

Tuesday, March 31st

Scientific Session III – Carotid

Presentation Number: 11

Publishing Title: Impact of Surgical Specialty and Operator Experience upon Outcomes Following Carotid Endarterectomy

Author Block: Kevin Caldwell, MD, Sarah Koch, MD, Imran Khan, MD, James Pan, MD, Douglas Hood, MD, Kim J. Hodgson, MD, Sapan S. Desai, MD, PhD, MBA.

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OBJECTIVES: Carotid endarterectomy (CEA) is commonly performed by general surgeons, cardiothoracic surgeons, neurosurgeons, and vascular surgeons, with each specialty having differences in residency structure, operative experience, and subspecialty training. The aim of this study is to evaluate the impact of surgeon specialty on outcomes following elective CEA.

METHODS: Patients who underwent elective CEA were identified from the 2007-2009 Nationwide Inpatient Sample (NIS). Physician identifiers in the NIS were used to determine surgical specialty and operative experience. Multivariate analysis adjusted for surgeon experience and mortality risk was used to compare differences in demographics, complications, outcomes, and hospital covariates.

RESULTS: A total of 13,727 patients were identified within the NIS, of which 19.9% underwent CEA by general surgeons, 10.7% by cardiothoracic surgeons, 2.6% by neurosurgeons, and 66.8% by vascular surgeons. The average age, gender, and DRG mortality risk and severity of illness scores were similar between specialties. General surgeons had the highest postoperative risk of bleeding (3.5%, $P<0.01$) and stroke (1.2%, $P<0.05$). Cardiothoracic surgeons had the lowest risk of bleeding (1.4%, $P<0.001$) and cardiac events (0.5%, $P<0.01$). Neurosurgeons had the highest risk of cardiac events (3.3%, $P<0.05$) and surgical site infections (0.6%, $P<0.01$). The length of stay was lowest for vascular surgeons (1.7 +/- 2.4 days, $P<0.001$), and both cardiothoracic and vascular surgeons had the lowest median cost of hospitalization (\$9,151 vs. \$9,666 in 2014 USD). Mortality was slightly higher for general surgeons (0.4%) compared to other specialties (0.2-0.3%, $P=N.S.$). Most general surgeons performing CEA do so at non-teaching hospitals ($P<0.001$) and tend to work in rural locations (23.5% vs. 5.9% for vascular surgeons, $P<0.001$). Low volume (<10 cases per year) adversely affects the rate of complications, length of stay and costs ($P<0.05$) but not mortality.

Abstract Body:

CONCLUSIONS: Surgical specialty impacts patient outcome following CEA. General surgeons have a higher rate of complications, longer length of stay, higher costs, and slightly higher mortality; however, they provide more immediate access to care in rural settings. High volume cardiothoracic and vascular surgeons have the fewest complications, shortest length of stay, and the lowest costs. These findings may impact patient referral patterns and hospital privileges for providers.

**Presentation
Number:** 12

**Publishing
Title:** Genetic Polymorphisms Influence Cognition in Patients Undergoing Carotid Interventions

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Author Block: ¹Palo Alto Veterans Hospital, Palo Alto, CA, USA, ²Stanford University, Palo Alto, CA, USA, ³Stanford/Palo Alto Veterans Hospital, Palo Alto, CA, USA.

OBJECTIVES: Carotid interventions help decrease the risk of stroke and improve cerebral perfusion. However, nearly 40% of patients who undergo carotid revascularization procedures experience cognitive deterioration. We have demonstrated that subclinical microembolization is associated with memory decline. The role of genetic factors in cognitive function is unclear. We therefore sought to assess genetic determinants as potential risk factors for these procedures.

METHODS: Over two years patients undergoing carotid interventions at a single academic institution were recruited to participate. Patients underwent neuropsychological testing within two weeks prior to and at one month following their procedure and MRI prior to and at 24 hours following their procedure. Saliva samples were collected for genetic testing and demographics were recorded. Logistic regressions were used to search for associations.

RESULTS: 74 patients were included (43 CAS, 31 CEA); all were male with an average age of 70. The majority of patients exhibit hypertension (95%) and have a history of smoking (80%). Other co-morbidities included diabetes (47%), obesity (41%), and CAD (53%). CAS was associated with higher incidence of microemboli ($p < .001$) and with susceptibility to memory decline ($p = .007$). Presence of ApoE 4 allele was associated with depression ($p = .03$) and demonstrated a trend with incidence of microemboli. A significant negative association was found between age and depression ($p = .99$). After correcting for age and BDNF polymorphism, prior symptoms were associated with depression ($p = .02$). Corrections for age and 5-HTT polymorphism also revealed a correlation between prior symptoms and depression ($p = .03$).

**Abstract
Body:**

CONCLUSIONS: Our study demonstrates that genetic polymorphisms such as 5-HTT, BDNF, and ApoE may provide additional insight on depression in patients with carotid stenosis. Further investigation of these polymorphisms in relation to overall cognition is warranted to understand and potentially prevent cognitive changes following carotid revascularization procedures.

Presentation Number: 13

Publishing Title: Common Carotid Artery Peak-Systolic Velocity Ratio Predicts High-Grade Common Carotid Stenosis

Author Block: **George T. Pisimidis, MD¹**, Dimitrios Katsavelis, PhD², Carlos F. Bechara, MD, MS¹, Neal R. Barshes, MD, MPH¹, Panagiotis Kougias, MD¹.

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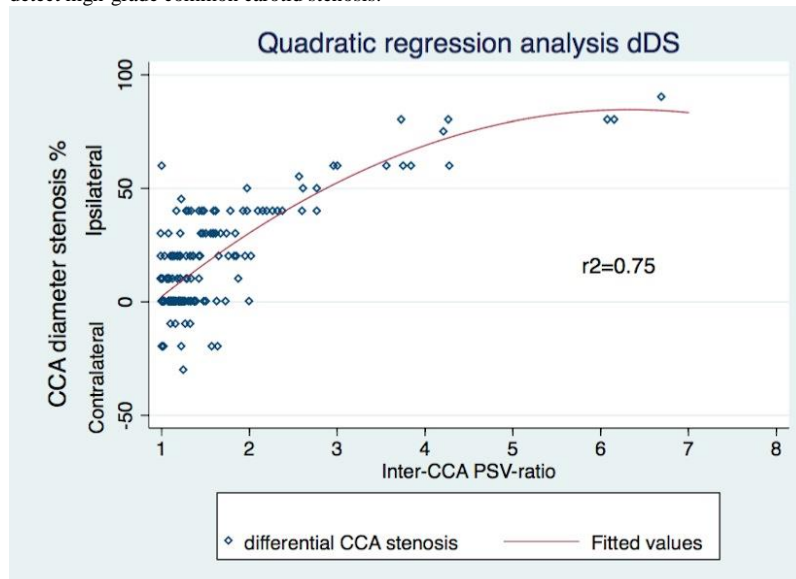
OBJECTIVES: Screening for common carotid artery (CCA) stenosis with duplex ultrasound (DUS) velocity criteria alone, can be limited due to within-patient and between-patients hemodynamic variability. This study aims to evaluate inter-CCA velocity ratio criteria to predict high-grade CCA stenosis.

METHODS: Retrospective review of consecutive patients who underwent computed tomography angiography (CTA) and DUS peak-systolic velocity (PSV) measurements of bilateral CCA, independently recorded, between 2008-2014. Patients with dampened CCA waveforms on DUS, readily indicating high-grade proximal stenosis, consisted group B. The remainder without dampened waveforms constituted group A. Inter-CCA PSV-ratios were calculated by dividing the higher CCA PSV to the lower one of the other side, so the ratios would always be >1. Ratios were subsequently paired with each respective unilateral CCA diameter stenosis (uDS) and differential bilateral CCA diameter stenosis (dDS). A quadratic regression model was fitted to predict uDS and dDS. Receiver operating characteristic (ROC) curve was used to determine optimal ratios for $\geq 50\%$ CCA stenosis. The study excluded patients with carotid artery occlusion.

