimally.

DISCUSSION AND CONCLUSION: The overall frequency of THA and TKA increased steadily from 1999-2008, paralleling the aging trend in the U.S. The nonmedical changes that resulted in increased use of these procedures were identified and their impacts are described.
of the general population, but with a trend toward younger patients covered by private insurance. During the period of reported economic decline in 2002-2003, THA rates decreased with fewer operations performed on private insurance patients reflecting the elective and discretionary nature of THA. Conversely, hip procedures among all other payers increased modestly suggesting the relative insulation of government beneficiaries with respect to healthcare spending in tight economic times. Notably there were continued increases in primary and revision TKA operations, suggesting that symptoms of end stage knee arthropathies may be more compelling than those of hip disease. From 2005-2006 there was an overall decrease in all categories of procedures, coinciding with initiation of widespread implant industry investigation. Specifically, the number of Medicare procedures declined in all categories while private insurance TKA increased and THA declined minimally. Given the noted insulation of Medicare procedures from economic perturbations, the observed increase in private insurance TKA, and the reported positive economic outlook during 2005-2006, the economy appears an unlikely explanation for the observed concurrent decline in Medicare THA and TKA during this period. Moreover, no changes in Medicare payments or major implant developments were reported from 2005-2006. Subsequent years of more strict industry regulation witnessed restored growth in utilization rates similar to those seen prior to the investigation. It is discouraging to acknowledge that some elective total joint replacement procedures appear "discretionary" in nature and subject to influence by socioeconomic and surgeon-related factors unrelated to the medical condition of the patient. In this setting the surgeon's ethics may be called into question; we are reminded that the imperatives of professionalism dictate that the best interests of the patient should at all times determine the course of medical therapy.

POSTER NO. P270

◆Improving Keratinocyte Growth and Adhesion by Dual Coating Proteins Silanized to Titanium Alloy

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INTRODUCTION: Following amputation residual stumps used to attach the external prostheses can be associated with sores, infection and skin necrosis. These problems could be overcome by off loading the soft tissues. Intravenous transcutaneous amputation prostheses (ITAP) attached the external implant directly to the residual bone reducing these complications. However, a tight seal at the skin implant interface is crucial in preventing epithelial downgrowth and infection. Fibronectin (Fn) and laminin 332 (Ln), extracellular glycoproteins, enhance early cell growth and adhesion of keratinocytes. Silanization to titanium alloy (Ti) allows these proteins to bond to the metal directly and has shown to improve cell attachment. We hypothesize that silanized dual coatings of fibronectin and laminin (SiFnLn) will be more durable than absorbed proteins and that keratinocyte adhesion will be increased compared with silanized Ti controls and single silanized proteins.

METHODS: All 10 mm diameter Ti alloy (Al 6%, V 4%) discs were fixed, vinculin stained using mouse vinculin antibody (1:200) for two hours and alexa fluor (1:100) for one hour. Image analysis software was used to measure cell area, vinculin markers per cell unit and per unit cell area on 15 cells per disc. Data was analysed in SPSS and significance was assumed at the 0.05 level. The data presented are median values with 95% confidence intervals.

RESULTS: Silanized dual coatings bonded to Ti alloy in significantly larger quantities compared with adsorbed coatings (all p values < 0.05). When proteins were combined on silanized discs the same amount of each protein was attached as when used as a single coating (i.e. non competitive binding). Retention of silanized proteins after incubation in serum was significantly greater than absorbed proteins at all time points. Keratinocytes cultured on silanized dual coatings were significantly larger, produced more vinculin markers per unit cell and per cell area compared with single coatings at all time points.

DISCUSSION AND CONCLUSION: This study has demonstrated that silanized dual coating proteins on Ti alloy enhances early keratinocyte growth and attachment compared with single coating in vitro. It also shows that there is non-competitive binding of laminin to Ti alloys in presence of fibronectin. This may lead to improved epidermal attachment to ITAP creating a tight seal at the implant interface, which will prevent migration of the epithelium and subsequent infection in vivo.

POSTER NO. P271

Mortality Rates are Similar After Hip Fractures in Rural and Urban Patients

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INTRODUCTION: Proximal femoral fractures are a common injury in the elderly. Optimal care depends upon expeditious presentation, optimization, and treatment of the condition. Residents of rural communities are at risk of suboptimal outcomes secondary to inaccessible facilities and treatment delays.

