tive visits between 9-15, 15-21, and 21-27 months after surgery were identified for 12-month, 18-month, and 24-month endpoints. All available data relating to the procedure, demographics, comorbidities, and prior surgical history were considered as potential predictors of %BMI loss. Regression models, using multiple model selection procedures, were fitted at each endpoint. **RESULTS:** The population consisted of 31,443 LAGB, 40,352 RYGB, and 2194 VSG patients, of whom 79% were female, 79% were Caucasian, and the mean age was 46 years. Of the total 73,989 patients, 26,920 had a 12-month endpoint, 7245 had an 18-month endpoint, and 1774 had a 24-month endpoint. Regression models explained 37 to 55% of the variance in %BMI loss, depending primarily on the endpoint, with the highest percent variance explained at the 12-month endpoint and the lowest at the 24-month endpoint. Model selection methods made little difference in model fit. The type of bariatric surgery performed was the most significant predictor in all models. Other significant predictors in various models included key demographic variables and comorbidities, as well as baseline BMI. **CONCLUSIONS:** The data in the BOLD registry are sufficiently robust to enable the evaluation of predictors of bariatric surgery success including surgery type, comorbidities, baseline BMI and key demographic variables.

**PSU4**

**OPEN VERSUS ENDOVASCULAR REPAIR FOR ABDOMINAL AORTIC ANEURYSM: AN EXPLORATION WITH DISCHARGE AND POST-DISCHARGE-MORTALITY DATA**

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**OBJECTIVES:** To explore the feasibility of using linked hospital discharge and vital statistics death records to study the comparative effectiveness of repairs for unruptured abdominal aortic aneurysm (AAA) using traditional open aortic repair (OAR) and endovascular aortic repair (EVAR). **METHODS:** Linked hospital discharge and vital statistics death records of the California Office of Statewide Health Planning and Development were used for 2000-2007. Hospitalized patients for AAA with OAR and those with EVAR were identified. Demographic characteristics, comorbidities, the rates of complication, mortality, readmissions were compared between these two groups. Descriptive statistics, Kaplan-Meier survival analysis, and propensity scores were used. **RESULTS:** We identified 8343 AAA patients with OAR and 6221 AAA patients with EVAR between 2000Q3 and 2007. The yearly number of OARs declined from 1,766 to 80, while EVARs increased from 676 to 1,389. Patients receiving OAR were more acutely ill and likely to be admitted through ED than those with EVAR (8.5% vs. 2.8%). Preliminary results indicated that the inpatient mortality rate was higher for OAR than EVAR (4.68 vs. 0.96 per 100; $P < 0.001$). The 30 day post-discharge mortality rates with OAR was not significantly different from EVAR (0.49 vs. 0.32 per 100; $P = 0.127$). **CONCLUSIONS:** The information generated from the linked discharge and death data will be useful in developing hypotheses, describing patients and trends, and obtaining fast, preliminary indications of the effectiveness and safety of alternative treatments. Although we found issues with the data quality about which data users need to be vigilant, these concerns do not negate the potential value of the data as an important adjunct and precursor to more expensive clinical trials. The strength of this observational analysis derives from the inclusion of all hospital stays for intact AAA as compared to the selected samples that often comprise randomized clinical trials.

**PSU5**

**PREVALENCE OF CARDIOVASCULAR RISK FACTORS AMONG PATIENTS UNDERGOING ELECTIVE CORONARY ARTERY BYPASS SURGERY**

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**OBJECTIVES:** Globally 80% cardiovascular disease deaths occurred in low and middle income countries with almost equal proportion inboth gender. Evidence shows that people in low and middle income countries are more exposed to cardiovascular risk factors while less exposed to preventivemeasures. It may lead to long course of management by either/ both medical and surgical techniques including coronary artery bypass surgery, increasing the economic burden.In order to find avenue for prevention, we aimed to measure the prevalence of cardiovascular risk factors among patients undergoing elective CABG in Karachi, Pakistan. **METHODS:** Information was collected through structured questionnaire and entered into Microsoft Access software. On the basis of research hypotheses, specific data chunk was extracted and analyzed in SPSS 19. **RESULTS:** In this retrospective chart review, 2073 patient undergoing elective CABG between January 2006 to June 2011 were included. Mean age of the patients was 54.85±9.7 years. Out of all, 14.7% patients were females.Family history was present in 53%, 47.7% were smokers. Conventional risk factors of overweight was 47.10%, obese was 14.7%,diabetes was 47.7%, hypertension was 69.50%, dyslipidemiawas 50.20%,renal failure was 9.2% and prior MI was 46.7%. Outcomes includeoperative mortality of 0.3% while14.8%, renal failure, 7% arrhythmias, 2.3% reoperation and 3.1% prolonged ventilation as postoperative complications. **CONCLUSIONS:** There is a high prevalence among patients undergoing elective CABG of coronary risk factors including dyslipidemia, hypertension, diabetes and smoking.