RESULTS: From total 174 patients, 167 patients were included in group A and 7 in group B. In group A, 31 patients had $\geq 50\%$ uDS and seventeen $\geq 50\%$ dDS. All stenoses $\geq 50\%$ were identified on the same side with the higher PSV. Inter-CCA PSV-ratio predicted $\geq 50\%$ uDS ($r^2=0.57$, $P<.0001$) and dDS ($r^2=0.75$, $P<0.0001$). In group B, all patients had $\geq 60\%$ stenosis that involved the vessel origin. An increasing inter-CCA PSV-ratio showed a trend towards contralateral high-grade stenosis ($r^2=0.54$, $P=0.06$). ROC curves for $\geq 50\%$ uDS showed optimal threshold CCA ratio ≥ 1.96 with 93% accuracy, 75% sensitivity and 97% specificity (area under curve= 0.857; 95% CI, 0.755-.958) and for $\geq 50\%$ dDS ratio ≥ 2.62 with 97% accuracy, 82% sensitivity and 99% specificity (area under curve= 0.938; 95% CI, 0.828-1).

CONCLUSIONS: Duplex ultrasound based common carotid peak-systolic velocity ratio can accurately predict unilateral and differential high-grade common carotid stenosis. Also, in patients with dampened waveforms it implied contralateral severe proximal stenosis. This parameter should be further validated in prospective studies and is a promising adjunct screening tool to detect high-grade common carotid stenosis.

Abstract Body:



Presentation Number: 14

Publishing Title: National Variation in Preoperative Imaging, Duplex Ultrasound Criteria, and Intervention Threshold for Asymptomatic Carotid Artery Stenosis

Edward J. Arous, MD¹, Jessica P. Simons, MD MPH¹, Julie M. Flahive, MS¹, Adam W. Beck, MD², David H. Stone, MD³, Andrew W. Hoel, MD⁴, Louis M. Messina, MD¹, Andres Schanzer, MD¹.

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OBJECTIVES: Carotid endarterectomy (CEA) for asymptomatic carotid stenosis is among the most common procedures performed in the United States. However, there is lack of consensus regarding optimal preoperative imaging, carotid duplex ultrasound criteria, and ultimately, threshold for surgery. We sought to identify national variation in preoperative imaging, duplex ultrasound criteria, and surgical intervention threshold for asymptomatic CEA.

METHODS: The Society for Vascular Surgery Vascular Quality Initiative (VQI) database was used to identify all CEA procedures performed for asymptomatic carotid artery stenosis between 2003 and 2014. VQI currently captures 100% of CEA procedures performed at over 270 centers by over 2,000 physicians nationwide. Three analyses were performed to quantify the variation in 1) preoperative imaging modality, 2) duplex ultrasound criteria, and 3) degree of stenosis threshold used for CEA.

RESULTS: Of 35,695 CEA procedures in 33,488 patients, 19,610 (55%) were performed for asymptomatic disease. The preoperative imaging modality varied widely with 53% of patients receiving a single imaging study (Duplex Ultrasound 41%, CT-Angiography 8.3%, MR-Angiography 2.5%, Cerebral Angiography 1.1%) and 47% receiving multiple preoperative imaging studies. Of the 16,997 (87%) asymptomatic patients who underwent a preoperative duplex ultrasound, there was significant variability between centers in the degree of stenosis (50-69%, 70-79%, 80-99%) designated for a given peak systolic velocity, end diastolic velocity, and ICA:CCA ratio. While the majority of asymptomatic CEA procedures were performed for an 80-99% stenosis (68% of patients), 26% were for a 70-79% stenosis, and 4.1% were for a 50-69% stenosis. At the center level, institutions range in the percent of CEA procedures performed for a <80% asymptomatic carotid artery stenosis from 2.8% to 86%. At the surgeon level, surgeons range in the percent of CEA procedures performed for a <80% asymptomatic carotid artery stenosis from 0.6% to 88%.

Abstract Body:

CONCLUSIONS: Despite CEA being an extremely common procedure, there is widespread variation in the three primary determinants - preoperative imaging, duplex ultrasound criteria, and treatment threshold - of whether CEA is performed for asymptomatic carotid stenosis. The observed variation likely has significant downstream effects that influence health care quality and health care costs, which may be improved with increased standardization of care.

Tuesday, March 31st

Scientific Session IV – Practice Management and Quality Improvement

Presentation Number: 15

Publishing Title: A New Era in Vascular Surgery Inpatient Care: Results of a Vascular Surgeon-Hospitalist Co-Management Service

Author Block: **Rami O. Tadros, MD**, Peter L. Faries, Rajesh Malik, Ageliki G. Vouyouka, Windsor Ting, Andrew Dunn, Michael L. Marin, Alan Briones.

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OBJECTIVES: Vascular surgery patients have increased medical co-morbidities that amplify the complexity of care. We aim to assess the impact of a hospitalist co-management service (HCS) on inpatient vascular surgery outcomes.

METHODS: 1059 patients were divided into two cohorts for comparison: 515 between January, 2012 and December, 2012 prior to the implementation of a HCS, and 544 between January, 2013 and October, 2013 after the initiation of a HCS. Nine vascular surgeons and ten hospitalists participated in the HCS. Endpoints measured were in-hospital mortality (IHM), length-of-stay (LOS), 30-day readmission rates (RAR), 0-10 visual analog scale pain scale scores, in-patient adult safety assessments using the Agency for Healthcare Research and Quality (AHRQ) Patient Safety Indicators (PSI), and resident perceptions assessed by survey.

Abstract Body: **RESULTS:** The IHM rate decreased from 1.75% to 0.37% after the implantation of the HCS, $p=0.016$, with a decrease in the observed: expected (O:E) ratio from 0.89 to 0.22. The risk adjusted IHM decreased from 1.56% to 0.0008%, $p=0.003$. Mean LOS was lower in the base period, 5.1 days vs. 5.5 days, $p<0.001$, with an O:E ratio of 0.83 and 0.78, respectively. The risk adjusted LOS increased from 4.2 days to 4.3 days, $p<0.001$. The overall 30-day RAR was unchanged, 23.1% compared to 22.8%, $p=0.6$. The related 30-day RAR was also similar, 11.5% compared to 11.4%, $p=0.5$. Patients reporting no pain during hospitalization increased from 72.8% prior to the HCS to 77.8% after, $p=0.04$. Reports of moderate pain decreased from 14% to 9.6%, $p=0.016$. Mild and severe pain scores were similar between the two groups. Adult safety measured by AHRQ demonstrated a decrease in the number of deaths among surgical patients with treatable complications from 3 to 0 patients, $p=0.04$. Most house staff reported that the co-management program had a positive impact on patient care and education.

CONCLUSIONS: The hospitalist co-management service has resulted in a significant decrease in in-hospital mortality rates, improved patient safety as measured by AHRQ, and lower pain scores. Resident surveys demonstrated perceived improvement in patient care and education. Continued observation will be necessary to assess the long-term impact of the HCS on quality metrics.

Presentation Number: 16

Publishing Title: Improved Access to Healthcare in Massachusetts after 2006 Massachusetts Healthcare Reform is Associated with a Significant Decrease in Mortality among Vascular Surgery Patients

Author Block: **Mohammad H. Eslami, MD¹**, Denis V. Rybin, MS², Gheorghe Doros, PhD², Alik Farber, MD¹.

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OBJECTIVES: Timely access to care is directly impacted by insurance coverage and affects outcomes after vascular procedures. We evaluated trends of in-hospital mortality (IHM) for index vascular procedures so as to assess the effects of 2006 Massachusetts (MA) Healthcare Reform (MHR) on the mortality trends.

METHODS: National Inpatient Sample (2003-2011) was queried to identify surgical patients with peripheral arterial disease, carotid stenosis and abdominal aorta aneurysm based on ICD-9CM diagnostic and procedure codes. The cohort was then divided into MA and non-MA (NMA) based on the location of the hospital. Two time intervals, 2003-2006 (P1) and after 2006 (P2) were selected for comparisons. The patients at MA and NMA hospitals were described in terms of demographic characteristics and presentation by time interval (P1 vs. P2) and compared using Chi-Square and T-test. Weighted logistic regression with a term modeling change in the odds ratio (OR) for second time interval was used to test and estimate trends in mortality and to compare MA and NMA trends.

