Dear Colleague:

Welcome to this year’s Orthopedic Outcomes Report from Anne Arundel Medical Center. In the 2019 edition, our commitment to quality improvement through patient-centered research will be evident as you review details on patient-reported outcomes data collection, clinical metrics and financial assessments.

The Outcomes Report highlights achievements by our Center for Joint Replacement, Center for Spine Surgery, Upper Extremity Program, Foot & Ankle Program, Sports Medicine Program, and Osteoporosis Screening and Treatment Program. With state leading programs in joint replacement, spine surgery and sports medicine, we feel it is our obligation to facilitate transparency through dissemination of key clinical and financial metrics.

This report also details research conducted by the Center for Orthopedic Outcomes and Research (COOR). Now in its third year of operation, the Center has become ingrained in our continual efforts to improve clinical care through patient-centered outcomes evaluation. Throughout this work, you will observe the synergistic relationship between research and clinical practice at Anne Arundel Medical Center Orthopedics.

In this year’s report, we hope to highlight the breadth of orthopedic research at AAMC. Caring for orthopedic patients requires a team-based, multidisciplinary effort. Many of the coauthors and collaborators named in this report include colleagues from nursing, physical therapy, anesthesia and other specialties. Without them, the high-quality, low-cost care we deliver to our patients and the ability to publish these results would not be possible. In the pages ahead, please enjoy highlights of the exciting work underway at Anne Arundel Medical Center Orthopedics.

Respectfully,

Jeff Gelfand, MD
Medical Director of AAMC Orthopedics

About Anne Arundel Medical Center
FACTS AND FIGURES FOR FY2019 (July 2018 – June 2019)

A not-for-profit regional health system headquartered in Annapolis, Maryland, Anne Arundel Medical Center (AAMC) serves an area of more than one million people. AAMC is recognized for orthopedic care, emergency heart attack response and cancer care. A leader in women’s services, AAMC ranks second in Maryland for number of births annually and has a Level III neonatal intensive care unit.

Total licensed beds* ............... 389
Inpatient admissions .......... 25,000
Births................................. 5,300
Emergency visits............... 100,000
Outpatient visits** ............ 1,048,000
Medical staff ...................... 1,070+
Employees ......................... 1,070+
Operating revenue........... $773 million

* Includes 40-bed facility, Pathways, dedicated to substance use and mental health treatment.
** Includes regulated and unregulated outpatient visits, imaging and observations.

Awards:
- Top four best hospitals in Maryland by U.S. News & World Report
- Magnet® recognition by the American Nurses Credentialing Center
- American Hospital Association’s Quest for Quality Finalist
- Blue Distinction® Center for maternity care and for knee and hip replacement
- LGBTQ Healthcare Equality Top Performer

AAMC Includes:
- The state’s third busiest hospital (measured by inpatient discharges)
- Outpatient pavilions in Bowie, Kent Island, Odenton, Pasadena, Easton and Waugh Chapel
- A multi-specialty medical group in 60+ locations throughout the region
- An accountable care organization (ACO) participating in the Medicare shared savings program
- Mental health and substance use treatment services
- Imaging and lab services
- A research institute
- Accredited Graduate Medical Education programs in general surgery, obstetrics/gynecology and internal medicine
- Accredited simulation and innovation center

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Note: Unless otherwise noted, all data in this year’s report is presented on a fiscal year (July-June) basis.
The Center for Joint Replacement at AAMC is a national model for knee and hip replacement. It is the most sought-after program in Maryland, drawing patients from around the country and remaining committed to continually advancing our mission of delivering high-quality, low-cost care.

**JOINT REPLACEMENT**

**FIRST PROGRAM IN MARYLAND TO PERFORM OVER 10,000 joint replacements over a five-year period.**

**9 YEARS in a row as the busiest joint replacement program in Maryland.**

**2,215 joint replacements performed in 2019 — the most in Maryland.**

**VOLUME**

**LENGTH OF STAY**

76% of total knee replacements performed in outpatient status — the most in Maryland.

77% of patients undergoing primary total joint replacement have a length of stay of zero or one day in the hospital.

**COST**

22% LOWER charge per case for primary total hip replacement than the Maryland state average.

18% LOWER lower charge per case for primary total knee replacement than the Maryland state average.

