

laparotomy for a given hypothetical individual with uncomplicated appendicitis. This model allowed for the incorporation of both the short-term and long-term effects of each respective treatment option. The primary outcome of the model was the cost per additional QALY gained. The analysis was conducted using a healthcare perspective. A 100 age-year time horizon was used. A 3% discount rate was applied to both the costs and effects in the model. Transition states are depicted. Surgical state rates were derived from HCUP. Treatment failure of antibiotics was defined as recurrent appendicitis within one year of antibiotic treatment. This was determined using results from prior RCTs and a Cochrane review of antibiotic management for uncomplicated appendicitis. Recurrent appendicitis was defined as recurrent appendicitis after 1 year of antibiotic treatment, using rates of appendicitis applied to the general population by age group. National age-adjusted mortality rates were applied to account for death due to causes unrelated to appendicitis. To assess differential results by age, different acute and long-term outcome, cost, and state transition rates were applied to 3 age groups: a pediatric group (1–17 years old), an adult group (18–64 years old), and a geriatric group (65+ years old). As an individual progressed through the model until age 100, the respective parameters would change to adjust for the transitions between the 3 life stages. Outcomes After Appendicitis: Lifetime QALYs were incorporated throughout the study for short-term and long-term health states. There is limited availability of QALY data in the literature pertaining to the health states specific to appendicitis. Due to this limitation, however, calculated quality of life (QoL) indices for 2015 created by Wu *et al.* were utilized for this study. QALYs were subsequently derived by multiplying QoL by the appropriate duration of time spent in a respective health status. Transition rates between health states were abstracted from the existing literature. Costs: Direct medical costs were obtained from HCUP statistics from the 2014 fiscal year for all age groups in the nationwide network. This database contains all costs of care related to surgical appendicitis intervention, however it lacks costs associated with antibiotic-only management. To account for these costs, data was extracted from current available literature, and the resulting average was applied to our model. Sensitivity Analysis: One-way analyses by cost of procedure and effectiveness of antibiotic protocol were undertaken to account for regional variation in costs and improvements in antibiotic therapy, respectively. For cost of procedure sensitivity analysis, costs were varied by 1 standard deviation below and above the mean cost per treatment group per age. These costs were then compared to a designated reference group. Antibiotic sensitivity analysis was conducted by reducing the effectiveness of antibiotics from the maximum reported effectiveness down to 0, with the goal of obtaining a level of effectiveness at which antibiotics were no longer cost-effective. A probabilistic Monte-Carlo sensitivity analysis was then employed to determine the percent likelihood of each treatment arm being cost-effective at a level of \$100,000 per additional QALY. The probabilistic sensitivity analysis was then repeated to determine the percent likelihood of each treatment arm being the dominant option, in that it lowers costs and adds QALYs. RESULTS/ANTICIPATED RESULTS: Our model examined the cost-effectiveness of 3 different treatment options for patients with acute uncomplicated appendicitis: laparoscopic appendectomy, laparotomy appendectomy, and an antibiotic regimen. We first examined the cost-effectiveness of each of these strategies in comparison to laparotomy. Laparoscopic appendectomy was shown to be superior to laparotomy in regards to costs and QALYs for patients ages 18 to 65+, while there was very little difference for patients ages 1–17. For those aged 1–17, laparoscopy had an additional cost of \$90.00 with an associated gain of 0.1 QALYs compared with laparotomy. For those aged 18–64, laparoscopy had a net cost-savings of \$3437.03 with an associated gain of 0.13 QALYs compared with laparotomy. For those aged 65+, laparoscopy had a net cost-savings of \$5713.55 with an associated gain of 0.13 QALYs compared to laparotomy. Antibiotic management was superior to laparotomy as it relates to both costs and QALYs for all 3 age cohorts. For those aged 1–17, antibiotic management had a net cost-savings of \$5972.55, with an associated gain of 0.6 QALYs compared with laparotomy. For those aged 18–64, antibiotic management had a net cost-savings of \$6621.00 with an associated gain of 0.5 QALYs compared with laparotomy. For those aged 65+, antibiotic management had a net cost-savings of \$11,953.00 with an associated gain of 0.21 QALYs compared with laparotomy. We then assessed the cost-effectiveness of antibiotics relative to laparoscopy. In all 3 age groups, antibiotics added QALYs and were cost-saving. For those aged 1–17, antibiotic management had a net cost-savings of \$6062.55, with an associated gain of 0.6 QALYs compared with laparotomy. For those aged 18–64, antibiotic management had a net cost-savings of \$3183.97 with an associated gain of 0.5 QALYs compared with laparotomy. For those aged 65+, antibiotic management had a net cost-savings of \$6239.45 with an associated gain of 0.21 QALYs compared with laparotomy. Sensitivity Analysis: We first examined the effect of varying costs on our results. Costs for all interventions were varied by 1 standard deviation above and below the average costs used in our original model, yielding 3 cost estimate levels: high cost (1 standard deviation above), middle cost (average cost reported in model), low cost (1 standard deviation below). For all 3 cost estimate levels of antibiotics, antibiotics persistently dominated laparotomy for all 3 age groups. Laparoscopy dominated at all cost levels in age groups 18–64 and 65+ but had a positive ICER for both high and medium cost levels in the 1–17 age group. We then varied effectiveness (one minus the failure rate) of antibiotic treatment in each age

group to assess at what level of effectiveness to antibiotics become dominant relative to laparotomy. In ages 1–17, antibiotic treatment became dominant at 43.8%; in ages 18–64, antibiotic treatment became dominant at 33%; and in ages 65+, there was no level of antibiotic effectiveness that did not result in this therapy being dominant over laparotomy. Probabilistic Monte-Carlo sensitivity analysis is pending, but we anticipate antibiotics having a high likelihood of being both cost-effective and dominant relative to the other 2 treatment options. DISCUSSION/SIGNIFICANCE OF IMPACT: We performed a cost-effective analysis comparing surgery versus antibiotic management for uncomplicated appendicitis. Our study found that antibiotic therapy was the dominant strategy in all age groups as it yielded lower costs and additional QALYs gained compared with laparotomy and laparoscopy. Appendicitis is the most common surgical emergencies worldwide, with a lifetime risk of 6.9% in females and 8.6% in males (Körner 1997). For over 100 years, open appendectomy had been the established treatment for appendicitis, but current management has evolved with the advent of laparoscopy and now growing use of antibiotics for treatment of appendicitis. There is growing interest in nonoperative management of uncomplicated appendicitis, given both an aging population that is increasingly frail and vulnerable to surgical complications and concerns over skyrocketing medical costs. Our model showed that antibiotic-only management was cost-effective in all age groups. This has important implications for management of appendicitis, where current management is to offer antibiotic-only management only in the “rare cases” where the patient is unfit for surgery or refuses surgery. Our data show that medical management of appendicitis not only is cheaper, but also provides more QALYs in all age groups. Our study has several limitations. First, we conducted our analysis under the assumption that all patients will be cured of appendicitis following surgical intervention. Some patients following appendectomy will develop symptoms of appendicitis and be diagnosed with “stump appendicitis,” which can occur in stumps as short as 0.5cm and can present as late as 50 years following initial surgery (Kanona, 2012). Additionally, any intraperitoneal surgery can lead to late complications such as small bowel obstruction from adhesions following surgery. Thus, our assumption that patients following appendectomy will return to the general population’s QALYs and mortality rate is not necessarily an accurate reflection of all clinical courses. However, the overwhelming majority of appendectomy patients recover fully post-surgery and we do not believe the above complications would significantly change our analysis. We also assumed that all patients with recurrent appendicitis following medical management would undergo surgery. However, patients who underwent nonoperative management at initial appendicitis may be more likely to be ineligible for surgery or refuse surgery during this second case of appendicitis. In addition, data were sparse for QALYs for the complications of open and laparoscopic surgery. We estimated these numbers from the EQ-5D, which while perhaps not accurate, we believe to be the best approximation given the available data. The next steps in evaluating the use of nonoperative management in uncomplicated appendicitis would be to validate the use of nonoperative management in elderly populations and to develop more accurate diagnostic criteria for uncomplicated Versus complicated appendicitis. Additionally, with increasing attention on antibiotic-resistant micro-organisms, policy decisions on the use of nonoperative management must also consider antibiotic stewardship. While one dose of perioperative antibiotics is indicated for appendectomy, treatment strategies from trial protocols for antibiotic-only management require significantly more antibiotics—some protocols require 1–3 days of IV antibiotics followed by up to 10 days of oral antibiotics. This study provides a cost-effectiveness analysis of treatment options for acute uncomplicated appendicitis among varying age groups. Our analysis demonstrates the benefit of antibiotics for initial therapy in the management of acute uncomplicated appendicitis. While the historic gold standard of laparotomy still is present as the first line treatment option in many physicians’ minds, new evidence indicates that the advancement of other methods, whether surgical via laparoscopic removal of the appendix or medical via improved antibiotic regimens, suggests better alternatives exist. Our study builds upon a growing body of literature supporting initial treatment of acute uncomplicated appendicitis with antibiotics, before surgical intervention.

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### Creating a reference analytics morphomics population from surgical patient cross-sectional imaging

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OBJECTIVES/SPECIFIC AIMS: Patient factors such as body mass index and functional status are commonly used in surgical decision-making and prediction of outcomes. Morphomic analysis uses semi-automated 3D cross-sectional imaging analysis to quantify tissue, organ, and bone geometry and density. These data can be

used to assess patient health status. There is an emerging trend of using morphomic variables such as muscle mass and bone mineral density to predict surgical and medical outcomes. In certain cases, it has been shown to predict cancer survival more accurately than conventional staging methods. With the growing popularity of morphomic analysis, it is vital to establish baseline variability against which patient populations can be validated. Of populations receiving radiographic imaging, trauma patients are approximately representative of the general population. We created a reference population of morphomic variables from over 6000 University of Michigan patients presenting with trauma. **METHODS/STUDY POPULATION:** Computed tomography (CT) scans were obtained for all patients who underwent scans for trauma indications at the University of Michigan starting from April 1998. High throughput image processing algorithms written in MATLAB 2015a were used to semi-automatically process chest, abdomen, and pelvis CT scans. Scans were referenced to a common coordinate system based on vertebral levels and body anatomy. Measurements of adiposity, muscle group, and bone density measurements were performed at each level. Percentile curves of morphomic measures of body composition by age and sex were created. The reference population dataset is periodically updated and is publicly accessible. **RESULTS/ANTICIPATED RESULTS:** As of July 2017, over 6000 patients aged 1–81 years have been included in the Reference Analytics Morphomics Population. Patient CT scans were analyzed at the T10, T11, T12, L1, L2, L3, and L4 vertebral levels. Morphomic measures analyzed include body depth, body cross-sectional area, vertebral trabecular bone density, visceral fat area, fascia area, subcutaneous fat area, central back fat, and psoas muscle area. **DISCUSSION/SIGNIFICANCE OF IMPACT:** We created reference curves for several morphomic variables from a Reference Analytic Morphomics Population of over 6000 University of Michigan patients presenting with trauma.

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### Development of the expanded access oversight committee at Michigan Medicine

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**OBJECTIVES/SPECIFIC AIMS:** Expanded Access is an avenue for patients with no available treatment options to access investigational drugs and devices for clinical therapy. This process requires physicians treating these patients to submit requests to the FDA and the local IRB, processes which are typically unfamiliar to clinicians. **METHODS/STUDY POPULATION:** With the goal of reducing burden and ensuring access to investigational products, Michigan Medicine established the Expanded Access Oversight Committee in January 2015. This committee brought together key stakeholders to develop appropriate policy and infrastructure to support these requests. **RESULTS/ANTICIPATED RESULTS:** Outcomes from this committee have resulted in a uniform process with a single point of entry for interested physicians and patients. With standardized policy implemented across the institution, a revised IRB application has been developed that is more tailored to Expanded Access and an informed consent document has been developed specific to the clinical use of investigational therapies. To ensure timely execution of these agreements, the contracts office has streamlined the process for negotiating Expanded Access agreements with manufacturing companies. Further development has begun with the Michigan Clinical Research Unit to provide space for clinical visits in Expanded Access cases, allowing for initiation of outpatient therapy. These changes have allowed Michigan Medicine to support triple the number of Expanded Access requests, including more than 45 Expanded Access requests in fiscal year 2018. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Institutional support for Expanded Access requests within a large academic medical center is feasible and can increase access to investigational therapies for patients.

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### Early findings from a real-world RCT: Acceptance and commitment therapy (ACT) for persistent pain in an integrated primary care setting

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**OBJECTIVES/SPECIFIC AIMS:** This study seeks to test the feasibility and effectiveness of a brief Acceptance and commitment therapy (ACT) treatment for patients with persistent pain in a patient-centered medical home. **METHODS/STUDY POPULATION:** Participants are recruited via secure messaging, clinic advertisements and clinician referral. Primary care patients

age 18 and older with at least 1 pain condition for 12 weeks or more in duration are stratified based on pain severity ratings and randomized into (a) ACT intervention or (b) control group [Enhanced Treatment as Usual (E-TAU)]. Participants in the ACT arm attend 1 individual visit with an integrated behavioral health provider, followed by 3 weekly ACT classes and a booster class 2 months later. E-TAU participants will receive usual care plus patient education handouts informed by cognitive behavioral science. Currently, 17% of our overall goal of 60 patients have completed ACT or enhanced treatment as usual. Average participant age is 49 years old, 70% female, and 70% Hispanic/Latino. Most report multisite pain conditions (e.g., musculoskeletal, fibromyalgia) and 30% are taking opioid medications. Data analysis in this presentation will include early correlational findings from baseline assessments. Upon study completion, we will analyze data using a general linear mixed regression model with repeated measures. **RESULTS/ANTICIPATED RESULTS:** The overall hypothesis is that brief ACT treatment reduces physical disability in patients with persistent pain when delivered by an integrated behavioral health provider in primary care. By examining a subset of patients on opioid medications, we also anticipate a reduction in opioid misuse behaviors. Additionally, it is anticipated that improvements in patient functioning will be mediated by patient change in pain acceptance and patient engagement in values-consistent behaviors. **DISCUSSION/SIGNIFICANCE OF IMPACT:** This pilot study will establish preliminary data about the feasibility and effectiveness of addressing persistent pain in a generalizable, “real-world” integrated primary care setting. Data will help support a larger trial in the future. If effective, findings could improve treatment methods and quality of life for patients with persistent pain using a scalable approach.

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### Evolution of the interdisciplinary co-citation network supported by the Georgia Clinical and Translational Science Alliance Program from 2006 through 2016

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**OBJECTIVES/SPECIFIC AIMS:** The National Institutes of Health (NIH) has provided continual support for the Georgia Clinical and Translational Science Alliance (CTSA) since 2006. An overarching goal of the Georgia CTSA is to accelerate clinical and translational research to impact health in Georgia and beyond. Toward these ends, a primary objective has been to support interdisciplinary research projects encompassing 2 or more disciplinary domains. The goal of the present study is to evaluate the degree to which interdisciplinary research projects increased in prevalence during the first decade of funding. **METHODS/STUDY POPULATION:** We began by using PubMed to identify all publications citing the Georgia CTSA hub (n = 1865), categorizing each article as encompassing 1 or more research domain using a taxonomy derived from the Web of Science. We created 1 network for each of the 10 years with nodes representing research areas and ties between pairs of nodes representing the presence of 1 or more publication integrating both research areas. We conducted longitudinal network analyses using an approach called MCMC MLE Temporal Exponential Random Graph Models, which models the antecedents of networks over time. **RESULTS/ANTICIPATED RESULTS:** Supporting Georgia CTSA objectives, results suggest the probability of publications connecting multiple research areas increased over time, with substantially greater increases appearing initially as compared to later years. **DISCUSSION/SIGNIFICANCE OF IMPACT:** This study advances an innovative approach to modeling the system-wide impact of CTSA hub funding.

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### Exploring the relationships between acculturation, discrimination and function in older African immigrants: A dissertation study

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**OBJECTIVES/SPECIFIC AIMS:** Acculturation and discrimination are associated with negative health outcomes including functional disability. The effect of these on functional disability in older African immigrants in the United States is not well understood. The purpose of this study is to describe and examine the experiences of acculturation, racial discrimination and functional disability in older African immigrants. **METHODS/STUDY POPULATION:** This study will use cross-sectional quantitative and qualitative mixed methods design. We plan