METHODS: We used Medicare Provider Analysis and Review (MedPAR) Part A data to identify 338,092 patients with hip fractures. Each patient was categorized as residing in urban, large rural, and small rural areas. The distance from each patient’s residence to the treating hospital was recorded. We compared the mortality rates, time from admission to surgery, and length of stay (LOS) for patients residing in each location.

RESULTS: Patients in rural areas traveled substantially farther to reach their treating facility than did urban patients (mean 34.4 miles for small rural, 14.5 miles for large rural, and 9.3 miles for urban, p<0.001). The adjusted odds ratios for mortality were similar but slightly better for urban patients for in-hospital mortality (small rural OR 1.05, p=0.24, large rural OR 1.13, p=0.01) and rural patients for one-year mortality (small rural OR 0.93, p<0.001, large rural OR 0.96, p=0.03).

We found no evidence that rural patients experienced a greater delay in time to surgery or longer hospital length of stay. DISCUSSION AND CONCLUSION: Although patients living in rural areas traveled a greater distance than those living in urban areas, travel distance did not result in greater mortality. We found no evidence to suggest that rural patients had a negative impact on survival when receiving care in an urban hospital.
centers, this did not result in increased time to surgery, hospital length of stay, or mortality. This suggests that the current triage and treatment systems function adequately for rural hip fracture patients.

POSTER NO. P272
Ninety-eight Cases of Venous Thromboembolism (VTE): Analysis of Adherence to Accepted Methods of Prophylaxis
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INTRODUCTION: Major orthopaedic surgeries involving the lower extremity and spine are associated with a high risk of venous thromboembolism (VTE). The AAOSS and ACCP have each established separate evidenced-based guidelines for VTE prophylaxis in these patients. Despite rigid adherence to these guidelines, VTEs still occur. We reviewed our experience in 98 patients who developed VTEs following spine or lower extremity joint replacements with respect to adherence to ACCP and/or AAOSS guidelines. METHODS: We reviewed all total knee and hip arthroplasties as well as spine surgery cases presenting with a post-operative VTE during their initial hospitalization over an 18-month time period. We did not routinely screen post-operative patients for the presence of VTE. VTEs were defined as either a positive Doppler or a positive CT angiogram. Medical record abstraction was performed to ascertain the method of VTE prophylaxis provided to each patient. We then compared these methods to the accepted guidelines from both the ACCP and AAOSS. RESULTS: (See Chart #1). A total of 98 patients experienced a post-operative VTE. Seven were deep vein thrombosis and 91 were pulmonary embolisms. Of the 98 patients who had a VTE; 19 underwent total hip replacement, 63 underwent total knee replacement and 16 had spine surgeries. During this time period the overall VTE rate for all total joint and spine surgery patients was 2.1%. Of the patients who underwent total hip replacement; 79% (15/19) received Enoxaparin and foot pumps, 11% (2/19) received foot pumps alone, 5.26% (1/19) received Warfarin and 5.26% (1/19) received both Warfarin and foot pumps. Of the patients who underwent total knee replacement; 3.17% (2/63) received Enoxaparin alone, 71.4% (45/63) received both Enoxaparin and foot pumps, 9.52% (6/63) received only foot pumps, 6.35% (4/63) received Warfarin, 4.76% (3/63) received Warfarin and foot pumps, 1.59% (1/63) received Fondaparinux and foot pumps and 3.17% (2/63) received aspirin and foot pumps. Lastly, in patients undergoing spine surgeries; 12.5% (2/16) received Enoxaparin, 6.25% (1/16) received both Enoxaparin and foot pumps and 8.13% (1/12) received foot pumps alone. In all cases of VTEs (98/98) AAOSS guidelines for VTE prophylaxis were followed. ACCP guidelines were followed in 88/98 (89.8%) of cases. DISCUSSION AND CONCLUSION: Despite following accepted evidenced-based guidelines for VTE prophylaxis, VTEs still occur in this high risk population.