**Marc Brassard, MD**
- Residency: University of Alabama Hospital
- Fellowship: Beth Israel Medical Center-Petrie Division
- Board Certification: American Board of Orthopaedic Surgery

**Paul King, MD**
- Medical Director, The Center for Joint Replacement
- Residency: University of Pennsylvania School of Medicine
- Fellowship: Harvard Medical School
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- Fellowship: Union Memorial Hospital
- Board Certification: American Board of Orthopaedic Surgery
The Multidisciplinary Rapid Recovery Protocol provides the highest level of care for our patients in the most efficient manner. In place since 2013, it combines evidence-based medicine, clinical outcomes measurement and lean methodologies.

Based on the success of the protocol, we’re proud to now offer same-day discharges for appropriate patients.

**BEFORE SURGERY**

- Schedule candidate for either zero- or one-day length of stay and communicate to the care team and the patient.
- Establish contact between dedicated joint nurse navigator and patient to discuss their length of stay (zero- or one-day), discharge plans and any other special circumstances.
- Assist patients in acquiring their durable medical equipment prior to surgery.
- Determine if surgery is the right decision.

**DAY OF SURGERY**

- Transfer the patient efficiently from post-anesthesia care unit (PACU) to floor.
- Maximize patient mobility and ambulation.
- Refer patient to pre-op physical therapy or PT 360 home therapy program.

**FOLLOWING DISCHARGE**

- Prevent readmissions and emergency room visits through follow-up calls.
- Undergo PT/OT evaluation and education for zero-day discharges prior to afternoon/evening discharge.
- One-day length of stay patients are discharged by mid-day on day one, post-op.
The Center for Joint Replacement at AAMC has been Maryland’s highest volume joint replacement program for nine consecutive years. Over the past five years, we have been the first program to perform over 10,000 joint replacements, and we performed 2,215 surgeries in 2019 alone. In 2018 CMS removed total knee replacement from its inpatient-only list. In response to this change, we performed 951 (76%) outpatient total knee replacements, an effort that enhances patient satisfaction and saves money for the health care system.

Our high volume — paired with an inpatient primary total hip replacement (THR) Average Length of Stay (ALOS) lower than that of the Maryland hospital average and the most outpatient total knee replacements (TKR) performed in the state — is a tangible benefit to our community and the Maryland hospital system. Over 77% of patients undergoing primary total joint replacement have a length of stay of zero or one day in the hospital.

As part of our mission to provide high-quality, low-cost care to the patients we serve, we continually aim to decrease the cost of total joint replacement and maximize the value delivered to patients. In 2019 the Center for Joint Replacement offered the lowest average charge primary THR in Maryland at $4,897 (23%) below the state average and the second-lowest charge primary TKR at $3,630 (18%).
Patient Outcomes

The Patient-Reported Outcomes Measurement Information System Physical Function (PROMIS-PF) instrument assesses a patient’s physical function across five domains. Physical function refers to the ability to perform activities of daily living—a major concern for elderly and patients with musculoskeletal diseases. Given its generic, rather than disease-specific, design, we use PROMIS-PF to evaluate patient-reported outcomes across a wide variety of surgical procedures at AAMC Orthopedics. A score of 50 represents the average for the United States general population, with a standard deviation of 10.

Clinical Quality Measures

In 2016, AAMC began participating in the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) — the first nationally validated, risk-adjusted, outcomes-based program to measure surgical care and quality. ACS-NSQIP allows valid comparison of outcomes among all 700+ hospitals participating in the program.

The graphs below present our ACS-NSQIP quality measures for patients undergoing total joint replacement.

These graphs showing Clinical Quality Measures present highlights of our performance as odds ratios, which estimate the odds of an event happening at AAMC compared to the estimate of that type of event happening in all 700+ hospitals reporting to the ACS-NSQIP database. An odds ratio of 1.0 means the hospital is performing as expected. A number less than 1.0 indicates the hospital is performing better than expected, while a number above 1.0 is worse than expected.
The Effect of Psychiatric Diagnosis and Psychotropic Medication on Outcomes Following Total Hip and Total Knee Arthroplasty

Andrea H. Stone, MSN, CRNP, James H. MacDonald, MD, Paul J. King, MD

As published in The Journal of Arthroplasty

Background: Nearly 20% of the US adult population lives with mental illness, and less than 50% of these receive treatment. Preoperative mental health may affect postoperative outcomes in patients undergoing total joint arthroplasty (TJA) yet is rarely addressed; poor outcomes increase the cost of care and burden on the health care system. This study examines the influence of patients with psychiatric diagnosis (PD) and taking psychotropic medication (PM) on emergency room visits, readmissions and discharge disposition following TJA.

Method: Single institution retrospective analysis of a consecutive series of 3020 primary TJA performed between January 2017 and June 2018. Chi-squared, t-tests and analysis of variance were used to quantify differences between groups.

