

# A Regional Assessment of Medicaid Access to Outpatient Orthopaedic Care: The Influence of Population Density and Proximity to Academic Medical Centers on Patient Access

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**Background:** Access to care is limited for patients with Medicaid with many conditions, but data investigating this relationship in the orthopaedic literature are limited. The purpose of this study was to investigate the relationship between health insurance status and access to care for a diverse group of adult orthopaedic patients, specifically if access to orthopaedic care is influenced by population density or distance from academic teaching hospitals.

**Methods:** Two hundred and three orthopaedic practices within the state of North Carolina were randomly selected and were contacted on two different occasions separated by three weeks. An appointment was requested for a fictitious adult orthopaedic patient with a potential surgical problem. Injury scenarios included patients with acute rotator cuff tears, zone-II flexor tendon lacerations, and acute lumbar disc herniations. Insurance status was reported as Medicaid at the time of the first request and private insurance at the time of the second request. County population density and the distance from each practice to the nearest academic hospital were recorded.

**Results:** Of the 203 practices, 119 (59%) offered the patient with Medicaid an appointment within two weeks, and 160 (79%) offered the patient with private insurance an appointment within this time period ( $p < 0.001$ ). Practices in rural counties were more likely to offer patients with Medicaid an appointment as compared with practices in urban counties (odds ratio, 2.25 [95% confidence interval, 1.16 to 4.34];  $p = 0.016$ ). Practices more than sixty miles from academic hospitals were more likely to accept patients with Medicaid than practices closer to academic hospitals (odds ratio, 3.35 [95% confidence interval, 1.44 to 7.83];  $p = 0.005$ ).

**Conclusions:** Access to orthopaedic care was significantly decreased for patients with Medicaid. Practices in less populous areas were more likely to offer an appointment to patients with Medicaid than practices in more populous areas. Practices that were farther from academic hospitals were more likely to offer an appointment to patients with Medicaid than practices closer to academic hospitals.

**Clinical Relevance:** This study illustrates the barriers to timely outpatient orthopaedic care that patients with Medicaid face. The findings from our study imply that patients with Medicaid in more populous areas and in areas closer to academic medical centers are less likely to obtain an outpatient orthopaedic appointment than patients with Medicaid in less populous areas and in areas more distant from academic medical centers. A shift in policy to enhance access to orthopaedic care for patients with Medicaid, especially those in urban areas and areas close to academic medical centers, will become increasingly important as more patients become eligible for Medicaid through the Patient Protection and Affordable Care Act of 2010.

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The American Academy of Orthopaedic Surgeons (AAOS) voiced their support for improved access to care for all orthopaedic patients in a position statement on health-care reform and specialty care<sup>1</sup>. The AAOS has argued that: “everyone within the United States should receive access to health care coverage—including specialty care—without financial barriers or undue burdens placed on the patient or physician.” Although this is the position of the AAOS, disparities in access to orthopaedic care based on patient insurance status have been illustrated in both adult and pediatric populations<sup>2-6</sup>. Skaggs et al. investigated access to care based on insurance status for a fictitious pediatric patient with a forearm fracture and found that a patient with Medicaid was less likely to obtain outpatient care compared with a patient with private insurance<sup>2</sup>. A similar model has demonstrated decreased access to care for adolescent patients with Medicaid requiring anterior cruciate ligament (ACL) reconstruction<sup>3</sup>. Similar results have been documented in the primary care literature where lower socioeconomic status has been linked to decreased access to care<sup>7</sup>. The use of a fictitious patient scenario has been validated in the pediatric orthopaedic literature as previously described<sup>5,6</sup>; however, to our knowledge, prior to work by our group, such an approach had not been utilized in the adult orthopaedic population.