POSTER NO. P273
Can Surgeons Collaborate with Industry and Maintain Public Trust?
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INTRODUCTION: Following recent allegations of kickbacks between orthopaedic surgeons and surgical device manufacturers, it is uncertain whether surgeons can continue to collaborate with industry and maintain public trust. METHODS: Using a 49-item self-administered questionnaire, we surveyed 251 post-operative U.S. patients (an 88% response rate) and 252 post-operative Canadian patients (a 92% response rate) in follow-up hip and knee arthroplasty clinics to explore their views on financial relationships between surgeons and device manufacturers. RESULTS: Only a minority of patients thought that it was inappropriate for surgeons to receive royalty payments from manufacturers (16% of U.S. patients and 15% of Canadian patients surveyed), receive consulting fees from manufacturers (32% and 25%) or receive speaking fees from manufacturers (31% and 26%). In contrast, most patients felt that it was inappropriate for their surgeon to receive gifts worth more than $100 from industry (63% and 59%). Only 6% of U.S. and Canadian patients were worried about possible financial relationships between their surgeon and industry. A majority of patients felt that their surgeon would hold the patient’s interests paramount regardless of any financial relationships with a manufacturer (76% and 74%). Few patients would pre-operatively examine a website disclosing their surgeon’s financial relationships with industry (33% and 32%) and only a few thought that knowing their surgeon’s financial relationships would help them with their pre-operative decision making (28% and 25%). A majority of patients surveyed wanted their surgeon and their surgeon’s professional organization to ensure that financial relationships are appropriate (83% and 83%); only a minority of patients wanted a government watchdog created to monitor these relationships (26% and 35%). DISCUSSION AND CONCLUSION: Participants distinguish between financial relationships that have the potential to benefit current or future patients from those relationships that benefit the surgeon or device manufacturer alone. Disclosure alone, without oversight, is an insufficient method of managing financial relationships between surgeons and manufacturers. Despite recent allegations of kickbacks, patients endorse professional oversight of these relationships.

POSTER NO. P274
A Hospital Wide Initiative to Decrease Flash Sterilization
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INTRODUCTION: Patients receiving flashed implants are at an increased risk of having a surgical site infection (SSI). We investigated the causes of implant flashing at our institution and implemented a variety of initiatives to decrease the rates of implant flashing, including multiple education programs, enhanced operating room equipment and supply purchasing, improved case
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Titanium Alloy on Improving Fibroblast Adhesion and Growth

Five thousand human dermal fibroblasts were seeded on discs (n=6) of Ti polished alone (Pol), Ti with adsorbed fibronectin (AdFn), Ti with adsorbed laminin (AdLn), Ti adsorbed dual coating (AdFnLn), Ti silanized (Si), Ti silanized with fibronectin (SiFn), Ti silanized with laminin (SiLn). Ti silanized with a dual coating (SiFnLn) for 24hrs. Cells were fixed, vinculin stained using mouse vinculin antibody (1:200) for 2hrs and Alexa Fluor (1:100) for 1hr. Image analysis software was used to measure cell area, vinculin markers per cell and per unit cell area. Data was analyzed in SPSS and significance was assumed at the 0.05 level. The data presented are median values with 95% confidence intervals.

RESULTS: Silanized dual coatings bonded to Ti alloy in significantly larger quantities compared with adsorbed coatings at all time points (all p-values < 0.05). Fibroblasts cultured on dual coatings were significantly larger, produced more vinculin markers per cell, and per unit cell area compared with single coatings. Cells on SiFnLn were larger with more numerous vinculin markers per cell, and per unit cell area compared with AdFnLn (p<0.05).

DISCUSSION AND CONCLUSION: This study has demonstrated that covalently binding both fibronectin and laminin to Ti alloy provides a durable dual coating that enhances early fibroblast growth and attachment compared with either protein coating alone in vitro. Our study showed that there is non-competitive binding of laminin on Ti surfaces in the presence of fibronectin. Dual coatings may be applied to the skin-penetrating region of transcutaneous devices to improve the skin seal and this may have positive implications for the development of ITAP.

