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## Effects of Revision Surgery on Grade of Adverse Local Tissue Reaction Following Recall of a Modular Hip Implant

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**Background:** Health care systems continuously seek to improve patient care through population-level analysis of clinical quality metrics and patient characteristics to identify disparities in care. Nationally, disparities in colorectal cancer (CRC) screening rates have been identified with lower screening rates reported for patients who are uninsured and/or lower socioeconomic status, African American/black, Asian, and non-English-speaking Hispanic patients. No age-related CRC screening rate disparities with associated interventions have been reported.

**Purpose:** Determine and address CRC screening disparities in care provided to eligible patients > 50 years old in two primary care residency clinics.

**Methods:** Retrospective analysis using REAL-G (race, ethnicity, age, preferred language, gender) categories and insurance coverage was completed on a 12-month data set to identify presence of CRC screening disparities. Barriers to CRC screening for largest disparity gap were then identified by clinic staff at two family medicine residency clinics (a third primary care clinic in same zip code and service region were used for nonintervention comparison) using the Institute for Healthcare Improvement fishbone approach. The project team, informed by the literature, then identified and implemented targeted interventions, monitoring progress during a 6-month period. Interventions included provider education with periodic reminders regarding system-approved CRC screening options and a workflow-based intervention. Postintervention analysis was completed using same preintervention approach.

**Results:** The largest CRC screening disparity for region and clinics was associated with age, with screening gaps ranging from 13% to 15% between populations aged 50–54 years versus >65 years. CRC screening rate disparities by race, ethnicity, and gender were less than 10%. Postintervention, one targeted clinic had a 6% increase in the CRC screening rates in the target population (age: 50–54) while a second targeted clinic had a 1% increase in screening rates during this period. The comparison primary care residency clinic had a 1% decline in CRC screening rates. Differences in insurance utilization types for CRC screening rates by clinic were noted. Differences between targeted clinic screening rates were attributed to successful workflow implementation and provider/staff champions.

**Conclusion:** Analyzing population data at a micro/clinic level using REAL-G categories can inform targeted interventions that aim to reduce health disparity gaps.

### Variations in Practice of Apnea Test for Brain Death: Review From a Multihospital Health Care System

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**Background:** Ventilation encompasses both active and passive processes. Air is initially drawn into the lungs due to a negative intrathoracic pressure created using the respiratory muscles, most importantly the diaphragm. In contrast, expiration is the passive relaxation of the respiratory muscles. Oxygenation occurs when oxygen diffuses across the alveolar-capillary membrane. The ability to oxygenate without ventilation has been termed apneic diffusion oxygenation or apneic oxygenation. We believe it is crucial to keep alveoli open in order for adequate oxygenation to occur. This can be achieved with the aid of positive end-expiratory pressure (PEEP). We investigated this concept in patients who are brain-dead because they cannot ventilate. The stimulus to breathe originates from chemoreceptors in the brainstem. These cells respond to a decrease

in pH by triggering the body to take a breath. A positive apnea test confirms that the patient has no functioning brainstem.

**Purpose:** Determine the rate of pO<sub>2</sub> and pCO<sub>2</sub> changes during different methods of the apnea test and identify variations in practice within Aurora Health Care.

**Methods:** Data were collected retrospectively on brain-dead patients older than 18 years. Data points pulled from Epic medical records included serial arterial blood gases (ABGs) that were completed during the apnea test and patient demographics. The rate of change in pCO<sub>2</sub> and pO<sub>2</sub> was evaluated using both Mann-Whitney and two-sample t-tests comparing a PEEP valve group to all other oxygenation methods.

**Results:** Eight variations of the test were performed, with median starting CO<sub>2</sub> for the oxygenation and PEEP group of 43 and 44 mmHg, respectively (95% confidence interval: 26–53, P=0.6771). Oxygenation group had a mean CO<sub>2</sub> increase of 2.95 mmHg/minute, whereas the PEEP valve group increased at 4.60 mmHg/minute. No statistical significance was found (P=0.0508). Neither was there significant difference between the rate of desaturation between the oxygenation and PEEP valve group (6.53 mmHg vs 2.60 mmHg, respectively; P=0.5536).

**Conclusion:** We found no difference in the rate of CO<sub>2</sub> increase comparing the oxygenation group to the PEEP valve group. This suggests that there is no significant component of CO<sub>2</sub> washout in the lungs using the PEEP valve setup. A superior method of apneic oxygen was not able to be demonstrated with our results due to an insufficient sample size and practice variations. The most common method to perform the apnea test at our institutions is preoxygenation.

### Effects of Revision Surgery on Grade of Adverse Local Tissue Reaction Following Recall of a Modular Hip Implant

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**Background:** The Stryker Rejuvenate modular hip implant device allows for greater versatility in matching a patient's anatomy than conventional implants. Device recalls and in vivo metal hypersensitivity after total hip arthroplasty (THA) are common. However, recall of the Rejuvenate implant represents one of the largest recall volumes to date, highlighting our uncertainty regarding causes of device metal fretting/corrosion and adverse local tissue reaction (ALTR). While devices with metal-on-metal bearings historically were culprits for release of metal debris, more recently developed modular-neck devices add opportunity for adjacent metal components to rub together. With the Rejuvenate device, corrosion or fretting likely occurs at the cobalt-chromium neck and titanium stem interface. Cobalt (Co) and chromium (Cr) particles then irritate tissues locally and cause a gradation of problems or indications of ALTR.

**Purpose:** Quantify the effect of revision surgery on ALTR grade in patients who previously underwent THA receiving the recalled Rejuvenate hip implant.