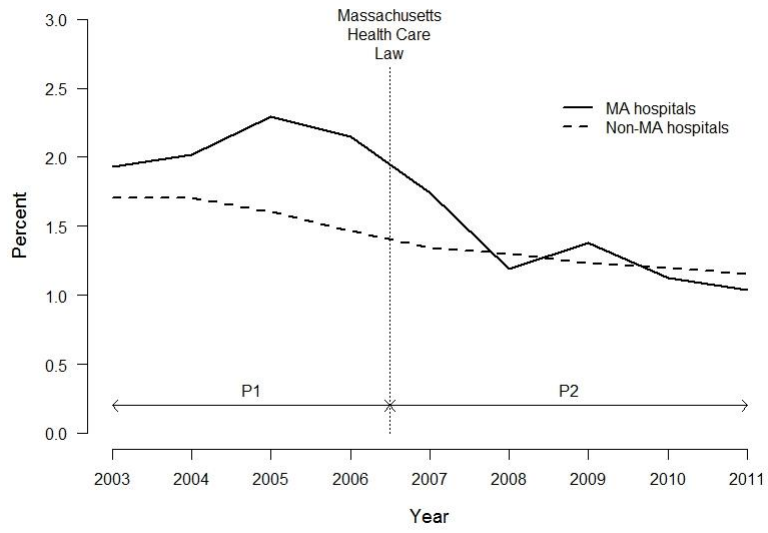
RESULTS: We identified 306,438 patients operated on for PAD, CS and AAA. MA and NMA cohorts were similar with a significant increase in Elixhauser comorbidity index in P2 (vs. P1) in both cohorts (p<0.001). Mortality trends are depicted in Figure 1. There was a significant decline in IHM for all vascular patients during both time intervals, although no significant difference in the rate of decline was noted (Table). There was no significant difference in IHM trends in P1 between MA and NMA; however, a significantly higher decrease in IHM was noted in MA compared to NMA in P2 (the annual odds ratio of IHM differ by 18%, p=0.010).

CONCLUSIONS: Overall a significant decrease in IHM for all vascular procedures was noted in the US. The decline in postoperative IHM was significantly more rapid in MA after 2006 compared to NMA sample. This study suggests that better access to care in MA may be a cause of this decline in IHM.

Abstract Body:

Annual change in In-hospital Mortality after Vascular Operations				
Contrast	Odds Ratio	95% Confidence Interval	p Value	
Overall Annual Change:				
	2003-2006 (P1)	0.93	0.90, 0.97	<0.001
	2007-2011 (P2)	0.95	0.93, 0.97	<0.001
P2 vs. P1	1.02	0.96, 1.08	0.569	
MA Annual Change:				
	P1	1.05	0.85, 1.29	0.648
	P2	0.78	0.67, 0.91	0.001
P2 vs. P1	0.74	0.56, 0.99	0.043	
Non-MA Annual Change:				
	P1	0.93	0.90, 0.97	<0.001
	P2	0.95	0.93, 0.98	<0.001
P2 vs. PA	1.03	0.97, 1.09	0.405	
MA vs. Non-MA (P1)	1.13	0.92, 1.39	0.260	
MA vs. Non-MA (P2)	0.82	0.70, 0.95	0.010	

Mortality (moving average)



Presentation Number: 17

Publishing Title: Integrated Vascular Surgery Residency: A Look at ERAS Applicant Numbers and NRMP Match Outcomes

Author Block: Malachi G. Sheahan, MD, Jacob Bray, MD, Claudie Sheahan, MD, Jodi Gerdes, MD, Estela Brooke, MD, Tapash Palit, MD, Bruce Torrance, MD, Robert Batson, MD, Larry H. Hollier, MD.
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OBJECTIVES: In 2007 the ACGME granted accreditation to three vascular surgery integrated residencies. This number grew to 44 programs offering 51 positions by the 2014 Match. In this study, we sought to identify the top U.S. domestic medical schools guiding seniors into 0+5 vascular surgery programs and ascertain which characteristics of their faculty and curriculum might be responsible for fostering this interest.

METHODS: Every U.S. medical school and its associated surgery department was queried between January 2 and February 26, 2014. Twenty-one data points were collected including specialty of the surgery department chair, number of vascular surgeons on staff, and option for a third year vascular surgery (VS) clerkship. Electronic Residency Application Service (ERAS) and National Residency Matching Program (NRMP) databases were accessed and queried. Data regarding number of integrated vascular applicants from each medical school was obtained by special request directly from ERAS.

RESULTS: Between 2007 and 2014, 505 students applied to an integrated vascular residency via the NRMP (Table 1) while ERAS reports 1476 applicants during the same time period. Out of the 138 U.S. medical schools, 119 (86%) had at least one graduating senior apply through ERAS to a vascular 0+5 program. U.S. graduating seniors from the top ten schools provided 21% (107/512) of the total applicants during these years. The presence of an integrated training program ($P=.005$) and a VS clerkship ($P<.05$) correlated with a higher number of applicants to 0+5 programs. Conversely, having a vascular surgeon as the department head for general surgery was a negative predictor of student applications to 0+5 vascular programs ($P=.005$, $OR=0.15$, 95% $CI .04-.56$).

RESULTS: This study emphasizes the need to foster medical student interest in vascular surgery through formal VS clerkships, mentorship, and targeting information about the 0+5 pathway to schools producing a lower number of applicants. The negative correlation between integrated vascular applicants and vascular surgeons serving as general surgery department chairs may be related to the latter's preference for the traditional 5+2 pathway.



Abstract Body:

	# of Programs	# of Positions	Positions Filled	Total App.	US Grad. App.	IM Grad. App.	App. per Position	US Grad App. per Position
Year								
2007	3	4	4	N/a	N/a	N/a	N/a	N/a
2008	7	9	9	31	21	10	3.4	2.3
2009	17	19	19	66	32	34	3.5	1.7
2010	20	22	21	72	39	33	3.3	1.8
2011	27	30	29	80	47	33	2.7	1.6
2012	35	41	41	82	55	27	2.0	1.3
2013	39	46	45	84	49	35	1.8	1.1
2014	44	51	46	90	48	42	1.8	0.9

**Presentation
Number:** MP10

**Publishing
Title:** Risk-Modifying Medication Prescription and Compliance in Vascular Surgery Patients

Author Block: **Ahmed Kayssi, MD MSc MPH.** George Oreopoulos, MD MSc, Leonard Tse, MD MASc, Barry B. Rubin, MD CM PhD,
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OBJECTIVES: Despite strong evidence for the role of risk-modifying (RM) medications in the management of vascular disease, the extent to which vascular surgeons are involved in prescribing and monitoring the effects of these medications on their patients is unclear. The goals of this study were to describe the pre-operative RM medication profile of the vascular surgery patients at a major Canadian vascular tertiary care center, assess the impact of a hospital admission on a vascular surgery patient's RF medication profile, and to evaluate the compliance of vascular surgery patients with RF medications post-discharge.

METHODS: A retrospective database review was carried out of all vascular surgery patients treated at our institution between August 2011 and February 2013. Baseline demographics and co-morbidities as well as pre- and post-hospitalization medication profiles were analyzed. Descriptive statistics and regression analysis were used to study the effect of a hospital admission on RF prescription patterns and compliance.

**Abstract
Body:**

RESULTS: Five-hundred and eighty-five patients were identified in our database review (75% male, average age 70.8 ± 9.8 years). Most patients were on aspirin (ASA) (73%), a statin (77%), or a beta-blocker (52%) pre-operatively. The average stay in hospital was 7.7 ± 11.9 days and most patients (67%) were admitted for elective surgery. Of the patients who were not on ASA, a statin, or a beta-blocker pre-operatively, only 50%, 43%, and 29% were started on those medications after undergoing surgery, respectively. Factors significantly associated with being started on ASA, a statin, or a beta-blocker included discharge to a rehabilitation or long-term facility rather than home, and being on multiple medications pre-admission. Length of stay was also significantly associated with being started on a beta-blocker in hospital. The type of surgery that the patients underwent was not associated with being started on a RM medication. Three-hundred and forty-five (59%) patients followed-up with their surgeon within the first year post-discharge. Patients were more likely to be compliant with a RM medication in follow-up if they were already taking that medication before admission (ASA: 86% vs. 75%, Statin 94% vs. 89%, Beta-blocker 86% vs. 64%).