POSTER NO. P275

◆Effect of Dual Coating Proteins Chemically Bonded to Titanium Alloy on Improving Fibroblast Adhesion and Growth

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INTRODUCTION: Intraosseous transcutaneous amputation prostheses (ITAP) provide an alternative means of attaching artificial limbs for amputees. Conventional stump-socket devices are associated with soft tissue complications including pressure sores and tissue necrosis. ITAP resolves these problems by attaching the exo-prosthesis transcutaneously to the skeleton. Other transcutaneous amputation prosthetics are limited by infection, however ITAP aims to overcome this by creating an infection-resistant transcutaneous seal. Previous work has demonstrated that early dermal attachment prevents epithelial downgrowth and infection, hence the aim of this study is to increase the attachment of dermal fibroblasts to titanium alloy (Ti) through silanization has shown to improve cell attachment. We hypothesize that silanized dual coatings of fibronectin and laminin (SiFnLn) will be more durable when compared with adsorbed dual coating (AdFnLn), and will enhance early fibroblast growth and adhesion compared to single coatings (AdFn, AdLn, SiFn, SiLn).

METHODS: The kinetics of dual single and dual protein coating attachment onto titanium alloy (Al 6%, vs. 4%) was quantified on silanized 10mm diameter discs using radiolabelled Fn (125I-Fn) and Ln (125I-Ln). Sixty discs were polished, sterilized and silanized with 636.62 ng/cm² of 125I-Fn, 125I-Ln, 125I-Fn+Ln or 125I-Ln-Fn (n=3). Coating durability was assessed when soaked in fetal calf serum (FCS) for 0, 1, 24, 48 and 72hrs.

The data was compared to un-silanized Ti discs with the same coatings. Data for full information refer to page 14. An alphabetical faculty financial disclosure list can be found starting on page 19.

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The PAPERS, POSTERS & SCIENTIFIC EXHIBITS section contains papers, posters, and scientific exhibits related to various medical and health-related topics. It covers a wide range of subjects, including but not limited to diabetes-induced chondrocyte/cartilage damage, diabetes complications, fibroblast adhesion, and infection prevention.
expressions of AGEs (Fig.1), RAGE, TLR4, COX-2, and HMGB1 could be detected in cartilages of STZ-induced diabetic mice. DISCUSSION AND CONCLUSION: These results indicate that AGEs-induced RAGE/TLR4-regulated inflammatory responses may play an important role in diabetes-induced chondrocyte/cartilage damage.

POSTER NO. P277

Mechanotransduction in Murine Skeletal Muscle

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INTRODUCTION: Skeletal muscles can sense their mechanical environment and respond appropriately; however, the mechanisms by which muscles convert mechanical signals to cellular responses, termed “mechanotransduction,” have yet to be defined. This research characterizes the components of the skeletal muscle mechanotransduction pathway by measuring signaling in mouse muscle after passive mechanical deformation.

METHODS: Extensor digitorum longus (EDL) muscles from 36 male mice (strain 129/SV) were assigned to one of six passive stretch protocols (Figure 1) while the contralateral muscle was used as a control. The six conditions varied in stretch number (240 vs. 480), duration of stretching (4, 8, and 16 min), and time interval between stretches (0.5, 1, 2, and 4 seconds) (Figures 1). After stretching, the EDL was frozen in liquid nitrogen. Quantification of the intracellular response was measured by protein assays for the presence of phosphorylated c-Jun N-terminal kinase (JNK), p38, and p70 proteins and normalized to the control muscle. A 2x3, 2-way ANOVA was utilized with a p<0.05 accepted for statistical significance.

RESULTS: Results demonstrated that p70 and p38 were affected by number of stretches (p=0.03 and p=0.02), but JNK was not (p=0.14). Duration of stretch had no significant effect for JNK, p70, or p38 (p=0.98, p=0.06, and p=0.64, respectively), nor did interval time (p=0.95, p=0.18, and p=0.77, respectively) (Figure 2).

DISCUSSION AND CONCLUSION: Prior studies have shown that JNK, p70 and p38 are implicated in the early intracellular signaling cascades of skeletal muscle mechanotransduction. These results further characterize the components of this system and reveal that p70 and p38 are influenced by stretch number, but that none of these three proteins are influenced by stretch duration or time interval.

POSTER NO. P278

Transfer of Vascularized Ulnar Nerve for the Reconstruction of Stepping Function of Paraplegia Patient

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INTRODUCTION: The purpose of this study is to evaluate the feasibility and effectiveness of the vascularized ulnar nerve transfer for the reconstruction of stepping function of paraplegia patient with spinal cord injury (T2-T7).