Result: Nine hundred seventy-six (32.3%) patients had a PD; most had depression (10.1%), anxiety (8.6%) or both (8.4%); 808 (26.8%) patients were on PM. Patients with PD were more likely to experience emergency room visits (6.3% vs 10.0%, P = .034) and skilled nursing facility discharge (11.6% vs 17.9%, P = .005). Patients taking PM were more likely to experience skilled nursing facility discharge (12.4 vs 17.1, P = .047); those taking >2 PM had the highest rate (21.6%).

Conclusion: Patients with PD on or off PM may experience increased health care utilization in the postoperative period. Increased patient education and support may reduce these discrepancies. PD is not a deterrent for TJA, but targeted interventions should be developed to provide additional support where needed and avoid unnecessary utilization of resources.

Table 3. Comparison of Groups by Surgery Type and Number of Medications

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<th>Sex, % female</th>
<th>THA</th>
<th>TKA</th>
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</thead>
<tbody>
<tr>
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<td>N=1337</td>
</tr>
<tr>
<td>N=100</td>
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<td></td>
</tr>
<tr>
<td>Sex, % female</td>
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<td></td>
</tr>
<tr>
<td>Female</td>
<td>49.7*</td>
<td>54.0*</td>
</tr>
<tr>
<td>Male</td>
<td>50.3</td>
<td>46.0*</td>
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<tr>
<td>Age</td>
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<td>65.8</td>
<td>64.6</td>
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<td>64.3</td>
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<tr>
<td>LOS, days</td>
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<tr>
<td>1.31</td>
<td>1.37</td>
<td>1.77*</td>
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<tr>
<td>1.29</td>
<td>1.37</td>
<td>1.83</td>
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<tr>
<td>Discharge SNF</td>
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<td>8.3*</td>
<td>8.4</td>
<td>20.0*</td>
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<td>6.1</td>
<td>5.9</td>
<td>14.0*</td>
</tr>
<tr>
<td>5.9</td>
<td>5.9</td>
<td>14.0</td>
</tr>
<tr>
<td>Readmit</td>
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<td>7.0</td>
</tr>
<tr>
<td>4.8</td>
<td>4.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>

* adj residual of 2 is ≤-2 or ≥ 1.4 post hoc test p < .05 when compared with control.
Opioid Use Patterns After Total Joint Arthroplasty

Paul King, MD, Andrea Stone, Elizabeth Arentz, and James MacDonald, MD

As published in Journal of Surgical Orthopaedic Advances

The incidence of new persistent opioid use following elective total joint arthroplasty (TJA) hasn’t been well documented; with this study we aim to further characterize opioid use following TJA, specifically focusing on those patients still requiring opioid prescriptions 6 months postoperatively. Retrospective review of a consecutive series of 977 primary TJA performed from June 2016 to May 2017. Opioid prescriptions verified in Surescripts database; 3.7% (29) opioid-naive patients and 18.0% (35) opioid non-naive patients received fills at 6 months. Opioid-naive patients requiring fills at 6 months had more fills from 1-2 months onward. Opioid non-naive patients requiring fills at 6 months had more preoperative fills than those that weren’t filling opioid prescriptions (5.49 vs. 2.52 fills). Most patients in this study ceased opioid use by 3 months postoperatively. More preoperative fills in the opioid non-naive population and continuing to fill prescriptions after 2-3 months were associated with continued opioid use.

Figure 2. Percentage of patients filling opioid prescriptions per month following surgery

The Center for Joint Replacement maintains an active research department, performing funded and investigator-initiated studies with the goal of improving patient outcomes and guiding clinical quality improvement. We publish our research to share our findings with arthroplasty surgeons across the United States and internationally.

JOURNAL ARTICLES


CONFERENCE PRESENTATIONS


Chad Patton, MD
Medical Director, The Center for Spine Surgery
Residency: University of Vermont Medical Center
Fellowship: University of Utah Orthopedic Center
Board Certification: American Board of Orthopaedic Surgery

Alessandro Speciale, MD
Residency: The George Washington University Hospital
Fellowship: Duke University Hospital
Board Certification: American Board of Orthopaedic Surgery

Timothy Burke, MD
Residency: George Washington University Hospital
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Roy Bands, MD
Residency: Yale New Haven Hospital
Fellowship: Hospital of the University of Pennsylvania Union Memorial Hospital
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Gary Dix, MD
Residency: University of Calgary-Foothills Hospital
Fellowship: University of Calgary-Foothills Hospital
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Chukwuemeka “Emeka” Nwodim, MD
Residency: Temple University School of Medicine
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Residency: The George Washington University Hospital
Board Certification: American Board of Neurological Surgery

Our multidisciplinary team approach drives our ability to deliver the highest quality care tailored to each patient’s needs. A variety of programs have been implemented through our spine pathway.