**Methods:** We conducted a prospective observational study of all patients who underwent THA performed by a single Aurora Health Care orthopedic surgeon using the Rejuvenate implant. Following implant recall in July 2012, patients were notified via letter/phone and asked to visit regularly (every 3–6 months) for lab work, imaging and device assessment. Using repeated measures multinomial logit analysis we examined the effect of revision surgery on abnormal grade of ALTR (ie, grade 1–4 vs 0), adjusting

for patient characteristics, device specifications and indicators of post-THA complication (serum Cr ion, Co ion, C-reactive protein, erythrocyte sedimentation rate).

**Results:** In total, 162 hips and 152 unique patients underwent THA during September 2009–May 2012, with 78 hips subsequently revised during 2012–2015. Patients were of median age 62 years (range: 32–90), nearly all non-Hispanic white (89%) and mostly female (58%). Several variables were significantly associated ( $P<0.05$ ) with ALTR grade, including occurrence of complication symptoms (eg, pain), patient age, and Co ion concentrations. Revision surgery was the most strongly associated variable with ALTR, with 5 times greater odds of abnormal grade when not undergoing revision (odds ratio: 5.68, 95% confidence interval: 2.69–11.9).

**Conclusion:** Within Aurora, patients who underwent THA with the Stryker Rejuvenate hip implant often experienced the complications of ALTR, but revision surgery reduced the ALTR grade.

### Family Practice Resident Expectations by Year From Faculty and Resident Perspectives: A Quality Improvement Initiative

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**Background:** The transition from student to physician requires substantial commitment and work from residents as well as guidance from program faculty. The Accreditation Council for Graduate Medical Education (ACGME) has standardized certain academic requirements for U.S. residency programs; however, faculty expectations of residents according to year in the program are less formal and more a hidden curriculum. Setting expectations for residents to consult could better help residents navigate their graduate medical education experience and achieve the level of excellence expected by ACGME.

**Purpose:** Our quality improvement study aimed to: 1) determine what the expectations of family practice residents were based on feedback from faculty members and current residents; and 2) share these expectations with residents.

**Methods:** A preintervention survey was emailed to family medicine program faculty and residents regarding resident expectations according to year in the program. Based on the results of the preintervention survey, expectations were outlined in a handout according to year in the program and were presented to current residents during scheduled didactic time. Residents who responded to the preintervention survey were then asked to respond to the postintervention survey. Fisher exact tests were used to compare pre- and postintervention survey responses.

**Results:** Overall, 64% (14 of 22) of faculty and 64% (18 of 28) of residents responded to the preintervention survey. While 79% of faculty expressed that they had specific expectations for residents, 77% felt that residents did not know these expectations. Additionally, while residents (94%) believed faculty had expectations of them, only 33% knew what the expectations were. Following intervention, 15 of 18 residents responded, with 79% now reporting they knew what the expectations were ( $P=0.02$ ). The handout was found useful by all those queried, and 85% felt it clarified expectations.

**Conclusion:** At baseline, residents and faculty knew there were expectations for residents as they progress through the program, but those expectations were not explicit. Despite the lack of vertical communication, the expectations from both groups were surprisingly similar. A handout delivered electronically and at didactic sessions

was deemed useful and clarified expectations.

### The Lifestyle Initiative: An Innovative Coaching-Based Quality Improvement Study to Improve the Health of Aurora Health Care Caregivers and Family Members

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**Background:** Self-management support has been shown to improve clinical outcomes. Health coaching, one form of self-management support, empowers patients within the health care system by providing information and through collaboratively developed care plans.

**Purpose:** Assess the impact of The Lifestyle Initiative, a coaching-based health program utilized by Aurora Health Care caregivers or family members.

**Methods:** The Lifestyle Initiative is a coaching-based approach for Aurora caregivers or family members enrolled in Aurora's health insurance network. Individuals were recruited from the care management database, and all participants had an Aurora primary care provider. Participation was limited to those  $\geq 18$  years of age who had a diagnosis of type 2 diabetes or hypertension (or both), had glycated hemoglobin (A1c)  $\leq 8.0$ , and were not on insulin. The Lifestyle Initiative was rolled out in three phases. Phase I: health coaching sessions through a standard web- and app-based platform (Noom Health), and access to a stress-management program (HeartMath). Phase II: health coaching sessions through a standard web- and app-based platform co-created by Aurora's Department of Integrative Medicine and Noom Health, and access to HeartMath; Phase III: health coaching sessions through a standard web- and app-based platform (Noom Health), and a customized web- and app-based platform. Those enrolled in each phase acted as their own controls. Paired t-tests were used to compare pre- and postintervention results of each phase.

**Results:** The majority of Phase I participants ( $n=23$ ; mean age 54.4 years) were female (91.3%) and white (52.2%). Preintervention A1c and blood pressure were not statistically different postintervention. However, pre- vs postintervention weights were statistically different (228.2 vs 218.5 lb;  $P<0.01$ ), as well as pre- vs postintervention body mass index (37.3 vs 35.7 kg/m<sup>2</sup>;  $P<0.01$ ). The majority of Phase II participants ( $n=63$ ; mean age 54.8 years) also were female (81.0%) and white (88.9%). Pre- and postintervention blood pressures were not statistically different. However, pre- vs postintervention A1c (7.2 vs 6.6;  $P<0.02$ ), weights (229.6 vs 225.7 lb;  $P<0.05$ ), and body mass index (37.1 vs 36.5 kg/m<sup>2</sup>;  $P<0.05$ ) were statistically improved. Phase III data collection is underway.

**Conclusion:** The Lifestyle Initiative health coaching program significantly improves certain health metrics when applied to health system employees and family members with diabetes or hypertension. Further study is needed to explore sustainability and the effects of more robust programs.

### Improving Obstetrics in Family Medicine Residency Clinics: A Quality Improvement Study

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