METHODS: Seven patients, aged 31 years on average, with spinal cord injury at T2-T7, were included in the study. The patients had received surgical decompression and their spinal injuries were still rated “A” on Frankel scale after at least more than one year rehabilitative treatment. The motor function of the hand was replaced by transferring pronator quadratus muscle branch of the anterior interosseous nerve after the ulnar nerve on the non-dominant side was amputated at the wrist incision. And then, the ulnar nerve was transferred to inguinal region and anastomosed with part of the femoral nerve and obturator nerve. Functional rehabilitation training lasted for at least one year. The restoration of the muscle strength and stepping function were assessed.

RESULTS: The functions of the transferred nerve recovered to varying degrees in all the seven patients. Six of them could stand, step forward and walk with the help of brace and two crutches. The score of SCIM was raised from preoperative 27-33 (mean: 29) to postoperative 45-62 (mean: 55). In all seven subjects, the strength of intrinsic hand muscles restored to grade 4 in five cases and grade 3 in two patients.

DISCUSSION AND CONCLUSION: Although the technique to treat paraplegia is not all-inclusive, it could effectively restore the stepping-forward function and substantially improved the quality of life of paraplegia patients.
Which Patients have Multiple Diagnoses of the Hand?

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INTRODUCTION: Although multiple diagnoses in the upper-extremity are clinically observed, the incidence is largely unknown. By studying these diagnoses together rather than as isolated incidences, we can better understand the management of these conditions by the patient and by the surgeon. The purpose of this study was to determine the prevalence of multiple diagnoses, assess whether certain patient or disease characteristics are linked to multiple diagnoses, and identify the most commonly paired pathologies.

METHODS: Medical records of all patients that presented to an orthopedic hand clinic at a single academic tertiary care medical center between January 2005 and January 2007 were reviewed. Each diagnosis was assigned a unique case. For each patient, gender, age, diagnostic category, surgery rate, and side of injury were recorded. Prevalence of multiple diagnoses was analyzed overall, by gender, age, occupation, and diagnostic categories. Surgical rates of multiple and single diagnosis patients were compared using Fischer's exact test. Statistical significance was measured at p<0.05.

RESULTS: A total of 1,098 consecutive patients with 1,971 unique diagnoses were identified, and over 5,000 data points were analyzed. Some 63% of patients had a single diagnosis and 37% had multiple diagnoses. In patients with multiple diagnoses, an average of 3.17 diagnoses per patient was observed. The rate of multiple diagnoses was 30% in males and 41% in females (p<.001). Older patients had significantly higher rates of multiple diagnoses than younger patients; 22% of patients less than 35 years old had more than one diagnosis, while rates reached 40% for patients 36-55, and 41% for those older than 55 (p<.001). The rate of surgery for single diagnosis patients was 34%, and 53% for multiple diagnoses patients (p<.001). The prevalence of multiple diagnoses were highest in clerical, laborer, and retired populations (40%, 43%, and 44%, respectively), and lowest in the medical and service occupations (27% and 30%, respectively). When stratified by diagnosis, patients with arthritis, tendonitis, and neurological diagnoses have higher likelihoods of having more than one diagnosis than patients with cyst, fracture or contracture conditions. For example, 79% of all neurological diagnoses were associated with at least one other diagnosis, while only 21% had only a single neurological diagnosis (Figure 1). Among multiple diagnosis patients with arthritis, tendonitis, and neurological conditions, the most commonly occurring diagnosis pairs were coexisting neurological and tendonitis conditions (29%) and multiple neurological conditions (18%).