## SURGERY – Cost Studies

**PSU6**

**ECONOMIC IMPACT OF USING SUGAMMADEX FOR THE REVERSAL OF DEEP NEUROMUSCULAR BLOCKADE IN THE SWEDISH HEALTH CARE SETTING**

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**OBJECTIVES:** The objective of this analysis is to assess impact on hospital costs for a patient using sugammadex for reversal of deep neuromuscular blockade compared to no reversal agent. **METHODS:** An economic model reflecting resource use and costs associated with neuromuscular block and its reversal, and residual blockade, was constructed for the Swedish healthcare setting. Sugammadex was compared to no reversal as other reversal agents are ineffective in reversing deep block. Clinical trial data were used to estimate time savings relating to shortened reversal in the operating room (OR). Costs of OR time were derived from labor costs for different types of OR staff. Resource use associated with clinical sequelae of residual blockade (aspiration, hypoxemia, muscle weakness, upper airway obstruction) was estimated from the literature, where available. Unit costs were taken from published pricelists of the state-owned pharmacy chain and, published hospital price lists. **RESULTS:** If all OR staff modeled (anesthetist, two surgeons and two nurses) can be re-allocated to realize time savings with shortened reversal, use of Sugammadex compared to no reversal of deep neuromuscular blockade is estimated to save ~353 SEK per reversed patient. This corresponds to an increase in drug costs of 1953 SEK, which is more than fully offset by a decrease in the costs of OR staff time and clinical sequelae of residual blockade (-2306 SEK). In a worst case scenario, if only the anesthetist, one surgeon and one nurse realize time savings, costs would be increased (594 SEK) compared to no reversal. Results were sensitive to OR staff costs and time savings. **CONCLUSIONS:** Sugammadex for reversal of deep neuromuscular blockade can potentially lead to cost savings in the Swedish health care setting. The degree to which costs may be saved depends upon which OR staff are able to redeploy to other activities with shortened reversal.

**PSU7**

**ECONOMIC BURDEN OF OBESITY AND THE IMPACT OF BARIATRIC SURGERY ON HEALTH CARE COSTS AND UTILIZATION**

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**OBJECTIVES:** This study was to estimate economic burden of obesity and to assess the impact of bariatric surgery on health care costs and utilization in adults in Alberta. **METHODS:** Multivariate regression models were developed to estimate the impact of BMI on physician, outpatient and inpatient costs and visits. A pre-post analysis over a 5-year period was conducted to compare the cost and visits before and after surgery. Patients who received bariatric surgery in 2006 were identified using the the Canadian Classification of Health Interventions (CCI) codes that correspond to bariatric surgery. Total physician, inpatient and outpatient costs and visits were calculated across all patients, over a period of two years before and two years after surgery. Health utilization data from Alberta provincial health administrative databases were linked with epidemiologic and demographic data contained in Canadian Community Health Survey (CCHS). **RESULTS:** When combining physician and outpatient costs, the mean estimate per obese resident was $696, following by $545 for overweight, $523 for underweight, and $480 for normal weight residents. Compared to normal weight, obesity, overweight and underweight were associated with increases of $217, $65 and $44, respectively. There were 217 bariatric surgery recipients in 2006. Health care costs and utilization two years pre-surgery were greater than two years post-surgery. The marginal change in health care costs and utilization between 2004 and 2005, however, was positive, indicating an increase prior to surgery. In contrast, the marginal change in health care costs and utilization was negative, indicating a decrease post-surgery. The estimate of total physician and hospital costs associated with bariatric surgery was $12,175.79 (SE: $586.75). **CONCLUSIONS:** Obesity placed a large economic burden on health care system. The bariatric surgery may alter the upward trajectory of health utilization for severely obese patients. Further research including longer follow-up period is necessary to confirm the impact of bariatric surgery.