The Patient Protection and Affordable Care Act of 2010 (PPACA) will dramatically increase the number of patients insured by Medicaid, with the potential to add up to 15.1 million new Medicaid recipients throughout the United States<sup>8,9</sup>. Calfee et al. investigated patients with hand and upper-extremity conditions and found that patients with Medicaid were traveling farther distances for appointments with specialists than patients with private insurance or Medicare<sup>10</sup>. For patients undergoing total hip arthroplasty, similar results have been seen, as patients with Medicaid were driving farther to obtain care at an academic hospital than patients with private insurance or Medicare<sup>11</sup>. These findings are in contrast to other published literature, as there is evidence indicating that rural pediatric and primary care practices are more likely to accept patients with Medicaid compared with similar practices in urban settings<sup>12,13</sup>.

The purpose of this study was to determine access to orthopaedic care based on insurance status in the state of North Carolina for three different orthopaedic problems. This study sought to identify demographic and geographic trends, such as population density and geographic distance to academic medical centers, which may correlate with access to orthopaedic care.

### Materials and Methods

This study was presented to our institutional review board and was given exempt status.

Two hundred and thirty-four orthopaedic offices within the state of North Carolina were identified using the online Yellow Pages ([www.yellowpages.com](http://www.yellowpages.com))<sup>14</sup>. Multiple searches were performed using the terms “orthopaedic,” “orthopaedic surgeon,” “orthopedic,” and “orthopedic surgeon.” Additionally, the terms “spine surgeon,” “neurosurgeon,” and “spine” were used to identify spine surgery practices. This previously described search technique allowed us to identify every

publicly listed private and academic orthopaedic practice and spine surgery practice within the state of North Carolina<sup>3,5,6</sup>. From this list, three samplings of practices were selected.

Practices were contacted on two occasions separated by three weeks with the fictitious presentation of identical patients with either Medicaid or private insurance to determine the ability of each patient to obtain an outpatient clinic appointment. During the first call, the practice was informed that the patient had North Carolina state-issued Medicaid. Three weeks later, during the second call, the same script was followed and the practice was told that the patient had private insurance. We reported Blue Cross Blue Shield as the hypothetical patient’s private insurance plan because Blue Cross Blue Shield is the largest private insurer in North Carolina, holding 41% of the market share in 2011<sup>15</sup>. In each case, an attempt to create a patient scenario with a high likelihood of urgent surgical treatment was made.

The primary outcome measure recorded from each call was whether or not an appointment was offered. If an appointment was offered, the number of days to the offered appointment was recorded. The number of days until appointment was recorded as a continuous variable and later was regrouped to a categorical variable to determine if the practice did or did not offer an appointment within two weeks of the appointment request. If no appointment was offered, the reason that an appointment was not offered was recorded, and an alternative practice was requested and was recorded.

### Access to Care for Acute Rotator Cuff Tears

The first sampling of seventy-five practices was generated from the complete list of 234 orthopaedic practices with a random number generator. For each call, the practices were read the following script: “My forty-two-year-old brother fell from a ladder two days ago while painting his house and injured his shoulder. He was seen at an emergency room, an MRI [magnetic resonance image] was obtained, and he was diagnosed with a rotator cuff tear. The treating emergency room physician recommended that he see an orthopaedic surgeon within two weeks as he will likely require surgery.”

Four of these practices were excluded because, when contacted, they reported that they no longer had an active orthopaedic surgeon on staff or they did not perform shoulder surgery. This left a total of seventy-one practices for our study sample.

### Access to Care for Acute Flexor Tendon Lacerations

A second sampling of 100 practices was generated from the complete list of 234 orthopaedic practices with a random number generator. For each call to the practices, the following script was read: “My twenty-eight-year-old brother was visiting me from out of state and cut his middle finger on a kitchen knife last night. He was seen at an emergency room where he was diagnosed with a cut flexor tendon. The emergency room doctor stitched up his skin and bandaged his hand. He was told to follow up with an orthopaedic surgeon within two weeks for possible surgery.”

**TABLE I Appointment Offerings Based on Insurance Status and Practice Location (Population Size)**

County Population	Appointments Offered*†	
	Medicaid	Private Insurance
Rural (<250,000 population)	89 (65%)	113 (83%)
Urban (≥250,000 population)	38 (57%)	59 (88%)

\*The values are given as the number of practices offering appointments, with the percentage in parentheses. †Significance was  $p = 0.001$  for insurance type,  $p = 0.354$  for population size, and  $p = 0.016$  for interaction.