DISCUSSION AND CONCLUSION: More than one in three patients presenting at an academic hand clinic had multiple diagnoses, with women and older patients with coexisting conditions more often than men. The majority of patients with arthritic, tendonitis, and neurological conditions have an additional diagnosis in the hand. Overall, patients with multiple diagnoses have higher surgical rate than patients with single diagnoses. Determining the prevalence of multiple diagnosis in the hand can help discern commonly paired musculoskeletal diagnoses and help identify patient populations who may be prone to coexisting conditions; a better understanding of these patterns may help surgeons better manage patients with multiple conditions of the hand.
The female athlete triad puts athletes at risk for diminished performance and long term health problems. Athletes in aesthetics sports such as dance and endurance events such as running have been considered to be at risk for developing disorders related to the female athlete triad. The prevalence of and risk factors for the female triad have not been well studied in soccer athletes. The purpose of this study was to test the hypothesis that elite female soccer athletes would have low rates of menstrual dysfunction, disordered eating attitudes, and stress fractures. METHODS: Female soccer athletes were recruited from an elite youth soccer club, an NCAA Division I university team, and a women’s professional team. Athletes completed questionnaires regarding age of menarche, menstrual history, and history of any musculoskeletal injury including stress fracture. The Eating Attitudes Test (EAT-26 test) was used to assess the athlete’s body perception and attitudes toward eating. RESULTS: A total of 220 female soccer athletes with a mean age of 16.4 ± 4 years participated in the study. Some 64% of athletes in the 10-14 age group had not yet passed menarche. The average onset of menarche reported by all other athletes was 13 ± 1 years or age. Nineteen percent of the 15-17 age group, 18% of the collegiate and 20% of the professional athletes reported irregular cycles (time between menses 28-34 days) and/or absence of a menses during the previous year. Only one player scored in the high risk range (>20) and 16 (8.8%) scored in the potentially at risk range (>10) on the EAT-26. A history of stress fracture was present in 14.3% of all athletes with the majority of these occurring in the ankle and foot. DISCUSSION AND CONCLUSION: Elite female soccer athletes are at risk for delayed onset of menarche, menstrual dysfunction and stress fractures despite reporting appropriate body perception and attitudes towards eating, likely as a result of imbalanced energy intake and output. These athletes may be at risk for poor healing from fractures. More research is needed to identify the underlying causes, and potential remedies, for these findings in elite female soccer athletes and whether these findings translate to other female athletes participating in nonaesthetic team sports.
No Effect of Pulsed Electromagnetic Fields on the Bioactivity of Human Osteoarthritic Chondrocytes

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INTRODUCTION: While the analgetic effect of pulsed electromagnetic fields (PEMF) in case of hip and knee osteoarthritis are already shown, it is assumed that most of this effect derives from improved tissue perfusion and oxygenation while the actual influence of electromagnetic fields on biosynthetic activity of osteoarthritic chondrocytes is still elusive and has not been differentiated from analgetic effects until yet. It is therefore the aim of this study to evaluate the effect of PEMF on human osteoarthritic cells of the osteoarthritic knee in vitro. We hypothesized that PEMF influence the biosynthetic activity of explantcultures of osteoarthritic chondrocytes is still elusive and has not been differentiated from analgetic effects until yet. It is therefore the aim of this study to evaluate the effect of PEMF on human osteoarthritic cells of the osteoarthritic knee in vitro. We hypothesized that PEMF influence the biosynthetic activity of explantcultures of osteoarthritic chondrocytes with respect to the expression of glycosaminoglycan (GAG) and DNA levels.

METHODS: We evaluated the effect of pulsed electromagnetic fields on human chondrocytes of the osteoarthritic knee in vitro. Biopsies of the cut femoral condyles after total knee arthroplasty were kept in a standard cell culture medium consisting of DMEM/F-12, 10% FCS, PenStrept, and ascorbic acid for four days and randomly split to an exposure group (PEMF for four hours and for four days at 75HZ and 1.6 mT) and a control group. Both groups were retained for biochemical and PCR analysis (glycosaminoglycan (GAG) and DNA levels). We used student‘ s t-tests in SPSS 11 at p<0.05.

RESULTS: DNA analysis revealed no differences between groups and no increase in content after exposure (p=0.88; p=0.66). The increases of glycosaminoglycans (GAG) were 0.4 ± 1.6 ng (95%CI[1.4; -0.5]) and -0.5 ± 1.8 ng (95%CI[0.6; -1.5]) (exposure versus control group) without significant differences (p=0.24). We observed less decrease of GAG and DNA levels over time (four days) in the intervention group in contrast to the control group without statistical significance.

DISCUSSION AND CONCLUSION: Low-frequency pulsed electromagnetic fields (PEMF) do not significantly influence the biosynthetic activity of explantcultures of human osteoarthritic cells in vitro. Nevertheless, they may be suitable as an adjuvant to a bigger treatment regimen.