CONCLUSIONS: Our findings suggest that admission to a hospital generally improves RM medication prescription patterns. Future initiatives are needed to improve post-operative RM prescription patterns and medication compliance among vascular surgery patients.

Presentation Number: MP11

Publishing Title: Prognostication of Ruptured Abdominal Aortic Aneurysm Repair Using an Artificial Neural Network

Author Block: Eric S. Wise, MD, Kyle Hocking, PhD, Colleen Brophy, MD
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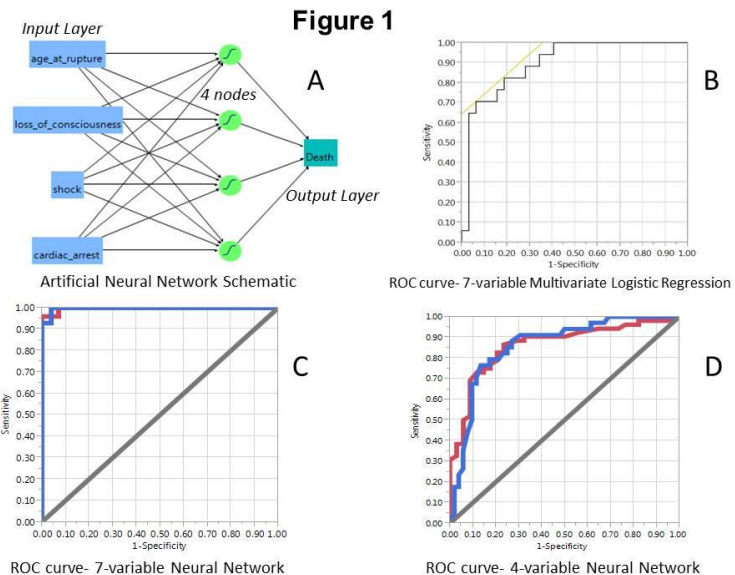
OBJECTIVE: First responders attending to ruptured abdominal aortic aneurysm (rAAA) patients relay pertinent information to anticipating providers prior to hospital transfer. Early identification of characteristics portending a poor outcome may prevent unnecessary operations and provide improved prognostic information. Artificial neural networks (ANN) are advanced, continually adapting computational systems taught to identify complex non-linear relationships among variables correlated with an outcome, with superior discriminant ability. Using ANN methodology, this study modeled in-hospital mortality after rAAA repair as a function of independent pre-operative predictors. We then developed a simplified ANN in which only variables most easily obtained prior to patient arrival can be used to accurately predict in-hospital mortality.

METHODS: 125 patients from 1998-2013 who had rAAA repair were reviewed for factors correlated with in-hospital mortality. Seven variables were significant in multivariate regression analysis (MRA); these variables were input into a computational ANN. Four of the pre-operative variables: age, shock, GCS <15 and cardiac arrest, chosen for their simplicity and ease of availability, were input into a second ANN (ANN-4, Figure 1A). MRA and ANN models were compared against the Glasgow Aneurysm Score (GAS). Models were assessed with a validation cohort, and by ROC-curve generation, with area under the curve (AUC) as the primary measure of each model's discriminant ability.

RESULTS: Of the 125 patients, 53 (42%) did not survive to discharge. Seven pre-operative factors were significant ($P < .05$) independent predictors of mortality: age, elevated lactate, myocardial disease, acute or chronic renal failure, GCS <15, cardiac arrest and shock. After modeling these seven factors via MRA and ANN, the generated AUC's were 0.8971 ± 0.06 and 0.9971 ± 0.004 (Figures 1B and 1C), respectively. In ANN-4, the AUC values were 0.8617 ± 0.06 (Figure 1D) and 0.9259 ± 0.05 in training and validation cohorts, respectively. Using an ANN output > 0.5 for predicted death, ANN-4 discriminated with 86.5% sensitivity and 76.5% specificity. GAS fits the dataset with an AUC of 0.7666 ± 0.06 .

CONCLUSION: ANN modeling represents a novel adjunct to the surgeon's clinical judgment in rAAA patient management. Patients known to be elderly, in shock, requiring CPR and with GCS <15 may represent a cohort for whom attempted repair of

Abstract Body:



rAAA carries little survival benefit.

Presentation Number: MP12

Publishing Title: Changing Practice Pattern for Arterial Intervention: Growth and Safety of Office Based Procedures

Author Block: Krishna jain, MD, John Munn, MD, Mark Rummel, Dan Johnston, Syed Alam, Chris Longton, RN
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INTRODUCTION: Traditionally, peripheral arteriograms and subsequent interventions if needed were carried out in a hospital and many patients stay overnight. With increasing frequency there is a movement towards managing these patients in the office. We have been performing percutaneous arterial procedures in the office since 2007. We wanted to analyze practice pattern between hospital and the office by our group. We also hypothesized that it is safe to do these procedures in office.

MATERIAL AND METHODS: Peripheral arterial procedure carried out in the office and the hospital between May 22, 2007 and July 31, 2014 were reviewed. Number and type of procedures in the 2 settings were identified. Office patients were divided in two groups. Group 1 had arteriogram only; Group 2 had arteriogram and intervention. Use of heparin during procedure, use of closure device, and size of sheath were recorded. In patients who had a complication, indication for the procedure, type of complication and management were recorded. Thirty day mortality and limb loss were recorded.

Abstract Body: **RESULTS:** During this period 1077 procedures were carried out in hospital as compared to 1290 in the office. Prior to then no cases were done in the office. In office procedures combined complication rate was 17/1290 (1.3%). Complication rate in group 1 was 4/697(0.6%) and in group 2 it was 13/593 (2.2%) not statistically significant $p=0.125$. In both groups combined 10 patients needed operative intervention: repair of artery 6, revision of bypass 2, embolectomy 1, and thrombin injection in pseudo aneurysm 1. Seven patients not needing an operation had retroperitoneal hematoma 6, cellulitis 1. Indications in patients who had complication were Claudication 11, stenosis of previous bypass 5, and rest pain 1. There was one death after brachial artery angioplasty because of multisystem failure. In 6/17 patients a closure device was used. Only patients in group 2 were heparinized. Commonest sheath used was 6 Fr (6), 5Fr (4), 4 Fr (3), 7 Fr (1). There was no limb loss.

CONCLUSION: More than half of all percutaneous interventions can be shifted to the office with satisfactory safety. With the growing concept of "endovascular first" more cases may migrate to the office. This may result in decreased health care costs and better use of strained hospital resources.

Presentation Number: MP13

Publishing Title: Impact of Trainee Participation on Perioperative Outcomes of Aortic Aneurysm Repair

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OBJECTIVE: The reported impact of trainees on major surgical procedures has been variable. Our goal was to assess the effect of involvement of senior residents and fellows on perioperative outcomes after endovascular (EVAR), open infrarenal (OJAR), and open juxtarenal aortic aneurysm repair (OJAR).

METHODS: Patients undergoing EVAR, OJAR, and OJAR were identified in the National Surgical Quality Improvement Program (NSQIP) from 2005-2012. Patient characteristics of attendings with and without trainee (PGY 4 and higher) were compared. To compare outcomes, 1:1 propensity matching based on clinically important and significantly different at 0.2 level factors and multivariable analyses adjusting for the same factors were used.