Thirteen practices were excluded from the final sample because, when contacted with both Medicaid and private insurance scenarios, these practices reported that they did not have an active hand surgeon on staff.

### Access to Care for Acute Lumbar Disc Herniations

A list of all spine surgery practices in North Carolina, both orthopaedic and neurosurgical, was compiled through the use of the search criteria listed above. This yielded a list of forty-five practices from the database containing all 234 practices within North Carolina. For each call to the practices, the following script was read: "My twenty-eight-year-old brother was visiting me from out of state and hurt his back while helping me move furniture yesterday. He was experiencing severe back pain and weakness in his leg, so we went to an emergency room. An MRI was obtained, and he was diagnosed with an acute lumbar disc herniation. The emergency room doctor told him to follow up with a spine surgeon within two weeks for possible surgery."

### Access to Care for Patients with Medicaid Based on Population and Distance to the Nearest Academic Orthopaedic Institution

Appointment data for the patient with Medicaid and the patient with private insurance were compiled for all three scenarios. United States Census data from 2010 was used to determine the population of each of North Carolina's 100 counties. The distance and driving time of each practice to the nearest academic orthopaedic institution were determined using mapping software. Driving distance was analyzed as both a continuous variable and a dichotomous variable. To define driving distance as a categorical variable, a distance of sixty miles from the closest academic medical center was used as the cutoff value. We selected sixty miles as the cutoff value because previous literature has shown that, on average, patients with Medicaid drive at least sixty miles for outpatient orthopaedic care for elective surgery<sup>11</sup>. Population size was analyzed as a continuous and dichotomous variable. To best stratify urban and rural counties, we defined an urban county as one with a population of  $\geq 250,000$  and a rural county as one with a population of  $< 250,000$ .

### Statistical Methods

A logistic regression was fit to compare appointment offerings between the Medicaid and private insurance groups, with adjustment for possible correlation between two responses from the same practice using robust variance estimation. Because of a nested structure when several practices had the same

population data, multilevel analysis was performed to determine the correlation between the county population size and the offering of an appointment to a patient with Medicaid. A similar approach was taken for the correlation between the distance to the nearest academic orthopaedic center and the offering of an appointment to a patient with Medicaid. The aforementioned analysis was further adjusted for the type of cases because the acceptance rate was significantly different between cases. We reported the adjusted odds ratio, and significance was set at  $p < 0.05$ .

### Source of Funding

No external funding was used to support this study.

### Results

#### Overall Appointment Offerings for Patients with Medicaid or Private Insurance

Of the 220 practices selected, 203 were included and were contacted on two occasions separated by three weeks. In the 203 practices in the study, 119 (59%) offered an appointment within the following two weeks to the hypothetical patients with Medicaid and 160 (79%) offered an appointment within two weeks to the hypothetical patients with private insurance; this difference was significant ( $p < 0.001$ ). When a practice offered an appointment outside of the requested two-week time frame, those responses were also recorded. In the 203 practices, 127 (63%) offered an appointment at any time point to patients with Medicaid and 172 (85%) offered an appointment at any time point to patients with private insurance; this difference was also significant ( $p < 0.001$ ). The odds of obtaining an appointment at any time point were significantly higher for patients with private insurance compared with those with Medicaid (odds ratio, 3.32 [95% confidence interval (CI), 2.27 to 4.86];  $p < 0.001$ ). The association remained significant after adjustment for the type of cases (odds ratio, 3.57 [95% CI, 2.39 to 5.32];  $p < 0.001$ ). Practice responses for each patient scenario are illustrated in Figures 1 and 2<sup>5,6</sup>.

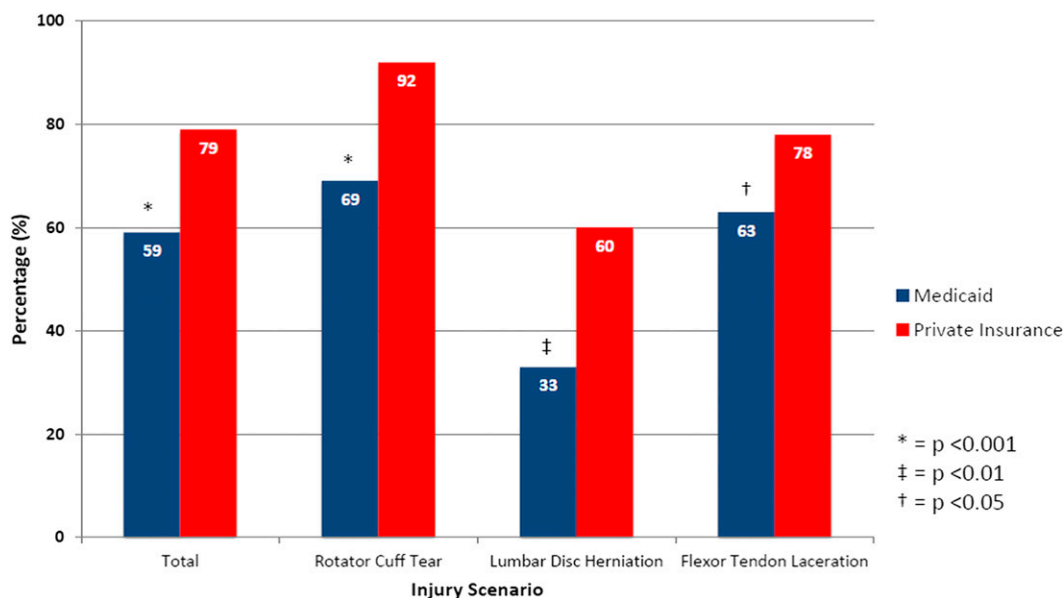


Fig. 1  
Practice responses and percentage of appointment offerings for patients with Medicaid compared with patients with private insurance. Patients with Medicaid were significantly less likely to obtain an outpatient orthopaedic appointment within two weeks of appointment request ( $p < 0.05$ )<sup>5,6</sup>.

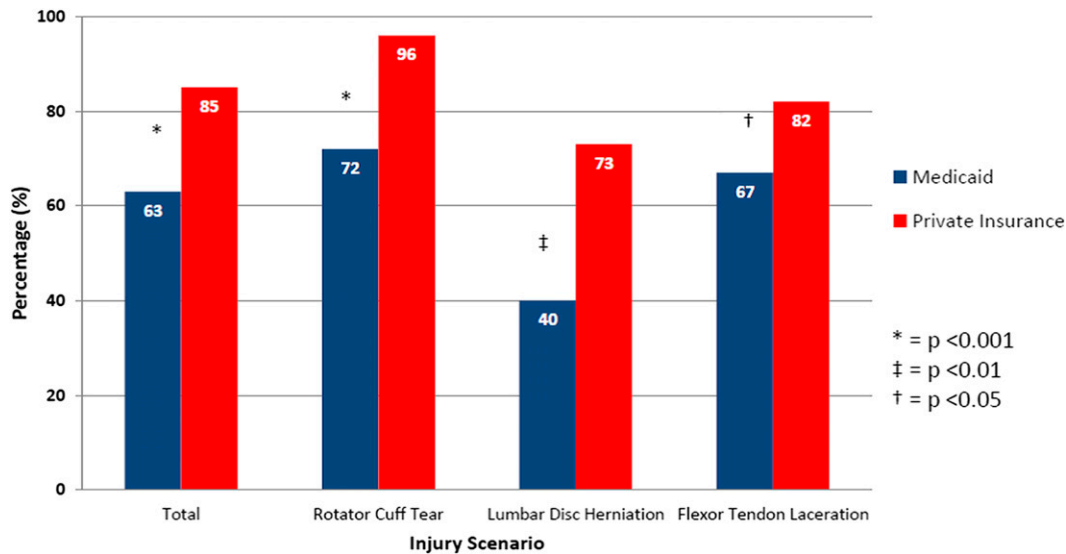


Fig. 2

Practice responses and percentage of appointment offerings for patients with Medicaid compared with patients with private insurance. Patients with Medicaid were significantly less likely to obtain an outpatient orthopaedic appointment at any time point ( $p < 0.05$ )<sup>5,6</sup>.

#### Population Size as It Relates to Appointment Offerings

As illustrated in Figures 3 and 4, our analysis indicates that practices in less populated areas were more likely to offer appointments to patients with Medicaid than practices in more populated areas (odds ratio, 1.01 [95% CI, 1.00 to 1.02];  $p = 0.003$ ). When population size was analyzed as a dichotomous variable, practices located in rural counties (population of  $< 250,000$ ) were more likely to offer a patient with Medicaid an

appointment as compared with practices in urban counties (population of  $\geq 250,000$ ) (odds ratio, 2.25 [95% CI, 1.16 to 4.34];  $p = 0.016$ ) (Table I).

#### Driving Distance and Driving Time as They Relate to Appointment Offerings

Practices farther from academic hospitals were more likely to offer an appointment to patients with Medicaid compared with

### Medicaid Appointment Offerings by County and Population

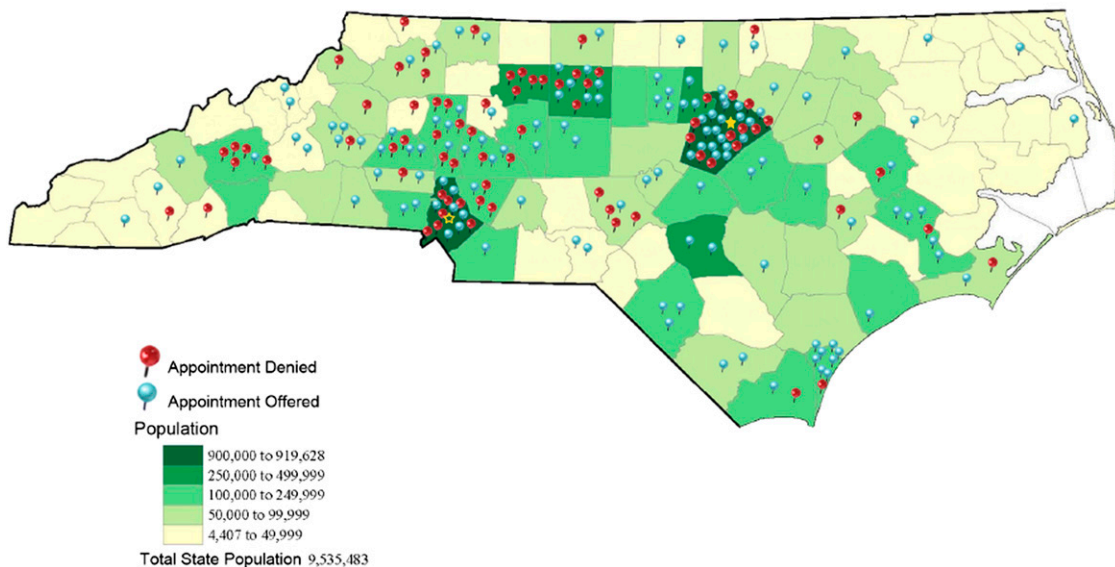


Fig. 3

Practice location and appointment offerings for patients with Medicaid by county and population. Practices in less populous counties were more likely to offer an outpatient orthopaedic appointment to patients with Medicaid as compared with practices in more populous counties.



### Private Insurance Appointment Offerings by County and Population

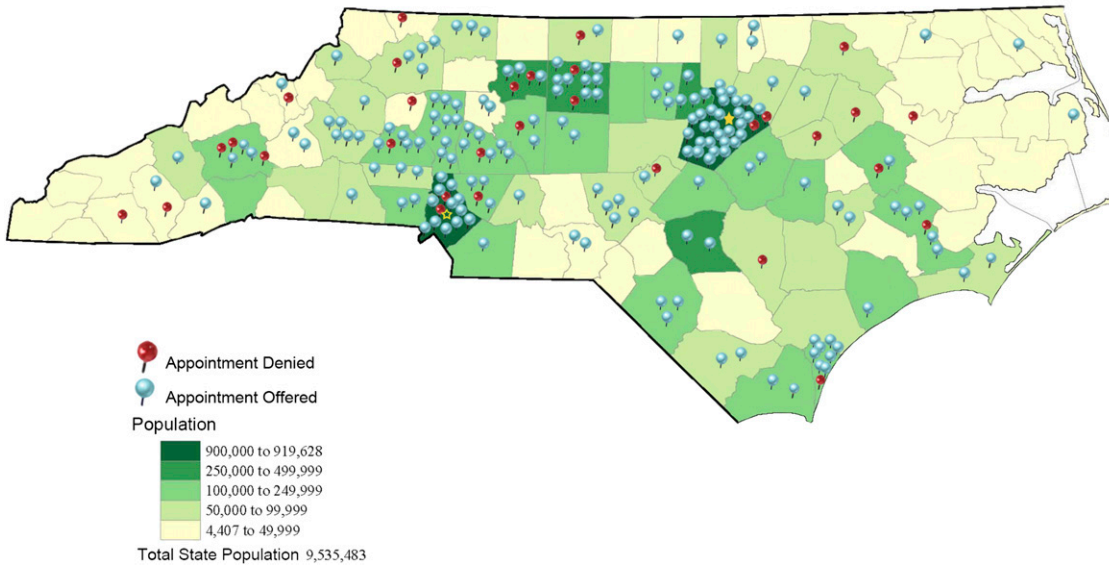


Fig. 4  
Practice location and appointment offerings for patients with private insurance by county and population.

practices closer to academic medical centers. These correlations were significant for both driving distance in miles (odds ratio, 1.01 [95% CI, 1.00 to 1.02];  $p = 0.004$ ) and driving time in minutes (odds ratio, 1.01 [95% CI, 1.00 to 1.02];  $p = 0.002$ ). Practices more than sixty miles from academic centers were

more likely to accept Medicaid compared with practices that were less than sixty miles from academic centers (odds ratio, 3.35 [95% CI, 1.44 to 7.83];  $p = 0.005$ ) (Table II) (Fig. 5). Practices located more than sixty minutes from academic hospitals were more likely to accept Medicaid compared with

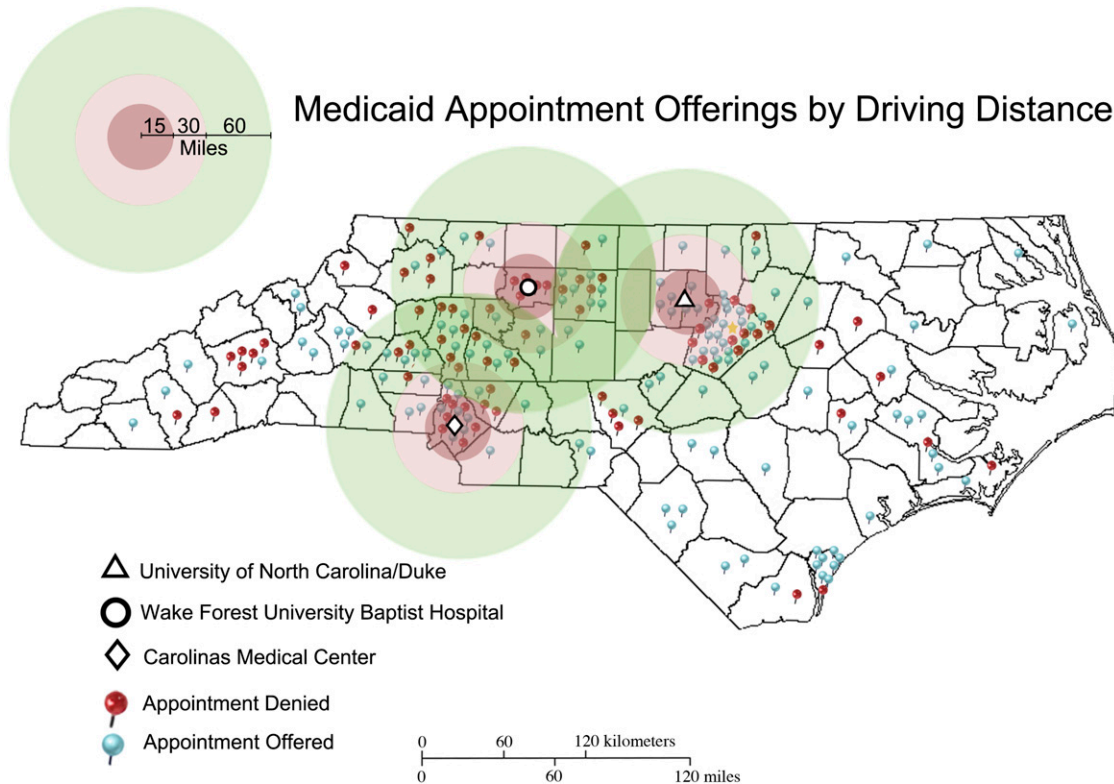


Fig. 5  
Medicaid appointment offerings by driving distance from academic hospitals. Practices more than sixty miles from an academic medical center were significantly more likely to offer an appointment to a patient with Medicaid than practices within sixty miles of an academic medical center.

**TABLE II Appointment Offerings Based on Insurance Status and Practice Location (Driving Distance from the Closest Academic Medical Center)**

Driving Distance	Appointments Offered*†	
	Medicaid	Private Insurance
Near (less than sixty miles)	77 (60%)	114 (89%)
Far (sixty miles or more)	50 (67%)	58 (77%)

\*The values are given as the number of practices offering appointments, with the percentage in parentheses. †Significance was  $p < 0.001$  for insurance type,  $p = 0.030$  for distance, and  $p = 0.005$  for interaction.

practices less than sixty minutes from academic hospitals (odds ratio, 3.49 [95% CI, 1.51 to 8.06];  $p = 0.003$ ).

### Discussion

This study confirms and quantifies the decreased access to care for a diverse group of orthopaedic patients with Medicaid compared with those with private insurance within the state of North Carolina. Patients with Medicaid were not only less likely to receive outpatient appointments for orthopaedic care, but they were also less likely to receive appointments in a timely manner even when the time until the appointment may negatively impact their overall care and prognosis.

Recent literature has shown health disparities for adult patients with Medicaid. Time to diagnosis for an adult patient with an ACL tear was increased in patients with Medicaid compared with those with private insurance<sup>4</sup>. A national review of hospital discharge records indicates that patients with Medicaid were less likely to undergo anterior cervical spine surgery compared with patients with Medicare or private insurance<sup>16</sup>. Patients with Medicaid not only had limited access to care, but they also scored lower on preoperative functional outcome scales compared with patients with private insurance<sup>17</sup>.

Previous work by our group has revealed decreased access to outpatient orthopaedic appointments for patients with Medicaid compared with patients with private insurance<sup>5,6</sup>. Our current study found that practices in less populous areas were more likely to offer an appointment for outpatient orthopaedic services to a patient with Medicaid than practices in more populous areas. Although our results did not identify population as a dramatic indicator of patient access to care on the basis of insurance status, we do believe that our data indicate valuable trends in access to care as it relates to population. There is generally a higher concentration of orthopaedic practices in areas of greater population, fostering competition. We hypothesize that such competition may encourage practices to accept fewer patients with Medicaid in exchange for the acceptance of more patients with private insurance, which may, in turn, be more lucrative. In a national survey of 230 orthopaedic practices, a direct correlation was found between reimbursement rates and access to care for patients with Medicaid<sup>18</sup>. In the primary care literature, similar correlations have been documented linking low

Medicaid-to-Medicare fee ratios with decreased access to care for patients with Medicaid<sup>19</sup>.

It has been previously shown that among hospitals, a wide variation in price exists for elective orthopaedic surgical procedures<sup>20</sup>. It has also been well documented that the total cost for common orthopaedic services is significantly higher in the United States, compared with countries with single-payer systems<sup>21</sup>. It is also well understood that Medicare has different reimbursement rates for various surgical procedures. The Centers for Medicare & Medicaid Services list the Medicare reimbursement facility fees as \$1087.16 for flexor tendon repair, \$974.50 for lumbar discectomy, and \$1080.01 for arthroscopic rotator cuff repair<sup>22-24</sup>.

To further evaluate the reimbursement rates of patients with private insurance or Medicaid, we contacted the billing department at our research institution (a large tertiary academic medical center). The average provider reimbursement for patients with Medicaid undergoing zone-II flexor tendon repair, lumbar discectomy, or arthroscopic rotator cuff repair was \$1200 less than that for patients with private insurance with similar conditions at our institution. Although private insurance provider reimbursement rates vary depending on institution and type of insurance, Medicaid reimbursement rates are more standardized throughout the state, and we do not believe that this would lead to incentives or disincentives for a specific practice to accept or to decline patients with Medicaid in North Carolina.

Our data indicate that a patient with Medicaid was more likely to obtain an outpatient orthopaedic clinic appointment at a practice farther away from an academic center than at a practice closer to an academic center. We speculate that this may be due to numerous factors. Practices more geographically isolated from academic centers may feel less comfortable asking a patient to pursue an appointment at a facility hours away than practices in closer proximity to academic centers. Because practices closer to academic centers are typically located in more populous areas and have a larger patient base, it could allow such groups to have more stringent policies for new patient acceptance, including payer mix. Our results indicate that distance to an academic medical center may be a more important factor in determining access to care for patients with Medicaid than population, although we did not specifically examine this relationship.

This study had many strengths. This study included a large and diverse group of practices that were randomly selected from a database created from yellowpages.com. We chose yellowpages.com to generate this database because it is a source that is likely to be used by patients in need of an orthopaedic surgeon. A strength of this study was the use of a hypothetical scenario to practices blinded to its purpose for data collection. By requesting appointments for patients with rotator cuff tears, flexor tendon lacerations, or lumbar disc herniations, we increased the heterogeneity of our hypothetical patient population.

Our study had limitations. Although the script for each appointment request was standardized, there were slight variations in

the appointment-making protocol for each practice. The research team systematically presented all pertinent patient information including patient age, date of injury, and insurance status. We attempted to formulate scenarios under which prompt orthopaedic care is typically recommended, although some of the practices contacted may not have thought that such urgent care was warranted for the hypothetical patients presented. Another limitation of this study was that the data may not be generalizable to every state outside of North Carolina, although North Carolina has both urban and rural areas with a total of four academic medical centers located in counties with higher population density. This same geographic trend is likely to be present in several states outside of North Carolina. It should also be noted that Medicaid reimbursement rates are not uniform throughout the United States with some states reimbursing more for Medicaid than others. In 2012, North Carolina ranked 15th in the Medicaid physician fee index, and North Carolina ranks 12th in regard to the Medicaid-to-Medicare fee ratio when compared with all states throughout the nation<sup>25</sup>. Our results are therefore likely applicable to states with similar Medicaid reimbursement levels.

The PPACA will increase Medicaid coverage to individuals with incomes at or below 133% of the poverty level, depending on each state's decision to expand Medicaid coverage<sup>26,27</sup>. With the implementation of the PPACA, the Medicaid-to-Medicare ratio will increase up to 73% for many primary care services<sup>27</sup>. Prior evidence has shown that higher Medicaid physician payments are associated with increased access to care for patients with Medicaid<sup>28</sup>. Although not currently included in the PPACA, increased Medicaid reimbursements for specialty surgical services such as orthopaedic care could have a profound impact on access to orthopaedic care for patients with Medicaid.

Our data confirm that there is decreased access to outpatient orthopaedic care for patients with Medicaid. Furthermore,

we have described two important risk factors for decreased access to care for patients with Medicaid, including the distance from an academic medical center and the population size of the county in which a particular orthopaedic practice is located. Our findings have major implications for the Medicaid population. Patients with Medicaid living in urban areas face greater challenges in access to outpatient orthopaedic care, while patients with Medicaid living in rural areas may be more likely to gain access to outpatient orthopaedic care than previously thought. Future public health efforts and health policies that strive to increase Medicaid coverage and to improve access to quality care will help to eliminate disparities for orthopaedic patients with differing payer status. ■

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