The Effect of Shoulder Immobilization on Driving Performance

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INTRODUCTION: There has been a growing interest in the investigation of a variety of orthopedic immobilization devices in the context of driving performance and safety. The majority of studies utilize surveys, driving simulators and controlled driving conditions to elucidate practice guidelines for patients utilizing these devices. The effect of upper extremity bracing using a shoulder sling has not been previously investigated. The purpose of this study was to evaluate the effect of upper extremity immobilization using a sling on driving performance using a driving simulator.

METHODS: A computerized driving simulator was used to develop a simulated circuit to test a variety of driving conditions. The circuit simulated normal rural driving with various hazardous conditions that necessitate evasive maneuvers and turns at varying angles. Twenty healthy volunteers were tested on two trials on a single simulated circuit. Trial 1 consisted of driving under natural conditions and served as the control group. Trial 2 consisted of driving with the dominant driving arm immobilized using a shoulder sling. Participants were randomized with respect to the temporal order of each trial and each course was customized to the driver’s reaction time to limit variability between course output measures.

RESULTS: The mean ± standard deviation for number of collisions, maximum angular change (rad/s) for each turn and proximity to any oncoming vehicles (m) and stationary objects was extrapolated from driving simulator output data. The total number of collisions for non-sling driving was 34 (mean 1.70 ± 1.21) and 73 for sling driving (3.65 ± 1.63) (p<0.01). Seventy percent of participants with upper-extremity immobilization were involved in ≥ 3 collisions, 70% of non-sling participants were involved in ≤ 2 collisions. There was no statistically significant difference between groups with respect to angular change for all simulated turning angles and with respect to proximity to oncoming vehicles and stationary objects.

DISCUSSION AND CONCLUSION: Sling immobilization of the dominant driving arm results in a decrease in driving performance and safety with respect to the number of collisions in a simulated driving circuit (p<0.01). The decrease in driving performance is likely to be related to the effect the immobilized arm has on performing evasive maneuvers during hazardous driving conditions. This data has important implications for patients and decisions related to return to driving after shoulder injury or shoulder reconstruction.
Technology in Orthopaedic Training

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Purpose: Recent advances in technology including social and electronic media, mobile devices and cloud servers have impacted our everyday lives. The impact of these technologies on orthopedic resident training and their implementation of patient care has been dramatic. The purpose of this scientific exhibit is to review these technologies and how they have enhanced the resident experience with regard to research, patient care, resources, and workflow.

Materials and Methods: The scientific exhibit will display screen shots of various applications as well as describe their uses, including illustrations from Sharepoint, Access, Facebook, Twitter, and Dropbox. Computer access will be available with the aforementioned applications for visitor use and trialing. iPads and smartphones will also be on hand to demonstrate the versatility and portability of electronic media. The presentation will describe four main areas where technology has made the most substantial impact:

1) Research - We will show how database management software such as Microsoft Access has revolutionized data collection and its compatibility with statistical analysis programs. Furthermore, we can demonstrate the use of reference management programs to facilitate organization and sharing of literature among researchers.
2) Patient Care - Database software has been used to maintain patient lists and communicate updates in patient information such as lab results, unfinished tasks, and sign out information including SBAR (Situation, Background, Assessment, Recommendations). This enables safe and efficient patient handoffs and provides seamless transfer of care between providers. Also, online programs such as “Own the Bone” can be used to provide patient educational materials and track treatment.
3) Resident Education - Resident operative cases are now tracked using a program installed by the ACGME. This allows program directors and other educators to monitor case variety as well as volume. On-line access to textbooks and journals can be easily utilized by mobile devices, putting large volumes of information in a portable device. Websites such as ResStudy, Wheeless, and Orthobullets provide online content and OITE preparation materials.
4) Workflow - Documents stored on cloud drives such as Dropbox can be used to share information and updates with an unlimited number of recipients. For maintaining work hour compliance, services such as T-Sheets, New Innovations or MyEvaluation.com can be used to track resident hours. The accessibility of the above programs have been advanced with new devices such as smart phones, iPads, and e-Readers. We will demonstrate how these devices have been incorporated into the orthopaedic training program.