**PSU8**

**DISEASE BURDEN AND MEDICAL NEEDS IN OLDER PATIENTS WITH TOTAL KNEE ARTHROPLASTIES AND MUSCLE ATROPHY OR WEAKNESS**

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**OBJECTIVES:** Incidence of total knee arthroplasties (TKAs) increased from 31.2 to 220.9 per 100,000 person-years in the US from 1971-1976 to 2005-2008. Muscle atrophy/weakness pre- or post-TKA surgery is associated with poor postoperative function. This review assessed disease burden and medical needs in older patients with TKA and muscle atrophy/weakness in US, Canada, Australia, and five major countries in Europe. **METHODS:** Using keywords related to muscle atrophy/weakness and TKA, we systematically searched English-language, MEDLINE- or EMBASE-indexed literature published from May 2001 to May 2011 and materials available from governmental or professional organizations. Selected articles focused on epidemiologic, economic, humanistic, and treatment burden of muscle atrophy/weakness (defined as evaluations of muscle atrophy, strength, or performance) in adults ages 50+ with TKA. Excluded articles were molecular and genetic studies, case reports, and evaluations of muscle atrophy/weakness in <20 patients. **RESULTS:** Eighty-three articles were included. Strength and function improve from preoperative baseline starting 3-4 months postoperatively but remain impaired compared with healthy controls. Postoperative physical therapy (PT), exercise, or electrical muscle stimulation improve strength and performance and accelerate recovery; however, operated limbs may never regain strength to match healthy controls or non-operated limbs. Preoperative exercise and education (Canada) or inpatient aquatic PT (Australia) do not reduce hospital length of stay versus usual care. Guidelines and real-world treatment pattern studies do not address optimal

PT regimens and settings. Few studies investigated effectiveness of pharmacological interventions for improving strength and performance. No studies estimated the incidence, prevalence, or direct or indirect cost of muscle atrophy/weakness in TKA. **CONCLUSIONS:** The impact of muscle atrophy/weakness on the cost and treatment of TKA is poorly defined; few rehabilitation strategies fully restore strength and function. Future research may need to evaluate the contribution of muscle atrophy/weakness to TKA disease burden and determine optimal interventions for recovery of strength and function.

PSU9

**INCREASED EFFICIENCY THROUGH PATIENT MANAGEMENT IN ORTHOPEDIC CARE: AN ECONOMIC EVALUATION OF THE RAPID RECOVERY PROGRAMME (RRP)**

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**OBJECTIVES:** The objective of this evaluation was to analyze the economic impact of introducing the RRP – a program that optimizes all aspects of a patient's journey from pre-operative assessment to discharge and beyond, which improves patient satisfaction of patients undergoing primary hip and knee arthroplasty, in the Norwegian South-Eastern Regional Health Authority (SENRHA). **METHODS:** An economic model was developed using empirical data from a retrospective evaluation of the RRP at the public-run London based Hillingdon Hospital Trust. The model compared the two scenarios pre- and post-implementation of the RRP where the former scenario constituted the current clinical practice of the SENRHA and the latter modeled the impact of the RRP on the SENRHA by assuming transferability of the Hillingdon results, as they are reproduced in a model developed by the Berkely Partnership in cooperation with the hospital. The model used in this analysis synthesizes the evidence from Hillingdon with Norwegian cost and LOS data. The pre-RRP number of patients and LOS at the SENRHA were retrieved from the Norwegian Patients Registry. Cost components including staff, theatre, prosthetics, drugs, bed days, pathology and diagnostics were collected from publicly available sources. Benefits were estimated using the Norwegian DRG-based public funding system. The SENRHA is one of four regional Norwegian health authorities serving a population base of 2.8 million inhabitants. **RESULTS:** The model predicts a 58% reduction in LOS for patients undergoing primary hip and knee arthroplasty and estimate a volume increase of 92% for arthroplastic surgeries. Due to a reduction in average cost per case and increased capacity, the overall change in SENRHA's net position is estimated to 70 million US dollars. **CONCLUSIONS:** The model suggests that implementing the Rapid Recovery Programme in the Norwegian South-Eastern Regional Health Authority (SENRHA) is highly cost effective.