PT360 VISITS: Offers in-home physical therapy pre- and/or post-surgery to help patients prepare their home environment for surgery and increase safety after discharge.

PRE-OP CLASSES: Offers daytime and evening classes weekly to accommodate patient schedules.

MULTI-MODAL PAIN MANAGEMENT: Uses both opioid and non-opioid medications to control pain (i.e. Tylenol, NSAIDs, muscle relaxers, etc.).

GROUP THERAPY: Provides emotional support and encouragement, with a special focus on non-pharmacologic methods of pain control.

EARLY MOBILIZATION: Gets patients out of bed the day of surgery and ready for group therapy early the following morning.

22,946 total patients seen in 2019 across multidisciplinary spine providers.

1,000+ spine procedures performed in 2019 – the fourth highest in Maryland.

15% LOWER charge per case than the Maryland hospital average for fusion procedures.

41% LOWER charge per case than the Maryland hospital average for laminectomy and discectomy procedures.

1,000+ total patients seen in 2019 across multidisciplinary spine providers.

22,946 spine procedures performed in 2019 – the fourth highest in Maryland.
Case Volume

The Center for Spine Surgery is Maryland’s fourth-highest-volume spine surgery program, offering comprehensive care for degenerative and acute back and neck conditions. Our program prides itself on taking a multidisciplinary approach to spine care and includes nonoperative physiatry and physical medicine and rehabilitation, physical therapists, same day nurse practitioner access through the SpineToday program, and dedicated nurse navigation.

Financial Outcomes

As of 2014, spinal fusion was the most costly inpatient surgical procedure performed in the United States, accounting for $12 billion in aggregate cost. At the Center for Spine Surgery we continually work to improve quality while reducing the cost of surgery. Our success in maximizing the value of care we provide is evidenced by our average charge per case, which is $5,683 (15%) lower than the Maryland hospital average for fusion and $5,669 (41%) lower for laminectomy and discectomy procedures.

Clinical Quality Measures

Financial Outcomes

As of 2014, spinal fusion was the most costly inpatient surgical procedure performed in the United States, accounting for $12 billion in aggregate cost. At the Center for Spine Surgery we continually work to improve quality while reducing the cost of surgery. Our success in maximizing the value of care we provide is evidenced by our average charge per case, which is $5,683 (15%) lower than the Maryland hospital average for fusion and $5,669 (41%) lower for laminectomy and discectomy procedures.

Patient-Reported Outcomes

Spine Surgery PROMIS Physical Function
Average Preoperative and Postoperative Scores

CY2018 ACS-NSQIP Outcomes:
AAMC Spine Surgery vs. National Benchmark

2019 Spine Surgery Average Charge per Case

2019 Spine Surgery Volume

2019 Multidisciplinary Spine Clinic Volume
Patient Goal-Directed Care in an Orthopedic Spine Specialty Clinic

Zachary Sanford, MD, Elizabeth Keller, Andrew Broda, BS, Justin Turcotte, PhD, MBA, Karen Pipkin, NP, Chad Patton, MD, MS
As presented at American Academy of Orthopaedic Surgeons 2020 Annual Meeting

Introduction: Patient satisfaction has evolved as an important metric for physicians and health systems, with satisfaction surveys used as a surrogate for measuring quality of care and overall patient experience. For patients seeking care for spine-related symptoms including low back pain, managing patient expectations and goals may be important in achieving high-value care delivery and high levels of patient satisfaction. We hypothesized that patient-reported goals are highly variable but also that patient-provider goal awareness may influence patient satisfaction.

Method: A prospective cohort study of consecutive adult patients (age ≥ 18 years) seeking specialist care at an orthopedic spine clinic was completed. New patients scheduled with either a fellowship-trained spine surgeon or an independent nonoperative spine nurse practitioner seeing same-day access and follow-up appointments were asked to select their goal(s) for the clinical visit. Patient goals were then verbally reviewed by the provider with the patient and documented as part of the medical record. The primary outcome measure was frequency of patient goals by provider type (surgeon vs. nurse practitioner). The secondary outcome measure included monthly aggregate Press Ganey patient satisfaction top-box scores pre- and post-implementation of the survey.