Conclusion: The recent innovations in electronic media, devices, and their widespread adoption holds the potential for advances in both resident education and patient care. Our goal is to demonstrate several of these applications and their impact on the practice of orthopaedics.
Conclusion: Integration of the principles of evidenced based medicine is critical to optimize patient care and for long term survival in orthopaedic practice.

SCIENTIFIC EXHIBIT NO. SE55
AAOS Patient Safety Committee - The Current State of Bacterial Screening & Decolonization in Orthopaedic Surgery
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Approximately 27 million surgical procedures are performed in the United States each year. The Centers for Disease Control and Prevention (CDC) estimate that nearly 500,000 surgical site infections (SSI) occur annually. Among surgical patients, SSIs were the most common nosocomial infection. Patients who develop a SSI are 5 times more likely to be re-admitted to the hospital, 60% more likely to spend time in an intensive care unit, and twice as likely to die compared to patients without an SSI. When surgical patients with a SSI died, 89% of the deaths were attributable to the infection. Nasal colonization with Staphylococcus aureus increases the risk of Staphylococcus aureus SSI. Preoperative nasal swabbing can detect carriers and may be a helpful screening test for elective surgery and some urgent procedures. Several screening methods and decolonization protocols have been described in the literature and will be synthesized in this exhibit. Results from published scientific articles will be presented in an effort to educate the viewer about the current state of screening and decolonization. Available economic analyses will also be discussed. Upon viewing of the exhibit medical personnel will be able to make educated decisions that will influence practice management.

SCIENTIFIC EXHIBIT NO. SE56
A Pre-Operative Staphylococcus Aureus Screening and Eradication Program: Our Institutional Experience
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Introduction: Pre-operative Staphylococcus Aureus colonization of the nares increases the chances of developing a post-operative infection. To address this problem, we initiated a pre-operative staphylococcus aureus screening and eradication program. Our institution is a single specialty Orthopedic Hospital which performs 16,000 procedures annually.

Methods: In 2007, we began to culture and decolonize the anterior nares of each patient scheduled for a hip replacement, a knee replacement or a spinal fusion presenting to our Pre-Admission Testing (PAT) clinic. We recorded the results of the cultures and patient compliance with mupirocin decolonization. We altered our choice of and prophylactic antibiotic based on the screening and compliance results.

Results: To date we have screen over 5000 patients, of whom 2.2% were positive for Methicillin Resistant Staphylococcus Aureus (MRSA) and 18.0% were positive for Methicillin Sensitive Staphylococcus Aureus (MSSA). We also screened our residents and attending surgeons and found a significant increase (p<.05) in MSSA colonization in our surgeons vs. our patients (35.7% vs. 18.1%) and between our residents and our attendings (59.0% vs. 23.3%). During this time, 678 previously screen patients were re-evaluated in PAT for an additional surgery. The results of the repeat cultures of these patients are displayed in Table #1. We compared the Surgical Site Infection (SSI) rate in those patients who were screened and treated to a concurrent control group who were not screened or treated. The rate of SSI decreased 13% in the treatment vs. the control group. This was not significant. (p=.87) A power analysis determined that 115,000 patients would be needed to demonstrate a significant result with this data. However we did demonstrate a significant decrease in the rate of MRSA Hospital acquired infections (HAI’s) during the study period. This rate of MRSA HAI’s is calculated as cases for 1000 inpatient days. In the 7 quarters prior to the onset of our screening program the rate was 1.23. This fell 33.5% to 0.83, in the period after the screening program. (p=.024) The odds ratio was 1.48. See table #2. The cost of our treatment protocol is $100.00 per patient. Assuming a 10% decrease in the SSI rate the cost per preventing an SSI is 56k. Thus the protocol was cost effective. Lastly we polled 100 patients undergoing the screening regimen and 94% were satisfied with the process and would do it again.

Discussion and Conclusion: Our experience with a Staphylococcus aureus screening and decolonization program demonstrated that the program decreased MRSA HAI’s, trended toward fewer SSI’s, was cost effective and was well tolerated by the patients.

*The FDA has not cleared the drug and/or medical device for the use described in this presentation (i.e. the drug or medical device is being discussed for an off label use). For full information refer to page 14. An alphabetical faculty financial disclosure list can be found starting on page 19.