RESULTS: There were 16,977 patients identified - 12003 EVAR, 3655 OJAR, and 1319 OJAR. Case coverage was 48% attending only (AO), 25% senior resident (SR), and 37% fellow. Comparing to AO patients, EVAR patients with fellows and SR were more likely to be attended by vascular surgeons (VS) (98% vs. 95%), non-Caucasian (9% vs. 7%), functionally dependent (5% vs. 4%), emergent (7% vs. 5%), had a recent MI (1.4% vs. 1%), and ESRD (1.5% vs. 1%); OJAR patients - more likely to be attended by VS (98 vs. 92%), functionally dependent (15% vs. 11%), had ruptured aneurysm (22% vs. 18%); OJAR patients - more likely to be attended by VS (98% vs. 93%), but less likely ruptured (11% vs. 19%) and with ESRD (1% vs. 3%) (P<.01). Propensity matching and multivariate analysis showed that trainee involvement for EVAR was associated with increased operative time (Means Ratio 1.16, 95% CI 1.12-1.18, P<.01) (173 vs. 149 min). For OJAR and OJAR there was an increase in bleeding complications (OR 1.2, 1.03-1.5, and OR 1.4, 1.06-1.9, P<.01), operative time (Means Ratio 1.18, 1.15-1.2, P<.01 and 1.28, 1.22-1.35, P=.01) (217 vs. 186 min and 265 vs. 213 min), and length of stay (Means Ratio 1.15, 1.09-1.2 and 1.11, 1.02-1.21 P=.01) (median 8 vs. 7 days). There was no significant increase in death, cardiac, pulmonary, renal, septic, or wound complications.

Abstract Body:

CONCLUSION: Trainee involvement is associated with increased operative time for EVAR, OJAR, and OJAR. Furthermore, in OJAR and OJAR trainee involvement is associated with bleeding complications and increased LOS. However, despite this, there is no significant difference in perioperative mortality or morbidity across organ systems.

Presentation Number: MP14

Publishing Title: Unplanned Reoperations following Vascular Surgery

Author Block: **Hadiza Kazaure, MD,** Venita Chandra, MD, Matthew W. Mell, MD, MS
Stanford University, Stanford, CA

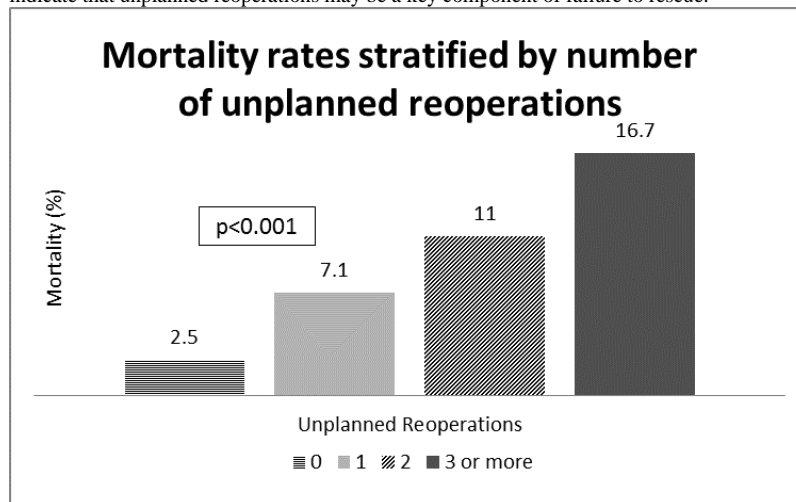
OBJECTIVE: Existing literature on unplanned reoperation after vascular surgery is limited. We characterize the frequency and reasons for 30-day unplanned reoperation after vascular surgery.

METHODS: Recipients of vascular procedures in ACS-NSQIP (2012) were abstracted. Unplanned reoperations, captured by a distinct variable now available in the dataset, and their association with readmissions and mortality were analyzed using bivariate and multivariate methods.

RESULTS: Among 35,106 patients in the cohort, 3,545 unplanned reoperations were performed on 2,874 patients. The overall unplanned reoperation rate was 10.1%. Among patients who underwent unplanned reoperations, approximately 80.4%, 15.8% and 3.8% had 1, 2 and ≥ 3 reoperations respectively; 39.4% of all unplanned reoperations occurred after discharge. Median time to unplanned reoperation was 7 days. Index procedures with the highest reoperation rates were open PVD procedures (38.8%), embolectomy (18.2%), and abdominal bypass (14.4%). The most common unplanned reoperations were incision and drainage, debridement, proximal limb amputations, thrombectomy, and re-exploration for bleeding. Patients with unplanned reoperations had higher rates of readmission (41.8% vs. 7.0%, $p < 0.001$) and mortality (8.0% vs. 2.5%, $p < 0.001$) than those not receiving unplanned reoperations. Mortality increased significantly with each subsequent procedure (Figure). Unplanned reoperation after open AAA repair, TEVAR, and EVAR had the highest mortality rates (23.1%, 22.7%, and 15.8%, respectively). After multivariate adjustment, factors independently associated with unplanned reoperations included emergent procedure (OR: 1.5, 95% CI 1.3 - 1.8), dialysis dependence (OR: 1.5; 95% CI: 1.3 - 1.8), and the presence and timing of a complication relative to discharge. Compared to patients without complications, unplanned reoperation was more likely associated with post-discharge complications (OR: 7.8, 95% CI 6.7-9.1) than inpatient complications (OR: 3.9, 95% CI: 3.5-4.3). Unplanned reoperation was independently associated with mortality in an incremental fashion (OR: 2.0, 95% CI 1.7-2.5 for 1 unplanned reoperation; AOR: 3.1, 95% CI: 2.2-4.2 for ≥ 2 unplanned reoperations).

CONCLUSIONS: Recipients of vascular surgery frequently undergo unplanned reoperations within 30 days of surgery. Unplanned reoperations are associated with both inpatient and post-discharge complications, and result in increased mortality. These findings indicate that unplanned reoperations may be a key component of failure to rescue.

Abstract Body:



Presentation Number: MP15

Publishing Title: Inaccurate Coding of Non-Invasive Tests May Call Into Question Clinical and Policy Recommendations Based on Administrative Databases

Author: Michael R. Go, MD, Brent Veerman, Loren Masterson, MD, Bhagwan Satiani, MD, M.B.A..

Block: The Ohio State University, Columbus, OH

OBJECTIVES: To curb increasing volumes of diagnostic imaging and costs to Medicare, reimbursement for carotid duplex ultrasound (CDU) is dependent on appropriate indications as documented by International Classification of Diseases (ICD) codes entered by ordering physicians. In our vascular laboratory, we have noted an increased need to discuss incorrect or inappropriate ICD codes with ordering physicians. We therefore sought to analyze the accuracy of ICD coding by identifying the rate of positive CDU for each indication. We hypothesized that symptomatic indications would yield a higher rate of positive CDU than asymptomatic or non-specific indications.

METHODS: We reviewed all CDU done on Medicare out-patients in 2011 at our institution. ICD codes and CDU findings categorized as positive (> 50% stenosis) or negative (< 50% stenosis) were recorded. Each individual ICD code as well as group 1 (asymptomatic), group 2 (non-hemispheric symptoms), group 3 (hemispheric symptoms), group 4 (preoperative cardiovascular exam), and group 5 (non-specific) ICD codes were analyzed for correlation with CDU results.

RESULTS: 994 Medicare patients had 74 primary ICD codes listed as indications for CDU. The 13 highest frequency ICD codes were analyzed; five codes were associated with positive CDU (Table). Patients in group 1 (asymptomatic) were significantly more likely to have a positive CDU compared to each of the other groups and to all other groups combined ($P < .00001$). Group 2 (non-hemispheric symptoms) patients were also more likely to have a positive CDU compared to all other groups combined ($P < .0073$).

CONCLUSIONS: Both asymptomatic and non-hemispheric indications by ICD codes yielded a higher rate of positive CDU than symptomatic indications. While other explanations may also be possible, these findings are inconsistent with clinical experience and historical data. We suggest that inaccurate coding, either inadvertent or to obtain desired testing, may play a role. Erroneous or ambiguous ICD coding may degrade the testing efficiency of CDU. Clinical studies and policy recommendations on reimbursement based on administrative databases must be viewed with caution unless validated with audits by clinical personnel.