Result: A total of 329 patients were included in the initial four months of the study, of which 115 (35%) were evaluated by a fellowship-trained spine surgeon and 214 (65%) by a nurse practitioner. Patients reported an average of five goals at time of initial encounter (range 0-13). The most commonly reported patient goal was to reduce pain (reported by 89.1% of patients), followed by learning about causes of symptoms (66.3%), increasing mobility (57.1%), returning to activities enjoyed (48.9%), and improving overall spine health or posture (41.6%). Frequency of these six patient goals were found to vary significantly by provider type. Fewer than one-third of patients evaluated by a spine surgeon reported learning about spine surgery as a goal (30.4%). Compared to the preceding seven months pre-implementation, aggregate patient satisfaction scores significantly increased across the cohort and were also observed to increase by each provider (87.3% to 95.6% spine surgeon; 91.8% to 96.6% nurse practitioner).

Discussion and Conclusion: To our knowledge, this is the first study to describe patient-reported goals in an orthopedic clinic setting. While patient-reported goals vary by provider type, improving pain and function appear to be highly valued by most patients. Furthermore, patient-provider goal awareness may have an impact on improving the patient experience.

Development of a Risk Prediction Model with Improved Clinical Utility in Elective Cervical and Lumbar Spine Surgery

Andrew Broda, BS, Zachary Sanford, MD, Justin Turcotte, PhD, MBA, and Chad Patton, MD, MS
As published in Spine

Objective: We present a model of risk prediction for patients undergoing elective cervical and lumbar spine surgery that may provide enhanced clinical utility over previously described instruments.

Summary of Background Data: Many previously described predictive risk models are specific to one condition or procedure, cumbersome to calculate or include subjective variables limiting applicability and utility.

Method: A retrospective cohort of 177,928 spine surgeries (lumbar (L) Ln=129,800; cervical (C) Cn=48,128) was constructed from the 2012-2016 American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP) database. Cases were identified by Current Procedural Terminology (CPT) codes for cervical fusion, lumbar fusion and lumbar decompression laminectomy. Significant preoperative risk factors for postoperative complications were identified and included in logistic regression. Sum of odds ratios from each factor was used to develop the score. Model performance was assessed using Receiver Operating Characteristic (ROC) curves and tested on 20% of the total sample.

Result: Eighteen risk factors were identified, including 16 found to be significant outcomes predictors. At least one complication was present among 11.1% of patients, the most common of which included bleeding requiring transfusion (4.86%), surgical site infection (1.54%), and urinary tract infection (1.08%). Complication rate increased as a function of the model score and ROC area under the curve analyses demonstrated fair predictive accuracy (lumbar= .741; cervical=.776). There were no significant deviations between score development and testing datasets.

Conclusion: We present the Cervical and Lumbar Risk Prediction Model (CL-RPM) as a robust, easily administered and cross-validated instrument to quickly identify spine surgery candidates at increased risk for postoperative complications and high resource utilization without need for algorithmic software. This may serve as a useful adjunct in preoperative patient counseling and perioperative resource allocation.
Research Activity

JOURNAL ARTICLES:


CONFERENCE PRESENTATIONS:


Broda A, Turcotte J, Sanford Z, Patton C. Analysis of the Hierarchical Condition Category (HCC) Score as a Predictor for Increased Risk for Complication and Resource Utilization Following Spine Surgeries. Podium presentation: Congress of Neurological Surgeons Spine Summit 2019, 35th Annual Meeting of the Section on Disorders of the Spine and Peripheral Nerves; March 14-17, 2019; Miami, FL.


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Board Certification: American Board of Orthopaedic Surgery

Christina Morganti, MD
Residency: State University of New York College of Medicine
Fellowship: The Johns Hopkins University School of Medicine
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Residency: Johns Hopkins Hospital
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Residency: Robert Wood Johnson University Hospital
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Robert Verklin, Jr., MD
Residency: University of Michigan Hospitals and Health Center
Fellowship: University of Wisconsin Hospital and Clinic
Board Certification: American Board of Orthopaedic Surgery

James York, MD
Residency: University Of Maryland Medical Center
Board Certification: American Board of Orthopaedic Surgery

2X MORE hip arthroscopy procedures performed than the second busiest program in Maryland.

7,000+ hip and knee sports medicine procedures performed over the past 5 years.

6 YEARS in a row as the busiest Sports Medicine, Hip and Knee surgery program in Maryland.

SPORTS MEDICINE

Thomas Harries, MD
Residency: Naval Regional Medical Center - Oakland
Board Certification: American Board of Orthopaedic Surgery

Robert York, MD
Residency: Naval Regional Medical Center
Board Certification: American Board of Orthopaedic Surgery

MORE

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Our Sports Medicine program has maintained its position as the highest volume program in Maryland. Throughout the past five fiscal years, AAMC has performed nearly double the number of sports medicine procedures than the next busiest Maryland hospital.
Community Involvement

The Sports Medicine team is involved in volunteer community sports coverage at all levels from the weekend warrior to Olympic teams. We are very proud to be selected by the following teams to provide their medical coverage:

- **Daniel Redziniak, MD**
  Chesapeake Bayhawks
  Professional Lacrosse Team, Bowie State, Anne Arundel Community College, Severna Park High School

- **Benjamin Petre, MD**
  USA Olympic Ski Team, USA Olympic Snowboard Team, Baltimore Orioles, Bowie Baysox AA Orioles affiliate, Annapolis High School

- **Peter Ove, MD**
  Bowie State, DeMatha Catholic High School

- **Christina Morganti, MD**
  Anne Arundel Community College

Community Education

The Sports Medicine team is dedicated to providing educational opportunities to both providers and the community. Highlights of our 2017 educational activities include:

- **Youth Injury Prevention Seminar (YIPS)** YIPS, an annual conference led by Christina Morganti, MD, aims to educate and update coaches, athletic trainers, parents, physical therapists, midlevel providers and other physicians on the most relevant injury prevention topics and techniques. Recent conferences have focused on topics such as concussions, the opioid crisis and what it means for injured youth, prevention of ACL tears, footwear, and playing surface, etc.

- **Emerging Concepts in Orthopedic Surgery** Organized by Daniel Redziniak, MD, and Jeff Gelfand, MD, this one-day course is targeted toward orthopedic surgeons, primary care providers, physical therapists, and other allied professionals who want to learn about emerging treatment options for common conditions encountered by orthopedic surgeons. Course lectures include new strategies for treating a range of orthopedic conditions and injuries, and discussion of new procedures compared with alternate management options.

- **Sports Medicine Fellowship** The AAMC Sports Medicine team was honored to be asked by the Uniformed Services University to take part in teaching their Sports Medicine fellows.

Research Profile

**Opioid Prescribing Guidelines for Arthroscopic Partial Meniscectomy Based on Patient-Reported Opioid Consumption**

Justin Turcotte, PhD, MBA, Samuel Taylor, BS, Andrew Palsgrove, BS, Jeffrey Gelfand, MD, Benjamin Petre, MD, Daniel Redziniak, MD

As accepted for publication in Journal of Surgical Orthopaedic Advances

**Purpose:** The purpose of our study was to determine the optimum number of opioid pills and morphine milligram equivalents (MME) required to treat postoperative pain following arthroscopic partial meniscectomy.

**Method:** A retrospective cohort study of 77 patients over 18 years old undergoing arthroscopic partial meniscectomy between January 2017 and May 2019 who returned patient-reported pill trackers was conducted. The primary endpoint was total MME consumed per patient. Secondary endpoints included the number of pills taken, MME and pills prescribed, and average overprescribing.

**Result:** No significant differences in opioid prescribing or consumption were observed across different grades or locations of chondromalacia. Following surgery, 19.48% of patients took no opioids. Patients were prescribed 84.34 ± 49.54 MME on average and took 28.23 ± 40.99 MME. This equated to an average of 16.52 ± 8.85 narcotic pills prescribed and 4.90 ± 6.26 pills taken; a surplus of 11.62 ± 8.07 pills per patient. Median MME taken was 15, and median pills taken was 3. Sixty-six of 77 (85.7%) patients took fewer than 10 total pills, and 57 of 77 (74.0%) took five or fewer.

**Conclusion:** Patients undergoing arthroscopic partial meniscectomy are commonly overprescribed opioids postoperatively. On average, patients consumed just under five narcotic pills, less than one-third of the number prescribed. No differences in consumption or overprescribing were found across chondromalacia, age, gender or BMI, suggesting a standard opioid protocol is acceptable for the procedure. A standard prescription of 5 opioid pills or 25 MME is recommended for patients undergoing arthroscopic partial meniscectomy.
A Retrospective Cohort Review of Opioid Prescribing and Patient-Reported Consumption Patterns Following Upper Extremity Surgery

Justin Turcotte, PhD, MBA, Andrew Palsgrove, BA, Marcia Fowler, BS, Stephanie Adams, MEd, Kevin Crowley, MBA, MS PT, Jeffrey M. Gelfand, MD

As accepted for publication in Current Orthopaedic Practice

Background: Across upper extremity procedures, patients are being prescribed approximately three times the opioid medication needed. The aim of this study is to evaluate opioid prescribing and consumption trends for patients undergoing various upper extremity surgeries at a regional medical center to further refine prescribing guidelines.

Method: A retrospective review of 152 patients undergoing shoulder, wrist and forearm or hand surgery who completed a patient-reported opioid consumption tracking form between June 2017 and May 2018 was conducted. Opioid prescription and consumption data was converted into morphine milligram equivalents (MMEs).

Result: Average total MME prescribed for the population was 147.5 ± 130.1 MME and was significantly different across procedures (p<.001). Average MME taken across the cohort was 55.5 ± 61.5 with significant differences across procedure types (p<.001). Controlling for gender and patient age, when compared with shoulder patients, patients undergoing wrist and forearm or hand procedures were significantly less likely to be overprescribed (OR=.309, p=.014; OR=.225, p=.001) and were overprescribed less MME on average (wrist & forearm χ=-120.1, p<.001; hand χ=-144.4, p<.001). There was no significant difference in the percentage of patients requiring second opioid fills, with an average refill rate of 14.5% across the cohort (p=.116).

Conclusion: Significant differences in the need for opioid analgesia exist across upper extremity procedures, with shoulder surgery patients being overprescribed most frequently and by the highest MMEs. Due to the variability in narcotic utilization, patient-specific factors must be considered by providers when determining optimal opioid prescribing levels.
Case Volume

The AAMC foot and ankle surgery program is the third-busiest in Maryland, performing over 3,500 procedures over the past five years and over 600 in 2019.

Patient Outcomes

Total Ankle Arthroplasty Can Be Safely and Effectively Performed in the Community Hospital Setting: A Case Series of 65 Patients

Justin Turcotte PhD MBA, Adrienne Spirit MD PhD, David Keblish MD, Edward Holt MD

As submitted to The Journal of Foot & Ankle Surgery

Background: The use of total ankle arthroplasty has expanded over the past decade, primarily due to improvements in implant design and survivorship that have significantly reduced the high failure rates observed in first generation implants introduced in the 1970s. Typically performed for end stage ankle arthritis, total ankle arthroplasty is increasingly being used as an alternative to total ankle fusion, the gold standard treatment for this condition.

Methods: A retrospective review of patients undergoing primary total ankle arthroplasty with a single senior orthopedic surgeon in a community hospital from January, 2014 through December, 2019 was performed.

Results: Sixty five consecutive primary total ankle arthroplasties were included in this case series. The average follow up time was 2.42 years (range: 0.05 to 5.99 years); 15 patients (23.1%) had a follow up of over four years. Patients had an average age of 67.2 ± 8.7 years, and body mass index (BMI) of 30.7 ± 4.6 kg/m². All procedures were performed for end stage osteoarthritis, with the most common secondary diagnoses being Achilles contracture (23%), retained hardware (17%) and calcaneovalgus deformity (11%). Preoperatively, patients averaged 10.45 χ ± 10.00 χ of non-weight bearing dorsiflexion and 30.00 χ ± 8.79 χ of plantarflexion. Postoperatively, patients averaged 13.33 χ ± 7.62 χ dorsiflexion, and 25.48 χ ± 7.87 χ of plantarflexion. A total of 8 (12.3%) patients required reoperation, and average time to reoperation was 1.55 ± 1.58 years. Implant failure, defined as reoperation requiring prosthesis removal, occurred in 2 (3.1%) patients, with an average time to failure of 342 days (105 days in failure due to PJI and 582 days in failure due to subsidence).

Conclusion: Patients undergoing total ankle arthroplasty at our institution had a 12.3% reoperation rate, and a 96.9% implant survival rate over an average follow up period of 2.42 years, results that compare favorably with previously reported outcomes. Based on these findings, we suggest that this procedure, which is often offered only in academic tertiary care facilities, can be safely and effectively performed by experienced surgeons in the community hospital setting.
The Osteoporosis Program at AAMG Orthopedics and Sports Medicine Specialists was started initially in 2006 to optimize the initiation of evaluation and management of osteoporosis in a high-risk fracture patient who has suffered a fragility fracture. It has evolved and grown over the years to include all patients where evaluation of bone health is indicated. Dr. Christina Morganti, founder, has directed the program since its inception, as a result of her interest in exercise, aging and bone health. This started from her own interest in fitness as well as her research fellowship at the aging center at Tufts University. The program was fortunate to add another practitioner to care for osteoporosis patients, Mandy Fawcett, PA. Mandy has this same passion about bone health and successful aging that is shared with our patients.

**Recommendations for Bone Mineral Density (BMD) Scanning**

<table>
<thead>
<tr>
<th>AAMG Subjects</th>
<th>All Clinics Reporting, Nationwide</th>
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<tr>
<td>Was BMD testing recommended to patient?</td>
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<td>No 1%</td>
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<tr>
<td>No—not indicated 8%</td>
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<tr>
<td>Was BMD testing performed or scheduled?</td>
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<td>Performed 81%</td>
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<tr>
<td>N/A (BMD in last 2 years) 11%</td>
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<tr>
<td>Planned/Scheduled 59%</td>
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<tr>
<td>Not performed or planned 1%</td>
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In 2018 AAMC Orthopedics received the American College of Surgeons Exemplary designation for performing in the top decile nationally for the following quality measures: morbidity, surgical site infection and sepsis.

**Clinical Quality Measures**

In addition to participating in the NSQIP program, we have implemented a physician self-reporting program using the RL6 platform. Under this initiative, all surgeons are expected to self-report all complications. This data, which is reviewed by our clinical quality committee is essential to building a culture of transparency, learning and continual improvement at AAMC Orthopedics. As evidenced by our utilization of the system, this program has become a widely adopted mechanism for our providers to track and study our patient outcomes.
Research Profile

The Impact of Opioid Prescribing Reduction Interventions on Prescribing Patterns Across Orthopedic Subspecialties

Justin Turcotte PhD, MBA, Kevin Crowley MBA, MS, PT, Stephanie Adams Med, David Keblish MD, Cyrus Lashgari MD, Chad Patton MD, MS, Benjamin Petre, MD, Paul King, MD, Jeffrey Gelfand, MD

As presented at American Academy of Orthopaedic Surgeons 2020 Annual Meeting

Introduction: The current opioid epidemic and the contributory role of physician overprescribing of narcotics is well described. We present the results of a systematic, multi-phased approach to reducing opioid prescribing implemented at a high volume, multispecialty orthopedic practice.

Method: A retrospective pre-post study of opioid prescriptions across 386,393 patient encounters was conducted. Multiple prescribing reduction interventions were implemented from April 2017 to April 2018. The primary outcome of average milligram morphine equivalent (MME) per patient encounter was compared between the pre-intervention cohort (patient encounters from November 2016 to March 2017) and the post intervention cohort (patient encounters from April 2017 to October 2019). Additional outcomes assessed included percent of encounters receiving an opioid prescription, compliance with prescribing guidelines and percent of encounters requiring second scripts.

Result: Implementation of the interventions resulted in an average reduction of 15.2 MME per encounter (54.5%) compared to the pre-implementation cohort (Pre: avg. MME=27.9, SD=113.6; Post: avg. MME=12.7, SD=66.1; p<.001). The number of pills per opioid prescription was reduced by 13.4 (29.5%) (Pre: avg. pill count=45.5, SD=25.1; Post: avg. pill count=32.1, SD=21.1; p<.001), and the percent of patients receiving opioids was reduced from 8.3% to 5.8% (p<.001). Prescribing compliance was evaluated for 7,664 surgical encounters, with 98.2% of prescriptions meeting stated guidelines; 5.5% of these encounters required second prescriptions. Of the nonoperative encounters requiring an opioid prescription, 99.5% were deemed compliant, defined as <500 MME per encounter, after implementation of this phase of the protocol in July 2018 (n=957), compared to 94.4% of encounters (n=2,103) prior to implementation (p<.001).

Conclusion: The use of a multi-phase approach effectively reduced the opioid prescribing patterns of a large orthopedic practice and was successful across subspecialties. This approach provides a template that other institutions may use to reduce opioid overprescribing in orthopedic practices.

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OrthoTODAY

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Annapolis, Md. 21401

AAMC Pavilion–Bowie
4175 North Hanson Court, Suite 301
Bowie, Md. 20716

AAMC Pavilion–Odenton
1106 Annapolis Road, Suite 130
Odenton, Md. 21113

AAMC Pavilion–Pasadena
8109 Ritchie Highway, Suite 200
Pasadena, Md. 21122

AAMC Pavilion–Easton
28438 Marlboro Ave, Easton, MD 21601

AAMC Pavilion–Kent Island
1630 Main St, Chester, MD 21619

Serious or life-threatening injuries such as open fractures, open/draining wounds or infections, spinal injuries, and head trauma should be seen in the ER as soon as possible.
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