PSU10

**COMPARATIVE COST-EFFECTIVENESS ANALYSIS OF COFLEX INTERLAMINAR STABILIZATION VERSUS POSTEROLATERAL FUSION FOR LUMBAR STENOSIS AND LOW-GRADE SPONDYLOLISTHESIS**

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**OBJECTIVES:** Lumbar spinal fusion for treatment of spinal stenosis with back pain and spondylolisthesis has potential for perioperative morbidity, adjacent segment degeneration, and increased costs which have led to the investigation into less-invasive alternative treatments. Analysis of two-year results from randomized, controlled clinical study comparing coflex interlaminar stabilization surgery with posterolateral spinal fusion (PLF) surgery for stenosis with spondylolisthesis demonstrated clinical equivalence or superiority with coflex, and showed clear superiority in perioperative outcomes. The objective of this study is to determine whether the actual cost of coflex procedures is favorable to PLF, as a result of decreased resource utilization. **METHODS:** Actual cost of care data was available for 62 patients across 3 of the 20 sites that participated in the clinical trial comparing coflex with PLF. Actual facility costs for each case were calculated as 2011 USD, reported as OR costs, recovery room costs, implant costs, supplies, drugs, and medical equipment. Assumptions of cost for implants included 1) $4-8,000 per coflex device, and 2) PLF implant costs range: $7-11,000 for 1-level, and $10-14,000 for 2-level. **RESULTS:** Average blood loss, hospital stay, and OR time were substantially lower with coflex. Based on actual costs to facilities examined, a 1-level coflex procedure saved on average $8776 peri-operatively, compared with 1-level PLF. Similarly, a 2-level coflex procedure saved $4702 compared with 2-level PLF. For these patients, %ODI improvement was similar among the 4 cohorts at 2 years: 1-level coflex (59.5%), 1-level fusion (38.0%), 2-level coflex (63.3%), 2-level fusion (64.1%). **CONCLUSIONS:** On average, 1-level coflex procedures saved $8776 per case, while 2-level coflex procedures saved on average $4702 compared with fusion, while producing similar or improved clinical outcomes at 2 years. Our data suggest the potential for substantial cost-savings with coflex interlaminar stabilization compared with fusion in the treatment of spinal stenosis and spondylolisthesis.

PSU11

**COMPARING ROBOT-ASSISTED TO CONVENTIONAL VIDEO-ASSISTED THORACIC SURGICAL (VATS)LOBECTOMY AND WEDGE RESECTION: RESULTS FROM A MULTI-HOSPITAL (PREMIER) DATABASE**

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**OBJECTIVES:** Video-Assisted Thoratic Surgical (VATS) lobectomies and wedge resections result in lower morbidity and shorter length of stay (LOS) than open thoracotomy. The impact of robotic-assisted VATS on clinical and economic outcomes, however, has not been examined. This study compared hospital costs and clinical outcomes for VATS lobectomies and wedge resections with and without robotic assistance. **METHODS:** Using the Premier hospital database, patients aged >18 years with a record of thoracoscopic lobectomy (ICD-9 code 32.41), thoracoscopic segmental resection of lung (ICD-9 code 32.30), or thoracoscopic excision of lesion or tissue of lung (ICD-9 code 32.20) between 2009 to Q2 2011 were identified. Procedures utilizing robotic technology were identified if one of two conditions were met: (1) a robotic ICD-9 procedure code accompanied the procedure of interest or (2) "text" fields in the hospital charge master file indicated use of robot. Data were collected on intra-operative and post-operative complications, LOS, readmission rates, and total hospital cost for the procedures. Bivariate comparisons between VATS procedures with/without robotic assistance used Mann Whiteny-U to test for differences in median costs and surgery times. **RESULTS:** Of 15,502 patient records analyzed, 96% (n=14,837) were performed without robotic assistance. Using robotic assistance was associated with higher median per patient hospital costs (not including robotic capital or service contract). Median cost of inpatient procedures with/without robotic assistance was $22,331 versus $17,667 ($p<0.0001$) for lobectomies and $17,369 versus 13,574 ($p<0.0001$) for wedge resections respectively. Median inpatient surgery times were not significantly different for lobectomy (4.03 versus 4.00) but where longer for wedge resection. Surgery hours for robotic wedge resection versus non-robotic were 2.92 versus 2.25 ($p<0.0001$), respectively. Median LOS was similar across both groups. **CONCLUSIONS:** Based on this analysis, robotic-assisted VATS for lobectomy and wedge resection appears to have higher hospital costs and wedge resections have longer surgery times.

PSU12

**COMPARING ROBOT-ASSISTED TO CONVENTIONAL LAPAROSCOPIC COLECTOMY: IMPACT ON COST AND CLINICAL OUTCOMES**

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**OBJECTIVES:** To compare clinical and economic outcomes for conventional laparoscopic (LAP) and robotic assisted minimally invasive surgery for segmental colectomies. **METHODS:** Using the Premier hospital database patients >=18 years of age having one of the following primary LAP colectomies performed in 2009 to Q2 2011 were identified: cecectomy, hemi colectomy, left hemi colectomy, and sigmoidectomy. Those procedures utilizing robotic technology were identified if one of two conditions were met: 1) A robotic ICD-9 procedure code accompanied the primary procedure of interest, or 2) "text" fields in the hospital charge master file indicated use of the robot. Patients were matched on laparoscopic versus robotic colectomy using a propensity score on severity, certain demographic and hospital characteristics, and 1:1 on type of procedure. The association between robot-assisted colectomy and adverse events, hospital costs, surgery time, and length of stay was examined. **RESULTS:** Of 25,758 patient records from 364 hospitals, 98% (n=25,210) of laparoscopic colectomies were performed without robotic assistance; 2% (548) with robotic assistance. After matching, 1,066 patients remained, 533 in each group. No significant differences existed between the matched cohorts for major, minor and/or surgical complications. Use of the robot was associated with statistically higher mean per patient hospital costs. Inpatient procedures with and without robot assistance cost $17,445 vs. $15,447 ($p=0.0008$) respectively. The analysis did not include capital costs or service fees associated with maintaining the robot. Inpatient surgery times were significantly longer for robot-assisted procedures than non-robot procedures (4.37 vs. 3.34 hours; $p<0.0001$). Length of stay was similar. **CONCLUSIONS:** Findings reveal minimal clinical differences in peri and post-operative events and length of stay. There were significant increases in cost per case and OR time for robotic assisted versus conventional LAP procedures. These results call into question the cost-effectiveness of this technology in these procedures.

PSU13

**COST ANALYSIS OF CELL SALVAGE IN PEDIATRIC SURGERY**

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**OBJECTIVES:** Perioperative red cell salvage (CS) – the process of collecting shed blood during surgery and returning it to patients - reduces the need for allogeneic blood transfusion, which results in fewer transfusion-related adverse events and consequently more quality-adjusted life years compared to surgery without CS. However, little is known about the cost of CS in pediatric surgery. Our objective was to compare the societal costs associated with four transfusion strategies among patients undergoing elective orthopedic or cardiac surgery in Children's Hospital Boston: 1) CS followed by autologous transfusion; 2) CS followed by allogeneic transfusion; 3) autologous transfusion alone; and 4) allogeneic transfusion alone. **METHODS:** A TreeAge © decision tree was used to conduct all comparisons (2010 dollars), threshold analyses, univariate and multivariate probabilistic sensitivity analyses. The CS-related and blood processing direct, indirect and labor costs/patient were obtained from the hospital accounting records and the cost of a unit of red blood cells (RBC), from nationally representative reports. Probabilities of blood transfusion after CS and the number of RBC units returned via CS were obtained from hospital utilization records. The probabilities and lifetime costs of a range of infections and reactions caused by allogeneic transfusion were derived from published sources. **RESULTS:** Average CS, blood processing and RBC unit costs were $160, $1895 and $223, respectively. Average volume of blood returned via CS was 271cc, and the probability of needing transfusion after CS was 0.80. Cell salvage with autologous blood transfusion ($1504) was least expensive, followed by CS with