Abstract Body:

433.10	Occlusion and stenosis of carotid artery without mention of cerebral infarction (asymptomatic)	$P < .001$
435.9	TIA unspecified	$P < .006$
780.2	Syncope and collapse	$P < .004$
780.4	Dizziness and giddiness	$P < .032$
782	Disturbance of skin sensation (anesthesia of skin, burning or prickling sensation, hyperesthesia, hypoesthesia, numbness, paresthesia, tingling)	$P < .022$
368.9	Unspecified visual disturbance	ns
414.02	Coronary atherosclerosis of autologous vein bypass graft	ns
424	Mitral valve disorders	ns
434.91	Cerebral artery occlusion, unspecified with cerebral infarction	ns
435.8	Other specified transient cerebral ischemias	ns
436	Acute, but ill-defined, cerebrovascular disease	ns
785.9	Other symptoms involving cardiovascular system (carotid bruit)	ns
V72.81	Preoperative cardiovascular exam	ns

Presentation Number: MP16

Publishing Title: Multidisciplinary Approach to Vascular Surgery Coding Improves Coding Accuracy and Revenue Capture

Author Block: **Francesco A. Aiello, MD¹**, Dejah Judelson, MD¹, Jeffrey Indes, MD², Sareh Rajaei, MD², Louis Messina, MD¹, Gordon Fitzgerald, PhD¹, William Robinson, III, MD¹, Danielle Doucet, MD¹, Jessica Simons, MD¹, Andres Schanzer, MD¹.

¹University of Massachusetts, Worcester, MA, ²Yale University, New Haven, CT

OBJECTIVES: Determine if a multidisciplinary approach to coding fistulagrams utilizing vascular surgeons and coders will improve coding accuracy and revenue capture.

METHODS: This prospective observational study evaluates coding accuracy of fistulagrams at two large academic institutions (A and B). All fistulagrams were coded by hospital coders (traditional coding) and a single vascular surgeon whose codes were reviewed and verified by two coders at each institution (multidisciplinary coding). Both coding methods were compared and differences were translated into revenue (\$) and work relative value units (wRVUs) using Medicare physician fee schedule. Comparison between traditional coding and multidisciplinary coding was performed for three discrete study periods at institution B: baseline (Period 1), after coding education session alone (Period 2) and after coding education plus implementation of operative note dictation template (Period 3). Accuracy of surgeon operative dictations were also assessed over each study period.

RESULTS: During Period 1, traditional coding showed an 11% (p=0.007) loss in revenue and 12% (p=0.01) loss in wRVU generation at Institution A compared to multidisciplinary coding. At Institution B, traditional coding resulted in a 4.5% (p=0.004) loss in revenue and 5.5% (p=0.01) loss in wRVUs. During Period 2 at Institution B, there was no significant difference between traditional and multidisciplinary coding in revenue (1.3%, p=0.24) or wRVU generation (1.8%, p=0.20). During Period 3, traditional coding yielded a slightly higher overall revenue (1.3%, p=0.26) compared to multidisciplinary coding. This, however, was due to a 3.7% coding error by hospital coders with one missed code and five inappropriately used codes resulting in a higher overall reimbursement which was inaccurate and subsequently corrected. Assessment of physician documentation showed improvement over each study period with decreased documentation errors (11% vs. 3.1% vs. 0.7%, p=0.02) at each interval. Overall, comparison of traditional coding between periods 1 and 3 revealed improvements in revenue per-case (\$17.63/case, p=0.004) and wRVUs(0.50/case, p=0.01).

CONCLUSIONS: The use of a multidisciplinary coding system resulted in more accurate coding of fistulagrams with significant improvement in revenue and wRVU generation. If multidisciplinary coding across other endovascular procedures could yield similar improvements, this coding methodology would result in substantial increases in revenue capture.

Abstract Body:

need picture

Presentation Number: MP17

Publishing Title: Predictors of Mortality in Abdominal Aortic Aneurysm Repair for Nonagenarians: Analysis of the NSQIP Dataset

Author Block: **Jimmi Mangla, MD**, Christina Jenkins, MD, Mohsen Bannazahdeh, MD, Elizabeth Gates, RN, Graham W. Long, MD, O W. Brown.

William Beaumont Hospital, Royal Oak, MI

OBJECTIVE: Increased longevity and incidental detection of abdominal aortic aneurysms (AAA) on imaging for other causes have led to increased prevalence of clinically significant (> 4 cm) AAA in nonagenarians. Previous studies have reported outcomes of AAA repair in nonagenarians. However, these involved small cohorts and factors contributing to mortality were not quantified. Our objective was to analyze predictors of mortality among nonagenarians undergoing endovascular aortic aneurysm repair (EVAR) and open surgical repair (OSR).

METHODS: Nonagenarians who underwent AAA repair between January 2005 and December 2012 were identified using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) participant use data files.

Multivariate step-down logistic regression was used to identify predictors of 30-day mortality.

RESULTS: Of 642 nonagenarians who underwent AAA repair, 552 (86%) had EVAR and 90 (14%) had OSR. Eighty-three patients underwent emergent EVAR and fifty-five patients had emergent OSR. Overall 30-day mortality was 7.3% in EVAR versus 38.9% in OSR (Odds Ratio (OR) 8.15, $p < 0.0001$). Mortality in patients undergoing elective EVAR was significantly less than in those undergoing elective OSR (3.2% versus 16.1%, $p = 0.01$). Similarly, mortality in patients undergoing emergent EVAR was significantly less than those with emergent OSR. (31.6% versus 50.8%, $p = 0.03$). Preoperative predictive factors for 30-day mortality in a multivariate step-down logistic regression model (Table) included ventilator dependence, dependent functional status, OSR, and emergent repair. Postoperative acute renal failure and cardiac arrest were also predictive of 30-day mortality. This predictive model has a c-statistic of 0.88, indicating a strong association of predicted probabilities with observed outcomes.

CONCLUSIONS: Elective EVAR is associated with an acceptably low 30-day mortality rate in nonagenarians. If technically feasible, EVAR should be first line surgical therapy in nonagenarians with AAA in both elective and emergent situations. Factors predictive of mortality can be utilized in perioperative risk stratification and during the informed consent process in these very elderly patients.

Abstract Body:

Predictive Factors		Odds Ratio	p value
Preoperative	Emergent Repair	7.2	<0.0001
	Ventilator Dependence	4.9	0.031
	Open Surgical Repair	2.5	0.013
	Dependent Functional Status	2.3	0.023
Postoperative	Acute Renal Failure	36.9	<0.0001
	Cardiac Arrest	17.2	0.0007

Tuesday, March 31st

Scientific Session V – Potpourri

Presentation Number: MP18

Publishing Title: Comparative Occupational Radiation Exposure between Fixed and Mobile Imaging Systems

Author Block: Daniel Kendrick, MD, **Claire Miller, BS**, Elizabeth Kudlaty, MS, Henry Baele, MD, Pamela Moorehead, BS, Ann Kim, MD, Dave Jordan, PhD, Vikram S. Kashyap, MD.

University Hospitals Case Medical Center, Cleveland, OH

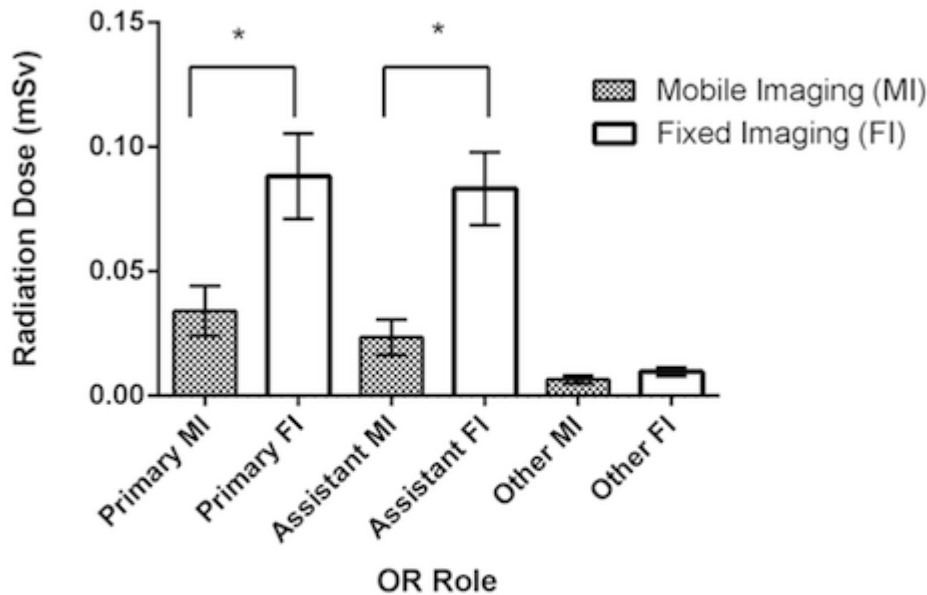
OBJECTIVES: Endovascular intervention exposes surgical staff to scatter radiation, which varies by procedure and imaging equipment. The purpose of this study is to determine differences in occupational exposure between procedures performed with fixed imaging (FI) in an endovascular suite compared to conventional mobile imaging (MI) in a standard operating room.

METHODS: A series of 116 endovascular cases were performed over a 4-month interval in a dedicated endovascular suite with FI and conventional operating room with MI. All cases were performed at a single institution and radiation dose was recorded using real-time dosimetry badges from Unfors RaySafe™. A dosimeter was mounted in each room to establish a radiation baseline. Staff dose was recorded using individual badges worn on the torso lead. Total mean Kar (mGy, patient dose) and mean case dose (mSv, scatter radiation) were compared between rooms and across all staff positions for cases of varying complexity. Statistical analyses for all continuous variables were performed using t-test and ANOVA where appropriate.

RESULTS: A total of 43 cases with MI and 73 cases with FI were performed by four vascular surgeons. Total mean Kar, and case dose, were significantly higher with FI when compared to MI. (mean ±SEM; 523 ±49mGy vs. 98 ±19 mGy; p<.00001; .77 ±.03 mSv vs. .16 ±.08 mSv, p<.00001). Exposure for both primary surgeon and assistant was significantly higher with FI compared to MI. Mean exposure for all cases using either imaging modality, was significantly higher for primary surgeons and assistant than for support staff beyond six feet from the X-ray source, indicated by one-way ANOVA (MI, p<.00001, FI, p<.00001). Support staff exposure was negligible and did not differ between FI and MI. Room dose stratified by case complexity (Kar) showed statistically significantly higher scatter radiation in FI vs. FI across all quartiles.

CONCLUSIONS: The generation of damaging scatter radiation is multiple-fold higher with FI than MI across all levels of case complexity. Dose exposure increases with proximity to the radiation source, and is negligible outside a six-foot radius. Modern endovascular suites allow high-fidelity imaging, yet additional strategies to minimize exposure and occupational risk are needed.

Abstract Body:



Radiation exposure compared by role and by imaging.

Mean exposure for primary surgeon (.088 ±.017mSv vs .034 ±.010mSv, p<.05), assistant (.083 ±.015mSv vs .024 ±.007mSv, p<.05), other (.006 ± .002 mSv vs .009± .002 mSv, NS). * denotes pvalue< 0.05.

Presentation Number: MP19

Publishing Title: Unexpected Relationship Between Obesity and the Risk of Vascular Disease

Author Block: **Caron Rockman, MD**, Yu Guo, BS, Glenn Jacobowitz, MD, Thomas Maldonado, MD, Mark Adelman, MD, Jeffrey Berger, MD. New York University Medical Center, New York, NY

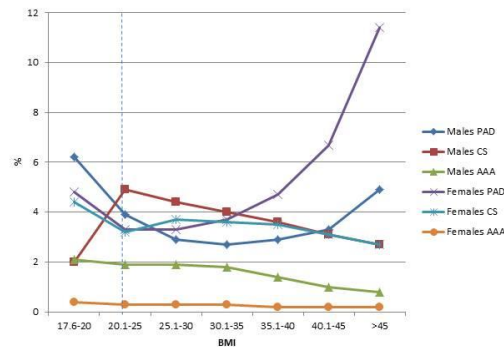
OBJECTIVES: Obesity is a risk factor for coronary artery disease. The relationship between obesity and peripheral vascular disease is not well-delineated. Our objective was to analyze the relationship between BMI and peripheral arterial disease (PAD), carotid artery stenosis (CS), and AAA in a large patient cohort.

METHODS: Subjects (N=3,588,946) who underwent voluntary vascular screening examinations were utilized. BMI was calculated from height and weight. PAD was defined as an ABI ≤ 0.9 ; CS as stenosis $\geq 50\%$; and AAA with aortic diameter ≥ 3 cm. Comorbidities were self-reported.

RESULTS: In univariate analysis among males, there was no consistent relationship between increasing BMI and either AAA or CS; the prevalence of PAD in males appeared to increase significantly only when the BMI was > 45 . Additionally, a low BMI of < 20.1 in men was associated with a marked increase in PAD as compared to males with normal BMI's. In univariate analysis among females, there was similarly no consistent relationship between increasing BMI and either AAA or CS; however, the prevalence of PAD among women appeared to increase significantly when the BMI was > 35 . Similar to males, a low BMI of < 20.1 was associated with an increase in the rates of PAD and CS as compared to females with normal BMI's. In multivariate analysis using a definition of obesity as a BMI ≥ 30 , obesity appeared to be mildly protective against the development of AAA and CS in both males and females, and against the development of PAD in men. Obesity was only demonstrable as an independent risk factor for PAD in women, with an Odds Ratio of 1.067 (95% Confidence Interval 1.051 - 1.084).

CONCLUSIONS: Mild to moderate obesity does not appear to represent a significant risk factor for either AAA or CS, and may be mildly protective. Moderate to severe obesity does appear to be associated with PAD in both sexes, particularly in women, but this was only found to be significant in multivariate analysis in females. A low BMI appears to be associated with an increased risk of PAD in both sexes, and CS in women.

Abstract Body:



**Presentation
Number:** MP20

**Publishing
Title:** Preemptive Non-selective Perigraft Aortic Sac Embolization with Coils (PNPASEC) to Prevent Type II Endoleak after Endovascular Aneurysm Repair (EVAR)

Habib Khan, MD¹, Mariel Rivero, MD², Raphael Blochle, MD², Linda M. Harris, MD², Maciej L. Dryjski, MD², **Hasan H.**

Author Block: Dosluglu, MD²

¹SUNY at Buffalo, Buffalo, NY, ²VA Western NY HCS, SUNY at Buffalo, Buffalo, NY

OBJECTIVES: Preemptive selective coil embolization of inferior mesenteric artery (IMA) and/or lumbar arteries (LA) as well as embolization of perigraft sac using coils and thrombin for prevention of type 2 endoleak (T2EL) has been described, but has not been adopted. T2EL is reported to increase 6 to 18-fold with increasing number of patent LA, IMA, and lumen diameter. We hypothesized that using preemptive non-selective perigraft aortic sac coil embolization (PNPASEC) at the time of graft insertion in patients with ≥ 4 patent LAs, IMA (≥ 3 mm) and ≥ 30 mm aortic patent lumen would decrease T2EL and compared T2EL rates before and after this approach was adopted.

METHODS: 210 patients underwent EVAR between 12/2001-03/2011 and 125 between 4/2011-2/2014. All but 2 meeting the above criteria in the second period had PNPASEC. In our technique, a separate wire is advanced into the sac after cannulating the contralateral gate, sheath is reinserted and graft deployment is completed with both iliac extensions. The contralateral sheath is reinserted over the wire in the sac, and a 5F catheter is advanced around the iliac limb into the sac. A 'sacogram' is performed and large coils are deployed until there is significant reduction or no flow. Wire/sheath are removed, sheath is reinserted and iliac limb is molded with the balloon before completion angiogram.

RESULTS: Nine PNPASEC were performed (8 EVAR, 1 FEVAR, all percutaneous). Mean aortic sac size was 60 ± 7 mm (53-73), mean lumen diameter 45 ± 11 mm (36-68mm), mean number of patent LAs 5.4 ± 0.7 (4-6); 3 had accessory renal arteries, and all had patent IMAs (4mm (3-5)). Sac diameter decreased or was stable in 8 cases (mean 15 month follow-up). T2EL with sac increase was seen in 16 (7.6%) in first period (14 underwent transarterial/translumbar coiling), and 3 (2.4%) in second period ($P=0.046$), 2 of whom met the criteria but did not have PNPASEC. The only failure in PNPASEC group (11%) had 2 accessory renal arteries and required transarterial coil embolization 23 months after EVAR. One of the remaining 2 had translumbar coil embolization 19 months after EVAR. The other died at 24 months of unknown causes and had refused treatment.

CONCLUSIONS: Selective use of PNPASEC with above-mentioned technique may be effective in preventing development of T2EL in carefully selected patients (7%) with high anatomic risk.

**Abstract
Body:**

**Presentation
Number:** MP21

**Publishing
Title:** Metabolic Syndrome Predicts High Risk Status for Vascular Surgery

Author Block: Trenton R. Foster, MD¹, Go Kuwahara, MD, PhD¹, Kota Yamamoto, MD, PhD¹, Roland Assi, MD¹, Clinton D. Protack, MD, PhD¹, Michael R. Hall, MD¹, Willis T. Williams, MD¹, Penny Vasilas, RN², Alan Dardik, MD, PhD¹

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OBJECTIVES: Metabolic syndrome increases the risk of cardiovascular events in patients with peripheral vascular disease.

However, the role of metabolic syndrome in predisposing towards postoperative complications after vascular surgery is poorly described. This study explores the effect of metabolic syndrome on adverse events after four commonly performed vascular surgical operations.

METHODS: The records of patients who underwent carotid endarterectomy (CEA) performed between 2004-2008, arteriovenous fistula creation (AVF) from 1999-2009, lower extremity amputation from 2005-2010, or endovascular abdominal aortic aneurysm repair (EVAR) from 2003-2011 at a single institution were reviewed. An adverse event was defined according to operation and includes: re-stenosis > 50% after CEA, AVF primary failure < 6 mo, non-healing of the amputation site requiring operative revision, or development of endoleak any time after EVAR. Metabolic syndrome (MetS) was defined as three or more of the following: blood pressure \geq 130/85 or on antihypertensive medication, serum triglycerides \geq 150 mg/dl, HDL \leq 40 mg/dl for men or \leq 50 mg/dl for women, fasting blood glucose \geq 110 mg/dl or on anti-hyperglycemic medication, or BMI \geq 27 kg/m².

**Abstract
Body:**

RESULTS: A total of 405 patients were included in the study. The average age was 69 years, 77% were white. Mean follow up was 3.9 years. 70% of patients had MetS. Baseline demographics were similar except that patients with MetS had statistically significant differences in mean triglyceride level of 198 vs 120 (p<0.0001), mean HDL level of 34 vs 48 (p<0.0001), hypertension was present in 97% vs 83% of patients (p<0.0001), diabetes present in 69% vs 22% (p = 0.0001), 27 in 75% vs 19% of patients (p<0.0001). Patients with MetS had an increased rate of adverse events, 46% versus 36% (p=0.049, Chi-Square). Of all factors examined, logistic regression showed MetS to be the most predictive independent factor for adverse events (OR 1.99, p = 0.01). There was no statistical significance in overall survival between patients with and without MetS (p = 0.75 Log-rank).

CONCLUSIONS: Metabolic syndrome is prevalent among patients undergoing vascular surgical operations. MetS is an independent risk factor for adverse events following these operations, suggesting that MetS is a factor identifying high risk patients after vascular surgery. Patients with MetS may require increased post operative surveillance or targeted treatment to reduce the rate of these events.

Presentation Number: MP22

Publishing Title: Clinical Judgment Remains the Most Important Tool in the Diagnosis of Neurogenic Thoracic Outlet Syndrome

Author Block: Colin P. Ryan, B.S.¹, Nicolas J. Mouawad, MD, M.P.H., M.B.A.², Patrick S. Vaccaro, MD, M.B.A.², **Michael R. Go, MD²**

¹The Ohio State University College of Medicine, Columbus, OH, ²The Ohio State University, Columbus, OH

OBJECTIVES: Diagnosis of neurogenic thoracic outlet syndrome (nTOS) can be difficult, yet appropriate patient selection is paramount to achieving good surgical outcomes. The utility of predictors of success including arterial Doppler studies (AD), nerve conduction velocities (NCV), electromyography (EMG), and physical therapy (PT) is unclear. We investigated whether preoperative AD, NCV, EMG, or PT predicted successful surgery.

METHODS: All patients undergoing surgery for nTOS at our institution from June 5, 2001 through December 31, 2013 were reviewed. Demographics, diagnostic workup details, and surgical outcomes were collected. Relief of symptoms was defined as complete (no residual symptoms), partial (improvement with some residual symptoms), temporary (initial improvement with relapse any time during follow-up), or none.

RESULTS: 121 first and/or cervical rib resections with scalenotomy/scalenectomy were performed on 93 patients for nTOS. 78.4% were female, mean age was 35.3, and mean follow-up was 54 weeks. 3.2% of patients had a family history of nTOS. 14% were athletes, 23.6% were unemployed or disabled, 29.0% were sedentary workers, and 30.1% performed frequent or repetitive overhead activity at work. Shoulder pain, numbness, and/or tingling were present in over 90% of cases while scalene tenderness was present in only 16.5%. In 40.5% of cases, patients were taking opioid medications preoperatively. Overall, complete or partial symptom relief occurred in 65.3% of cases. Preoperative AD was done in 44%, NCV and EMG in 53%, and PT in 95%. Test results as related to surgical outcomes are shown in Table I. EMG was associated with surgical outcome with statistical significance, but sample size was low; AD, NCV, and PT were not associated with surgical outcome.

CONCLUSIONS: In properly selected patients, surgery for nTOS offers acceptable success rates, but preoperative diagnosis remains difficult. In this retrospective contemporary series, outcomes of preoperative AD, NCV, and PT were not associated with symptom relief after surgery. Clinical judgment remains the most important tool in the diagnosis of nTOS.

Abstract Body:

Test (Total Number of Cases in which Test was Done)	Test Result	Complete or Partial Relief of Symptoms After Surgery (% of Complete or Partial Relief)	Temporary or No Relief of Symptoms After Surgery (% of Temporary or No Relief)	P
arterial Doppler (53)	+	29 (72.5)	10 (76.9)	1
	-	11 (27.5)	3 (23.1)	
NCV (64)	+	13 (32.5)	6 (25.0)	.5249
	-	27 (67.5)	18 (75.0)	
EMG (64)	+	8 (20.0)	0 (0.0)	.0207
	-	32 (80.0)	24 (100.0)	
physical therapy (115)	+	30 (40.0)	23 (57.5)	.0730
	-	45 (60.0)	17 (42.5)	

Presentation Number: MP23

Publishing Title: The Effect Anti-platelets and Statins on Peri-Operative and Long Term Outcomes in Dialysis Patients Undergoing Arterial Surgery

Author Block: **Trissa Babrowski, MD¹**, Randall R. DeMartino, MD, M.S.², Christopher L. Skelly, MD¹, Ross Milner, MD¹, Darwin Eton, MD¹, Robert C. Steppacher, Jr., MD¹.

¹University of Chicago, Chicago, IL, ²Mayo Clinic, Rochester, MN

OBJECTIVES: The incidence of peripheral arterial disease (PAD) is roughly twice that in patients with end-stage renal disease (ESRD) as compared to the general population. ESRD PAD presents challenges as the disease process is accelerated and response to treatment inferior than non-ESRD PAD. The benefits of medical management in PAD have been clearly demonstrated. However, less is known on the benefit of anti platelet (AP) and statin use in the ESRD PAD population. Our aim is to determine if the use of anti-platelet agents and statins have any effect on perioperative and long-term outcomes for patients with PAD and ESRD.

METHODS: Perioperative demographic and medication usage data from the Vascular Quality initiative (VQI) from 2005 to 2013 for ESRD patients undergoing open or endovascular aortic aneurysm repair, carotid endarterectomy, carotid stenting, and supra or infra-inguinal bypass was analyzed to determine the effect of medication utilization on cardiovascular morbidity long term mortality. The association between optimal medication utilization and mortality was determined using life table methods with Cox proportional hazards techniques.

RESULTS: A total of 1394 patients were included in the analysis. At two years, no significant difference in early or late cardiovascular morbidity or mortality was seen in ESRD PAD patients regardless of the use of AP and/or Statin. (Figure 1)

CONCLUSIONS: The use of AP and statin medications in the perioperative period do not affect mortality and cardiovascular morbidity in the ESRD PAD population as recorded in the VQI. Current evidence does not support routine use of these medications for risk reduction. Future research is warranted to see if any subgroup would benefit from more intensive medical treatment.

Abstract Body:

