

Yale University

## EliScholar – A Digital Platform for Scholarly Publishing at Yale

---

Yale Medicine Thesis Digital Library

School of Medicine

---

1-1-2021

### Preauthorizations In Orthopaedic Surgery: An Analysis Of A Single Institution's Spine Center

Kareem Jamal Kebaish

Follow this and additional works at: <https://elischolar.library.yale.edu/ymtdl>



Part of the [Medicine and Health Sciences Commons](#)

---

#### Recommended Citation

Kebaish, Kareem Jamal, "Preauthorizations In Orthopaedic Surgery: An Analysis Of A Single Institution's Spine Center" (2021). *Yale Medicine Thesis Digital Library*. 4007.

<https://elischolar.library.yale.edu/ymtdl/4007>

This Open Access Thesis is brought to you for free and open access by the School of Medicine at EliScholar – A Digital Platform for Scholarly Publishing at Yale. It has been accepted for inclusion in Yale Medicine Thesis Digital Library by an authorized administrator of EliScholar – A Digital Platform for Scholarly Publishing at Yale. For more information, please contact [elischolar@yale.edu](mailto:elischolar@yale.edu).

Preauthorizations in Orthopaedic Surgery: An Analysis of a Single Institution's Spine Center

A Thesis Submitted to the  
Yale University School of Medicine  
in Partial Fulfillment of the Requirements for the  
Degree of Doctor of Medicine

Kareem Jamal Kebaish

2021

## Abstract

### Introduction

Preauthorizations are frequently required by commercial insurers before patients can undergo magnetic resonance imaging (MRI) of the spine. In addition to the administrative burden, such processes can lead to delays in care. The current study assessed the rates and eventual disposition of preauthorizations required prior to spine MRIs ordered from an academic spine center.

### Methods

Patients from a single academic institution's spine center who were covered by commercial insurance and referred for a spine MRI between January 2013 and December 2019 were included in the analysis. The requirement for preauthorization and eventual disposition of each of these studies was tracked. Multivariate logistic regressions were then used to determine if commercial insurance carrier or anatomic region of requested MRIs were associated with requiring a preauthorization.

### Results

In total, 2,480 MRI requests were included in the analysis. Of these, preauthorization was needed for 2,122 (85.56%). Of the studies requiring a preauthorization, peer to peer was required for 204 (8.23% of the total studies ordered) (Figure 1).

Of the studies requiring preauthorization, 375 (17.67%) were initially cancelled or denied. Of those denied, 204 underwent peer to peer review, and 59 (28.92%) of those peer to peer requests were denied or cancelled.

Of the cancelled or denied studies, 290 (77.33%) went on to be completed within three months. In total, only 85 (3.43% of the originally ordered MRIs) were not eventually approved and completed.

Relative to the control insurer, four of the five commercial carriers had statistically significant increased odds of requiring preauthorization (OR=1.54 to 10.17  $p<0.050$ ). Relative to cervical spine scans, preauthorization was required more for thoracic (OR=2.71,  $p=0.003$ ) and lumbar (OR=2.46,  $p<0.001$ ) regions.

### Discussion/Conclusion

Of 2480 distinct MRI orders, commercial insurers required preauthorization for 85.56% and peer to peer for 204 (8.23% of the total scans ordered). Nonetheless 2395 (96.57%) of the scans went on to be completed, and only 85 (3.43%) were not completed. Further research on the costs and benefits of this administrative paradigm is encouraged.

## Acknowledgements

The author wishes to acknowledge and express sincere gratitude to the following individuals and groups for providing valuable mentorship, guidance, intellectual contributions, and support of this thesis.

Jonathan Grauer, MD, whose incredible guidance, mentorship, and support made this dissertation possible; the faculty of the Yale Department of Orthopaedic Surgery, who have encouraged my intellectual curiosity and provided me with unwavering support to pursue a career in Orthopaedic Surgery, especially Lee Rubin, MD, Arya Varthi, MD, Adrienne Socci, MD, Michael Medvecky, MD, Michael Leslie, DO, Brad Yoo, MD, and Lisa Lattanza, MD; the members of Dr. Grauer's lab team who made this study possible, including Anoop Galivanche, BS and Michael Mercier, BA.

Finally, I would like to acknowledge my family and friends who have been a constant source of encouragement throughout my educational career especially Esmat Radwan, Gamal Kebaish, Khaled Kebaish, Amre Kebaish, Mohamed Kebaish, Shreef Kebaish, Jessie Li, Joshua Hyman, Ronan Talty, Sina Torabi, Benjamin Steren, Chaarushi Ahuja, and Connor Peck.



## Table of Contents

1. Introduction.....	1
I.    What is a Preauthorization?.....	1
II.   The Preauthorization Process.....	1
III.  Medicare Preauthorization Policies.....	2
IV.   What is the reason for implementing Preauthorizations?.....	4
V.    Summary of Preauthorization Literature.....	5
VI.   What is the Legislation Surrounding Preauthorizations? .....	8
VII.  What is the role of Preauthorizations in Orthopaedic Surgery? .....	11
2. Statement of Purpose.....	14
3. Methods.....	16
I.    Student Contribution.....	16
II.   Ethics Statement.....	16
III.  Methods Description.....	16
IV.   Statistical Methods.....	20
4. Results.....	21
I.    Patient Demographics.....	21
II.   Preauthorization Requirement Trends.....	23
III.  Factors Associated with Preauthorization requirements.....	23
IV.   Outcomes of the Preauthorization Process.....	25
V.    Administrative Burden and Cost Analysis of Preauthorizations.....	26
5. Discussion.....	29
I.    Brief Summary.....	29

II.	Preauthorization Requirement Trends.....	30
III.	High Rates of Preauthorization Approval.....	30
IV.	The Economics of Preauthorization.....	31
V.	Preauthorization Impact on Patient Care.....	32
VI.	The Importance of Regulating Preauthorizations through Legislation.....	34
VII.	Limitations.....	35
VIII.	Conclusion.....	36
6.	References.....	38

## Introduction

### **I. What is a Preauthorization?**

Preauthorization is an insurance practice designed to ensure appropriate utilization of healthcare resources. The process involves obtaining permission from a patient's health insurance company before providing certain medical services. Such services can include medication prescriptions, diagnostic imaging, and surgical procedures.

In general, high cost services, such as new drugs with generic alternatives or advanced imaging, tend to require preauthorization. Preauthorization requirements can vary across different insurance companies and their individual coverage plans. Insurers may publish coverage policies, which outline their specific guidelines and the requirements that must be met prior to granting preauthorization for a medical service.

### **II. The Preauthorization Process**

The preauthorization process begins when a provider orders a medical service that requires preauthorization from a patient's insurance company. Administrative and billing staff from the provider's practice are then tasked with completing paperwork and forms required by the insurer. This initial paper work typically describes the clinical indications for providing the ordered medical service. The insurance companies review the submitted forms and can issue a variety of responses. Ideally, the initial response is an approval indicating that the insurance company is willing to provide coverage for the service.

Other possible outcomes include requests for additional paperwork or denials. The additional paperwork is typically for the insurance company to verify that the patient has met the appropriate criteria to receive the service, such as a sufficient duration of conservative treatment or an

inadequate response to first line agents. After reviewing the additional paperwork, insurance company can then issue an approval, denial, or another request for additional information.

When an insurance company issues a denial, providers and patients are faced with a decision on the next step of action. One possibility is that the patient or provider may agree that the service is unnecessary. Alternatively, the patient may choose to pay for the service as an out of pocket expense. Finally, if the provider feels that the insurance company's decision was inappropriate, the provider can challenge the decision through an appeal process.

During the appeal process, the provider is tasked with providing an argument for why the requested service is necessary. This can be accomplished in a few ways, such as providing additional patient history or requesting a peer-to-peer discussion. In a peer-to-peer discussion, the patient's provider schedules a telephone call with a provider affiliated with the insurance company and provides justification for the why the requested service should be covered.

### **III. Medicare Preauthorization Policies**

Understanding the frame work of preauthorizations for Medicare patients is complex, and adding to this complexity are Medicare Advantage plans (also known as Medicare Part C). The terms 'Original Medicare' or 'Traditional Medicare' are used to refer to Medicare Part A and B. Medicare Part A covers inpatient hospital expenses, skilled nursing facilities, home health care, and hospice care. Patients are typically automatically enrolled in Part A, without needing to pay premiums, when they begin receiving social security benefits. Medicare Part B covers office visits and outpatient hospital services, and requires beneficiaries to pay a monthly premium. Medicare Part D covers prescription drug costs, and Medicare beneficiaries must pay a monthly premium to add this benefit. Finally, Medicare Advantage Part C allows a private insurance company to manage a beneficiary's Medicare Part A and B benefits. In Medicare Advantage, patients typically

pay a monthly premium to the private insurer, and the plan includes additional benefits such as Medicare Part D, vision, and dental coverage.

Original Medicare plans, Parts A and B, historically did not require preauthorization for services. However, in October of 2016, Medicare announced it would begin exploring a nationwide preauthorization model for non-emergent ambulance transportation to reduce expenditures after trialing it in three states in 2014 and 2015.<sup>1</sup> The policy was continually renewed and expanded over the next few years, culminating in the announcements of nationwide implementation of the policy in November of 2020.

Similar to the implementation of the transportation preauthorization policy, in December of 2016 Medicare announced that it would begin to require preauthorization for certain durable medical equipment and supplies in July of 2017, with intentions of expanding preauthorization policies to other services.<sup>2</sup> Throughout 2018, 2019, and 2020, Medicare continued to expand the preauthorization policy to include additional Durable Medical Equipment.

In November of 2019, Medicare announced that, starting in July of 2020, preauthorization would be required for five hospital outpatient department services.<sup>3</sup> The policy targeted cosmetic procedures, which were blepharoplasty, botulinum toxin injections, panniculectomy, rhinoplasty, and vein ablation. Medicare's recent history of rapidly implementing preauthorization policies regarding non-emergency transportation, durable medical equipment, and outpatient department services suggests a probable trajectory of policy expansion.

Medicare Advantage Part C and D plans are only offered by private companies. Therefore, the preauthorization policies can be considered analogous to private insurance, in which the preauthorization requirements depend on specific insurers and plans. Medicare Advantage Part C plans spark an interesting policy discussion. While some premium-free plans exist, many patients

pay a premium for their Medicare Advantage plans for access to additional benefits. The result is that private insurers receive payment from the government as well as the patient, while gaining the ability to require preauthorizations for services that do not require preauthorization through traditional Medicare. It is important to note that Medicare Advantage policies may still be the fiscally appropriate choice for some patients. For these reasons, it is prudent that patients be educated about the intricacies of such policies in order to make an informed decision.

The role of preauthorization in Part D is to ensure that the most cost-effective therapy is used before alternative options are explored. This model is referred to as Step Therapy, in which generic formulations are the preferred starting therapy and providers must document failure of less expensive therapies before prescribing more expensive alternatives.

#### **IV. What is the reason for implementing Preauthorizations?**

There are a multitude of arguments for the use of preauthorization, these include prevention of unnecessary or harmful healthcare services, reduced healthcare spending. Healthcare spending is a significant concern in the United States, as 17.8% of the United States gross domestic product was spent on healthcare in 2016.<sup>4</sup> Despite spending twice as much as other high-income countries, healthcare utilization in the United States was similar to those countries. Use of preauthorizations can reduce healthcare costs for both patients and insurance provider. Nevertheless, an insurance company that sets out to reduce spending through the use of preauthorizations leads to a potential for competing interests. While American health insurance serves a variety of purposes, one major purpose is to act as a safety net that ensures patient can receive appropriate healthcare without devastating financial outcomes. A for-profit health insurance company balances this goal with the goal of increasing their revenue.

On the other hand, patients can also benefit from the costs saved by preauthorizations. For example, a patient might be prescribed a high cost drug before trialing an equally effective low-cost generic alternative. Furthermore, preauthorizations can also serve as an additional review of drug interactions to ensure that a patient does not receive harmful drug combinations. With constant updates to the medical literature, insurance companies may have a greater capacity to review and apply the most recent findings.

Aside from reviewing prescribed medications, preauthorizations can help patients by saving them from the high cost of redundant imaging. For example, prior to referral to an orthopedic provider for knee pain, a referring provider may order knee MRIs in an effort to assist the orthopedic provider and reduce the number of visits. Through preauthorization, the insurance company can both review whether the patient has met criteria to receive an MRI and note whether recent imaging was already obtained. These efforts can reduce patient spending and spare them from having to undergo the arduous process of obtaining multiple MRI scans.

## **V. Summary of the Preauthorization Literature**

Investigating the effects of preauthorizations is an emerging topic in the medical literature, with a dearth of research across all specialties. Key areas necessitating investigation include patient outcomes, cost analyses, and administrative burden. Research on patient outcomes must include investigations into delays of care, complication rates, and adverse outcomes comparing patients who required preauthorizations to obtain care compared to those who did not. Cost analyses must assess the cost saving benefits for patients and insurance companies, as well the as the additional administrative costs that hospital must incur to process preauthorizations.

While a number of different metrics can be used to study and quantify administrative burden, patient outcomes are more difficult to investigate. Part of the reason for this is that knowing the

number of preauthorization requests and the ratio of approvals and denials provides a relatively complete picture of the administrative burden. On the other hand, preauthorizations can affect patient outcomes by delaying care or preventing care. The effect of delayed care is the most difficult to study as a temporal relationship between adverse outcomes must be demonstrated. Nevertheless, some studies have demonstrated poor patient outcomes as a result of preauthorizations preventing care.

In 2013 by Bergeson et. al. studied patients with type 2 diabetes mellitus who were prescribed diabetic medications requiring preauthorization.<sup>5</sup> The study found that patients who did not receive their medications had higher health care costs. Furthermore, only 32.1% of the patients who were denied preauthorization maintained their previous treatment regimen compared to 56.1% of patients who were approved but did not fill their prescription. A 2014 study by Seabury et. al. found that patients with schizophrenia who were subject to formulary restriction on atypical antipsychotics were more likely to be hospitalized, have higher inpatient costs, and higher total costs.<sup>6</sup>

In 2016, Goldstein et. al. published the findings of a two-year study investigating the preauthorization administrative burden at an HIV clinic.<sup>7</sup> The study found the average time spent by a nurse practitioner to be  $26.8 \pm 18.4$  minutes and by a clerk to be  $6.5 \pm 2.9$  minutes for each authorization. The average preauthorization request required  $5.8 \pm 6.5$  pages of paperwork to be completed. Approval rates were high, with 73% of preauthorizations receiving approval. The study estimated that the overall cost to the office per preauthorization was \$41.60.

Surveys of 1,000 physicians conducted by the American Medical Association in 2017 and 2019 found that 86% of reported increased administrative burden related to preauthorization requests in the past 5 years.<sup>8,9</sup> An average medical practice processes 29.1 preauthorization requests each

week, requiring 14.6 hours to complete. The studies also found that 79% of physicians reported needing to complete repetitive preauthorization requests for patients on stable treatment regimens for chronic conditions. Across both study years, 91-92% percent of physicians reported preauthorizations caused delayed access to necessary care. Finally, 90-92% of physicians perceived preauthorizations to have a negative effect on patient outcomes, with only 2% perceiving preauthorizations to have a positive effect.

In an article discussing the history of preauthorizations for medication prescriptions, Resneck argues that while preauthorizations initially focused on new and expensive drugs, the scope has become broad.<sup>10</sup> The author cites that between 2007 and 2019, preauthorization requirements for drugs covered by Medicare part D has risen from 8% to 24% of medications.<sup>11</sup> The required preauthorizations are also starting to include generic formulations with established efficacy. The Office of the Inspector General found that of all the Medicare Part D preauthorization requests in 2017, 65% were approved with 73% of denials being approved after an appeal, yielding a total approval rate of approximately 90.55%.<sup>12</sup> preauthorizations have also been associated with higher rates of initially rejected prescriptions being abandoned.

Resneck proposes a three-part solution. The first part includes eliminating preauthorizations for medication with low denial rates, have low inappropriate variance in use, and that do not have a lower cost or safer alternative. The second part is protecting patients with chronic conditions from lapses in prescriptions, by stopping repeated preauthorizations or step therapy trials. The final proposal is to streamline access to each insurance company's formulary, as often times providers are forced to navigate increasingly complex websites in an effort to find the specific formulary for the patients plan. This process should be integrated into the existing workflow. The final proposal is to expedite the appeal process and have providers within the same specialty review the case.

There has been a recent increase in focus on preauthorization research in the field of Dermatology. This research has primarily focused on the incremental costs associated with preauthorizations as well as the overall effectiveness of preauthorizations for reducing unnecessary healthcare utilization. In 2017, a viewpoint article argued for elimination of preauthorizations for skin biopsies, citing that the author's academic institution received no denials since the 40% of health plans that require preauthorization cannot offer a clinical basis to deny a skin biopsy for evaluation of uncertain skin conditions.<sup>13</sup> The article argued that requiring preauthorizations for biopsies lowered quality of care, as patients had to return for their biopsy appointment, with the average wait time for a new visit being 55 days.

A study of preauthorization administrative burden on a Dermatology office by Carlisle et. al. found that the median cost of preauthorization processing was \$6.72, with preauthorizations for biologic medications costing a median of \$15.80.<sup>14</sup> Staff spent 169.7 hours during a one-month period directly handling preauthorizations, with an approval rate of 99.6% for procedures, 78.9% for biologics, and 58.2% for other medications. Of the denied requests, 21.7% were approved after an appeal.

Preauthorizations have also been studied in Otolaryngology. A study by Torrecillas et. al. investigating the effects of preauthorizations on pediatric tonsillectomies found that only 1.5% of claims were denied through preauthorization.<sup>15</sup> The incidence of tonsillectomies was unchanged by preauthorization implementation, but there was increase in consultation to surgery time by 2.38 days. The study questioned the utility of implementing preauthorizations for pediatric tonsillectomies in the setting of such a low rate of denial.

## **VI. What is the legislation surrounding Preauthorizations?**

There are 38 out of 50 states that have passed statutes, regulations, or bills regarding preauthorizations. In addition to these states, preauthorization is legislated at the federal level through bills such as the Patient Protection and Affordable Care Act (ACA). The extent of such legislation varies widely, with some states only requiring insurance companies to accept electronic preauthorization requests while other states place more extensive regulations on the entire process. Summarizing the entirety of legislation across each state would be difficult to undertake, however, policies within some of the most regulated states are worth noting.

States such as Arkansas, California, and Washington are among those with extensive policies regarding preauthorization.<sup>16</sup> In Arkansas, insurance companies are required to disclose all preauthorization requirements, and in order to change these requirements they must provide a 60-day notice. Providers can submit an inquiry before prescribing a service to determine the patient's coverage. When a preauthorization request is submitted, the insurer must respond within 72 hours. Insurance companies are also required to publish their preauthorization statistics regarding approvals and denial for all medical services, including the reason for denial. The law also includes additional protections for patients with terminal illness or those undergoing emergency medical care.

In California, insurance companies are also required to provide written policies and procedures about their preauthorization process. Preauthorization requests must receive a response within 2 business days or 72 hours for urgent requests. The insurance companies are required to employ a physician licensed to practice medicine in the state of California to oversee the preauthorization policies and procedures. Any denials on the basis of medical necessity must be issued by a licensed physician or healthcare professional with the competency to evaluate the specific clinical condition.

In Washington state, insurance companies must have an online system that informs providers about the required patient-specific and service-specific information they must provide. Furthermore, the online system must provide information on whether the service is a benefit, whether preauthorization is required, and what preservice criteria must be met. Preauthorization approvals cannot expire prior to 45 days from approval. The preauthorization program must be staffed by licensed healthcare professional who are in the same or related field as the provider submitting the request. Denials must detail the specific reason for denial, and provide contact information for the person with the authority to approve or deny the request. Preauthorization approvals must include information on whether the service can be rendered by an out-of-network provider and how that would affect the coverage of service.

Other states also have some distinct policies. Like Arkansas, Delaware also requires insurers to publish preauthorization statistics on a semi-annual basis. Maryland has a step-therapy overriding policy. In New York, appeals must be reviewed by a peer who did not make the original decision and is not subordinate to the person who made the original decision. In North Carolina, preauthorization denials must be review by a medical doctor licensed in the state of North Carolina. In Ohio, preauthorizations granted for drugs related to a chronic condition must be honored for 12 months from approval unless the person is no longer eligible for the policy. Rhode Island prohibits paying a bonus or incentivizing preauthorization reviewers to issue denials.

At the Federal level, bills addressing preauthorization include the ACA as well as the Improving Seniors' Timely Access to Care Act of 2019 which was introduced to the House of Representatives Subcommittee on Health in June of 2019. Preauthorization is mentioned in three contexts within the ACA.<sup>17</sup> The ACA requires that emergency department services be covered without requirement of preauthorization. The second context states that preauthorizations can be

applied to certain medications of an insurer's formulary. The third context states that individuals do not require preauthorization to seek care for obstetrical or gynecological care, however, providers must obtain preauthorization for certain services within obstetrical or gynecological care if required by the insurer.

The Improving Seniors' Timely Access to Care Act of 2019 aims to establish federal standards related to the use of preauthorization under Medicare Advantage plans.<sup>18</sup> The bill proposes to establish an electronic preauthorization program, which would meet certain set standards and have the ability to provide real-time decisions. It would require annual publication of preauthorization related data such as average response time and request approval rates. The bill would also prohibit insurers from requiring preauthorizations for surgeries or related services that are provided to a patient during another surgery not requiring preauthorization or that has already received preauthorization. Finally, the bill establishes standards set by CMS related to "quality and timeliness of prior authorization determinations."

## **VII. What is the role of Preauthorizations in Orthopaedic Surgery?**

While policies may differ across each insurer and state, in general, preauthorization requirements apply to orthopaedic procedures and advanced diagnostic imaging. Insurance companies may publish information about requirements for authorization of each service online. While this information can be useful to providers, insurers do not share a standardized format for reporting this information and some policies require login credentials to be accessed.

Three major private insurance companies were researched for information regarding their policies on total knee arthroplasty. One company required login credentials to access their policy. In comparing the other two policies, both had the same indications for a total knee arthroplasty, including pain, functional disability, and radiographic evidence of an abnormality. The policies

diverged in that one policy published all of the specific paperwork that was necessary for approval, while the other did not. Despite both policies having similar indications for authorization, administrative burden can result from the wide variation of requirements that providers and administrative staff must navigate to obtain authorization. Companies may withhold specific policy information for proprietary reasons.

There are many indications for a patient to undergo spine magnetic resonance imaging (MRI). While no recent studies have compared the rates of different indications for spine MRIs, low back pain is among the most common indications. Of the two major insurers with public guidelines, both policies are equivalent in that low back pain lasting for 6-weeks without responding to conservative therapy is an indication for a lumbar spine MRI. Conservative therapy was defined as anti-inflammatory medication or muscle relaxants by both insurers. Nevertheless, one insurer also includes a course of oral steroids as a conservative therapy option, while the other includes moderate activity. Both policies also recognize that red flag signs such as neurologic deficit necessitate earlier imaging.

The requirement of 6-weeks of conservative therapy is the recognized standard of care as many cases of low back pain will resolve with conservative management.<sup>19</sup> This saves the patients from the cost and stress of undergoing a lengthy MRI scan. A study of patients with low back pain found that 26.8% experience complete resolution of symptoms within 12 months.<sup>20</sup> Of patients who experience complete resolution, 24%-33% will have a recurrence of pain at 12 months.<sup>21</sup> While the majority of patients experience only mild back pain, inadequate pain management for these patients can lead to a significant amount of healthcare utilization.<sup>22</sup> Furthermore, a study by Lurie et. al. found that areas with higher rates of spine MRIs had higher rates of spine surgery performed.<sup>23</sup> The study theorized that high rates of incidental findings might account for the

increased rates of operation. As such, from a cost perspective, insurers are motivated to reduce unnecessary utilization of spine MRIs to avoid the cost of the scans as well as the resulting spine surgery.

## Statement of Purpose

The purpose of the current study is two-fold: to summarize the current literature and legislation related to preauthorization and to investigate the impact of preauthorization on the care of orthopedic spine patients in relation to obtaining a spine MRI scan. The study will determine the rate of preauthorization as well as trends in preauthorization use in recent years for patients covered by commercial insurance at a single spine center. Analysis will be performed to determine the patient factors associated with requiring preauthorization for an MRI scan. The study also aims to derive a cost analysis to determine the amount of money saved through the preauthorization process. No previous studies have investigated the use of preauthorization for spine MRIs, and there is a dearth of orthopaedic literature on the subject of preauthorization as a whole.

The first hypothesis of this study is that commercial insurers require preauthorizations for the majority of their spine MRIs, and these requirements have up trended in recent years. The second hypothesis is that over 90% of preauthorization requests for spine MRIs are ultimately approved. The third hypothesis is that the patient's insurer will be a statistically significant determinate of whether a spine MRI requires preauthorization. The fourth hypothesis is that the cost analysis will estimate that preauthorizations are not a cost saving initiative for insurers.

### Research Questions:

1. What percent of spine MRI scans require preauthorization?
2. What is the trend in use of preauthorization for spine MRIs in recent years?
3. What patient specific factors are associated with preauthorization requirements?
4. What is the rate of approval and denial for spine MRI preauthorization requests?

5. What is the estimated cost saved per MRI scan to implement preauthorization? And does this outweigh the administrative costs?

## Methods

### **I. Student Contribution**

Kareem Kebaish was responsible for conception of the study questions, methods, and aims. In addition, he was responsible for obtaining the study data, analyzing the data, and authoring the current manuscript. Anoop Galivanche was responsible for obtaining and analyzing the study data. Michael Mercier was responsible for analyzing the study data.

### **II. Ethics Statement**

The protocol for the current study was approved by the Yale University Institutional Review Board (IRB) which considered this research to pose minimal risk to subjects. The study utilized a large sample of patient data, and analyzed this data in the aggregate. All subject data was stored in the Yale Secure Box, which is the institution's approved method of storing high risk data. Results of the analysis are reported in the aggregate.

### **III. Methods Description**

#### *i. Patient Population*

The current study examined the outcomes of preauthorization requests for Spine MRIs that were submitted to commercial insurance providers. It is important to note that the subjects of analysis were individual requests, rather than individual patients. The reason for this is that individual patients can have multiple spine MRI requests throughout the duration of the study period. Furthermore, patients with multiple requests may have had more than one insurance provider during the study period. Therefore, individual preauthorization requests were binned and analyzed based on the insurance provider to which they were submitted.

In selecting an appropriate patient population to study spine MRI preauthorizations, a number of factors must be considered. Indications for obtaining a spine MRI can vary widely. Such

indications can include trauma, chronic back pain, or acute neurological deficits. Furthermore, different training backgrounds across providers further increases the variability and threshold for ordering a spine MRI. Therefore, the study population was narrowed in order to reduce the effects of variable ordering patterns.

The study sample was limited to spine MRI scans that were ordered by providers who practice at the Yale New Haven Hospital Spine Center. Some scans were ordered in different location within the YNNH system where these providers practiced; however, the majority of scans were order at the Spine Center. All scans that were ordered in the emergency department were excluded from analysis, as these scans cannot be subject to preauthorization. Patients whose Spine MRI request were submitted to Medicare, Medicare Advantage Plans, or Medicaid were excluded from the analysis.

ii. *Data acquisition*

The study data was obtained through electronic medical record (EMR) review. Due to the large size of study data, manual chart review was impractical. Furthermore, the history and outcome of each preauthorization request was inaccessible through the typical chart review interface. Therefore, a request was made to the Yale Joint Data Analytics Team (JDAT) for assistance in acquiring the study data.

JDAT is comprised of a team of informaticists and analysts who are able to provide customized reports and data samples from the EMR system. Provided with the appropriate parameters, the JDAT analysts are able to retrieve records for the entire study sample, reducing the need for manual chart review.

The data obtained through the study's JDAT request included patient age, sex, race, spine MRI region, referring provider, the ICD10 diagnosis code associated with the MRI order, the order

location, and the insurance provider to which the request was sent. Insurance provider names were replaced with a numeric identification. The choice to withhold the names of individual companies was made because the investigators recognized that it would not be appropriate to use the results of the current study to evaluate the practices of individual companies. Rather, the aim was study whether preauthorization practices were performed consistently across different insurers.

Each spine MRI request was associated with a unique referral identification number which allowed the JDAT team to collect a detailed history of how the request was managed and the final outcome. The process of working with billing data, and determining the final outcome of each request is detailed in the following section.

After determining the final outcome of each preauthorization request, manual chart review was required to evaluate the outcomes of 375 spine MRI orders that were denied or cancelled. This was to test the hypothesis that patients who were denied preauthorization would ultimately undergo a spine MRI within 3 months of the initial request.

### iii. *Analyzing billing data*

The use of billing for the purposes of retrospective analysis poses some challenges. The root of these challenges is that billing data is created exclusively for billing related functions. To successfully perform research on such data, investigators must reengineer the data into useful variables for analysis.

The particular challenge with preauthorization billing data stems from requests undergoing extensive processing between the initial request and the final outcome. These processes are best defined as a request's "history action." Each time a request undergoes any form of review or handling by the billing department or the insurance provider, the request gains more history. The particular history statuses that requests can undergo are predefined, typically describing actions

such as submission of the request to insurance providers, requirements of additional documentation, or receipt of approval. However, there is no predefined order for these history statuses, and each request can collect a unique and comprehensive history as the billing department and insurance providers exchange communication. This results in infinite possibilities for the histories of each request; a data set that is incompatible with an analysis of the binary outcomes: approved or denied.

To mitigate this challenge, a sample of the requests were individually analyzed in an attempt to find a more efficient means of determining their final outcome. The result of this analysis determined that the presence of certain history statuses could reliably indicate the requests final outcome, regardless of the other history components. Each request could then be binned into one of three groups: automatically approved (no preauthorization necessary), approved through preauthorization, and denied through preauthorization.

The requests needed to be binned in a step wise fashion to ensure that they were placed in the correct binning group. The reason for this is that some requests were designated as automatically approved before the insurance provider indicated that the request needed preauthorization for coverage. Furthermore, some requests that initially received approval through preauthorization were later denied by the insurer. It was not possible to investigate the reason for each rescinded approval, but discussing the trend with the billing department revealed that they were most commonly due to inadequate documentation.

The final protocol for binning each request began with placing automatic approvals into an initial bin. This was followed by placing any request, binned or un-binned, that was approved after preauthorization into a second bin. The last step was placing any requests, binned or un-binned, that were denied after preauthorization into a third bin. The algorithm allowed for incorrect binning

in earlier steps to be corrected by succeeding steps. The order was chosen as it reflected an increasing degree of administrative burden, with automatically approved orders requiring the least administrative time and denied requests requiring the most. At the end of the binning process, a random sample of 100 requests were manually analyzed to verify the algorithm functioned accurately, all 100 requests in this sample were confirmed to be accurately binned.

#### **IV. Statistical Methods**

Patient characteristics including sex, age, spine MRI region, insurance provider, and year the request was placed were tabulated. Patient age was binned into the groups <40, 41-50, 51-60, 61-70, 71-80, and >81 years old. The rates of automatic approval, approval after preauthorization, and denial after preauthorization were calculated.

A multivariate logistic regression controlling for sex, age group, race, MRI region, insurance provider, and year of order was performed to determine the factors associated with a higher chance of requiring preauthorization.

All statistical analyses were performed using STATA version 13 (StataCorp LP, College Station, TX). Figures were created using Graphpad and Microsoft Powerpoint.

## Results

### I. Patient Demographics

Patients who were referred for a spine MRI between 2013 to 2019 by providers who practice at the Yale Spine Center were identified. In this population, 2,480 patients were covered by commercial insurance companies for their spine MRI. Of these patients, 1,315 (53.02%) identified as female and 1,165 (46.98%) identified as male. The most common age group was 51-60 years old, with a breakdown of 638 (25.73%) patients less than 40 years old, 501 (20.20%) patients between 41 and 50 years old, 770 (31.05%) patients between 51 and 60 years old, 530 (21.37%) patients between 61 and 70 years old, 436 (1.45%) patients between 71 and 80 years old, and 5 (0.20%) patients greater than 81 years old.

The most common MRI region was the lumbar spine, as 114 (4.60%) scans were of the cervical spine, 283 (11.41%) scans of the thoracic spine, 1,993 (80.36%) scans were of the lumbar spine, and 90 (3.63%) scans were of the total spine. The insurance companies were removed and labeled as “Insurer A-F.” Insurer A had 468 (18.87%) patients, Insurer B had 528 (21.29%) patients, Insurer C had 592 (23.87%) patients, Insurer D had 174 (7.02%) patients, Insurer E had 309 (12.46%) patients, and Insurer F had 409 (16.49%) patients. There was little variation in the number of spine MRI requests across the years, with each year making up 9.64% to 16.85% of the total requests. The demographic breakdown is shown in Table 1.

**Table 1**

	Number	Percent
n = 2,480		
<b>Sex</b>		
Male	1,165	46.98%
Female	1,315	53.02%
<b>Age Range</b>		
< 40	638	25.73%
41-50	501	20.20%
51-60	770	31.05%
61-70	530	21.37%
71-80	36	1.45%
> 81	5	0.20%
<b>Region</b>		
Cervical	114	4.60%
Thoracic	283	11.41%
Lumbar	1,993	80.36%
Total	90	3.63%
<b>Insurance</b>		
Cigna	468	18.87%
Connecticare	528	21.29%
Aetna	592	23.87%
Oxford Health	174	7.02%
United	309	12.46%
Yale Health	409	16.49%
<b>Year</b>		
2013	239	9.64%
2014	323	13.02%
2015	364	14.68%
2016	390	15.73%
2017	418	16.85%
2018	405	16.33%
2019	341	13.75%

## II. Preauthorization Requirement Trends

The rate of spine MRI requests requiring preauthorization ranged between 74.14% to 90.82%. The proportion requiring preauthorization reached a peak in 2018 with 90.82%, followed by a decrease in 2019 to 85.96%.

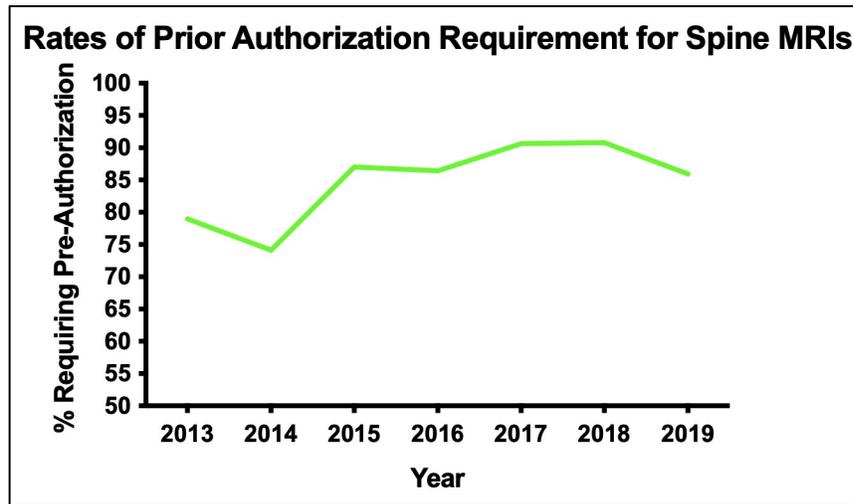


Figure 1. Preauthorization requirement trends between 2013 to 2019

## III. Factors Associated with Preauthorization requirements

Multivariate regressions were used to determine the factors associated with requiring preauthorization. The demographic characteristics used as controls were female sex, age less than 40, and white race. Additionally, cervical MRI region, Insurer A, and the year 2013 were also used as controls. Cervical MRIs and Insurer A were chosen as controls as they had the lowest rates of requiring preauthorization. There were no statistically significant differences between preauthorization requirements across sex, age, or race.

Using the cervical MRI region as a control, thoracic spine MRI scans had a 2.35 ( $p=0.003$ ) odds ratio of requiring preauthorization, and lumbar spine MRI scans also had a 2.35 ( $p<0.001$ ) odds ratio of requiring preauthorization. There was no statistically significant difference between preauthorization requirements for cervical and total spine MRI scans.

In analyzing the difference between preauthorization requirements across insurance companies, an odds ratio could not be determined for Insurer D as the entire patient group required preauthorization for their MRI scans. Compared to Insurer A, Insurer F had the highest odds ratio of requiring preauthorization, with an odds ratio of 10.17 ( $p < 0.001$ ). Insurer B had an odds ratio of 7.36 ( $p < 0.001$ ) of requiring preauthorization. Insurer E had a 1.54 ( $p = 0.020$ ) odds ratio of requiring preauthorization. There was no statically significant difference in preauthorization requirements between Insurer A and Insurer C.

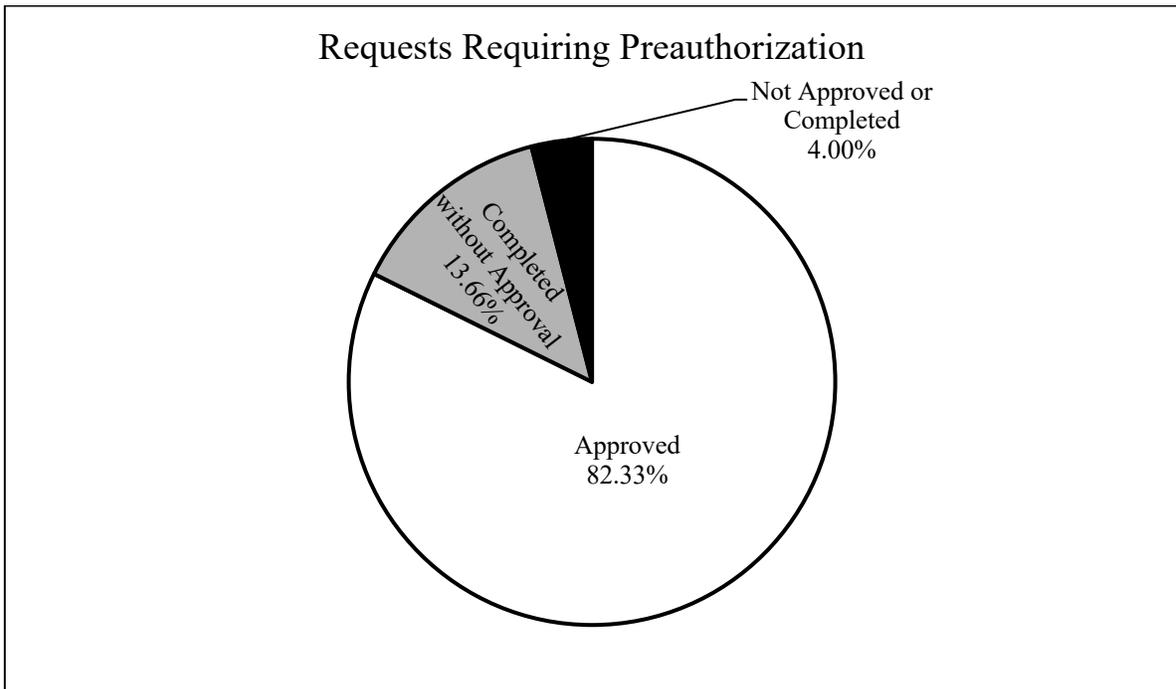
Compared to 2013, patients in 2015 through 2019 had statistically significant increases in preauthorization requirements. However, patients in 2014 did not have any statistically significant differences in preauthorization requirements. The findings of the multivariate analysis are shown in Table 2.

**Table 2**

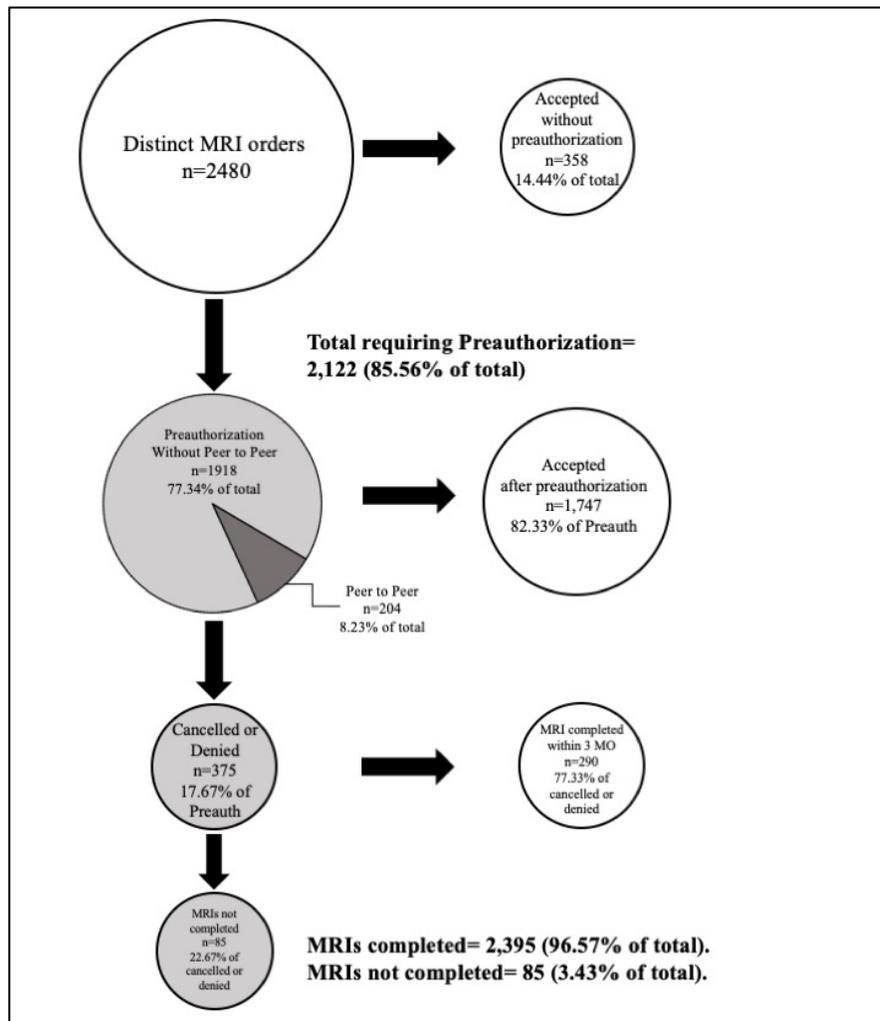
	Odds Ratio	p-value
<b>MRI Region</b>		
Cervical	Control	-
<b>Thoracic</b>	<b>2.35</b>	<b>0.003</b>
<b>Lumbar</b>	<b>2.35</b>	<b>&lt;0.001</b>
Total	1.65	0.166
<b>Company</b>		
Insurer A	Control	-
<b>Insurer B</b>	<b>7.36</b>	<b>&lt;0.001</b>
Insurer C	1.28	0.090
<b>Insurer D</b>	<b>All</b>	
<b>Insurer E</b>	<b>1.54</b>	<b>0.020</b>
<b>Insurer F</b>	<b>10.17</b>	<b>&lt;0.001</b>
<b>Year</b>		
2013	Control	-
2014	0.73	0.129
<b>2015</b>	<b>1.77</b>	<b>0.011</b>
<b>2016</b>	<b>1.70</b>	<b>0.015</b>
<b>2017</b>	<b>2.66</b>	<b>&lt;0.001</b>
<b>2018</b>	<b>2.66</b>	<b>&lt;0.001</b>
<b>2019</b>	<b>1.60</b>	<b>0.035</b>

#### IV. Outcomes of the Preauthorization Process

The 2,480 MRI requests submitted to private insurers were tracked to determine the final outcomes. Of the initial requests, 358 (14.44%) were accepted without requiring a preauthorization. All percentages in the following section are reported as a ratio of the 2,122 requests. Of the remaining 2,122, 1,747 (82.33%) were accepted after preauthorization. Manual chart review was then performed on the patients for whom the remaining 375 (17.67%) requests were denied and cancelled, which found that 290 (13.67%) patients received a spine MRI scan within 3 months of the original request. Ultimately 85 (4.00%) MRI scans were prevented by preauthorization.



**Figure 2. Outcomes of requests requiring preauthorization, 1,747 (82.33%) were approved, 290 (13.66%) were completed without approval, and 85 (4.00%) were not approved or completed.**



**Figure 3. Step wise outcomes of Spine MRI requests**

### V. Administrative Burden and Cost Analysis of Preauthorizations

Quantifying the administrative burden and costs of preauthorization can be difficult in a retrospective analysis without knowing the amount of time needed to complete each request and the actual cost of MRI scans. Given that the administrative hours needed to complete the requests could not be determined for the analysis group, time estimates from previous studies which quantified the administrative hours were used. Carlisle et. al. quantified the number of minutes required to complete each preauthorization in a dermatology, finding the median to be 12 minutes per request.<sup>14</sup> While hospitals may publish an out of pocket value for individual scans, the actual

cost paid by individual insurers is determined through confidential contractual agreements. Possible ranges for these costs, derived through publicly available information, can be used to produce estimations.

Using 12 minutes as approximation of the time need to complete a request, the 2,122 preauthorization requests took approximately 25,464 minutes or 424.4 hours to complete. While administrators are likely given a higher compensation, the Connecticut minimum wage of \$12.00 can be used to estimate the lowest possible administrative cost. The total cost for 2,122 preauthorization requests would be \$5092.80, or \$2.40 per request. In addition, 204 requests required a peer to peer discussion, using 15 minutes as an estimated time of completion, this leads to an additional 51 hours of administrative burden for providers. It is important to note that none of these estimates consider cost burden of preauthorization for the insurers, which also entails hiring administrative staff and healthcare providers to manage their preauthorization requests.

Online estimates of the cost of a spine MRI vary widely, ranging from \$193 on the Medicare Procedure Price Lookup webpage to \$3,919 on individual hospital websites. Since the actual cost billed to insurers is proprietary, using these estimates to produce a range is the most accurate possible approach. The end point of this calculation is to determine for every preauthorization request that is processed for MRI scans, how much money is saved by implementing preauthorization. The first step is to determine the cost saved by the 85 MRIs that were prevent, which was \$16,405 using the low estimate and \$333,115 using the high estimate. This number is then divided by the number of MRI scans that were approved, which demonstrates that insurers are saving approximately \$7.97 to \$161.86 per scan.

**Low Cost Estimate:**

Cost of a spine MRI	\$193
Number of Pre-Auth Requests	2122
Number Completed	2058
Number of MRIs prevented	85
Total amount saved	\$16,405
Amount saved per MRI	\$7.97

**High Cost Estimate:**

Cost of a spine MRI	\$3,919
Number of Pre-Auth Requests	2122
Number Completed	2058
Number of MRIs prevented	85
Total amount saved	\$333,115
Amount saved per MRI	\$161.86

## Discussion

### **I. Brief Summary**

Preauthorization is an insurance process in which healthcare providers must obtain permission from a patient's insurer in order to provide certain medical services. With an increase in perceived administrative burden associated with the preauthorization, the benefits of this process have been questioned. Studies in other fields have found that preauthorization requests receive high rates of approval while delaying patient care.<sup>13,14</sup> Few studies have examined the impact of preauthorizations on orthopaedic patients, however, a study by Goodman, Powell, and Park found that preauthorizations led to higher costs of treating low back pain and did not reduce rates of lumbar fusion.<sup>24</sup> The current study aimed to determine the commercial insurance preauthorization approval rates for spine MRIs, determine the factors associated with preauthorization requirements, and quantify the administrative burden of preauthorization.

Using a sample of patients from a single institution's spine center, the study found that between 2013-2019, 74.14% to 90.82% of spine MRI scans required preauthorization. Thoracic and lumbar scans, the years 2015 through 2019, and certain commercial insurers were associated with increased preauthorization requirement. The approval rate of preauthorization requests was 82.33%, and ultimately only 85 out of 2,122 scans were prevented by preauthorization. Processing these preauthorization requests was estimated to cost the hospital \$5092.8, however, the cost of peer to peer appeals could not be estimated. By implementing a preauthorization process, insurers save between \$7.97 to \$161.86 per scan, not accounting for their administrative costs to process requests.

### **II. Preauthorization Requirement Trends**

In 2017 and 2019, the American Medical Association survey of 1,000 physicians found that the burden of preauthorization continues to increase, in 2019 43% felt that there was a significant increase.<sup>8,9</sup> The results of these surveys are consistent with the findings of the current study, as between 2014 and 2018, the percent of spine MRIs requiring preauthorizations increased by 16.68%. This figure modestly decreased by 4.86% in 2019.

Considering the administrative burden of preauthorization is critical, as a study by Carmen et. al. found that the average time spent on administrative tasks by physicians increased between 2014 and 2017.<sup>25</sup> The study also found that increased administrative burden increased the likelihood of burnout. Conversely, Hillmann et. al. found that reducing administrative burden led to decreased symptoms of burnout in hospital clinicians.<sup>26</sup> Studies have demonstrated significant overlap between physician burnout and depression, with some experts arguing that burnout should be categorized as a depressive condition.<sup>27,28</sup> In addition to affecting provider well-being, burnout has been associated with poor patient care. In 2002, a survey study by Shanafelt et. al found that residents experiencing burnout reported significantly higher rates of providing suboptimal patient care, the study also found a dose-response relationship between burnout and suboptimal patient care.<sup>29</sup>

The negative impacts of administrative burden and physician burn out are well documented. As preauthorization requirements continue to rise, it is incumbent on healthcare systems to implement initiatives to reduce the burden on providers. Organized solutions such as optimizing electronic medical records, offloading clerical work to nonphysician staff, and preventing interference with personal responsibilities through strict duty hour limits can reduce burnout.<sup>30</sup>

### **III. High Rates of Preauthorization Approval**

The results demonstrate that initial preauthorization approval rates were 82.33%, and ultimately 96% of patients who required preauthorization received their scans within 3-months of the original request. Such high approval rates are consistent with previous studies in dermatology which had approval rates ranging between 58.2% for certain medications to 99.6% for procedures.<sup>14</sup> In otolaryngology, pediatrics tonsillectomies had an approval rate of 98.5%.<sup>15</sup> Furthermore, in 2017, 90.55% of Medicare Part D prescriptions were ultimately approved.<sup>12</sup>

It should be noted that in considering the approval rates within orthopaedics, dermatology, and otolaryngology, the requested services are specific to each sub specialty. Therefore, it is reasonable to expect that these specialists are more likely to be familiar with the specific preauthorization requirements for their services, and less likely to submit requests that do not meet the criteria. Therefore, the preauthorization approval rates for these services among general practitioners might be different, and should be assessed in future studies.

Nevertheless, the high approval rates among specialist combined with concerns for increasing provider administrative burden, prompts discussion of possible solutions. Resneck proposes that providers who have a history of appropriately utilizing services should be alleviated from some preauthorization burden.<sup>10</sup> Reducing preauthorization processing could be beneficial both to providers as well as insurers who would require less administrative staff and physicians to process requests that are highly likely to be approved. Hospitals and insurers should collaborate in implementing preauthorization reducing initiatives, insurers that are able to may gain advantageous contracts and create a competitive market for other insurers to follows.

#### **IV. The Economics of Preauthorization**

Through various assumptions and adapting the findings of Carlisle et. al., the estimated minimum cost to process each preauthorization by a hospital is \$2.40.<sup>14</sup> This figure does not

account for the processing cost incurred by insurers, nor does it consider the cost of peer to peer discussions. Overall, it is estimated that insurers save between \$7.97 to \$161.86 per MRI. Over, the 7 years included in the study, the total costs saved are between \$16,405 to \$333,115, or 2343.57 to \$47,587.46 per year. The large variation in cost estimates is due to the inaccessibility of contracted costs between hospitals and insurers. Given that the low estimate is based on official Medicare figures, the actual figures for private insurers are likely at the lower end of these estimates.

Nevertheless, even with modest cost savings, if the cost of processing preauthorizations is lower, then insurers are financially incentivized to continue implementing preauthorization policies as a critical form of utilization management. In addition, if non-specialists receive higher rates of denials for their requests, the cost savings are likely greater than estimated. Hospitals and healthcare systems should consider the permanence of preauthorization policies and implement systems to bolster their efficiency in processing requests. Furthermore, they should consider including the cost of processing preauthorizations in the facility fees billed to insurers. This would allow the hospitals to increase the availability of support staff who can manage the growing clerical demands of insurers.

## **V. Preauthorization Impact on Patient Care**

The current study did not assess the impact of preauthorization on patient outcomes. Few studies have examined this relationship, likely due to a number of research challenges. Preauthorization can potentially affect patient outcomes through delay of care or prevention of care. A prospective study model tracking these variables in addition to patient outcome measures would be most appropriate.

Within the orthopaedic literature, a study by Goodman, Powell, and Park, investigated the impact of mandatory physiatry referrals prior to surgical evaluation for patients with low back pain.<sup>24</sup> The study found that required physiatry referrals caused a short term decreased in lumbar fusions, but the rates of surgery rebounded in subsequent years, leading to no overall changes. However, the required nonoperative care unexpectedly led to increased healthcare costs by an average of \$2,233 for physiatry care and an additional \$1,370 for patients requiring preauthorization for surgery, while lengthening the period that patients experienced lower back pain from 198 to 309 days. Nevertheless, negative outcomes in one application of preauthorization may not reflect the entire process, and further studies are need to assess the impact of preauthorization in other areas of orthopaedic care.

Keast et. al. found that preauthorization policies were associated with reduced likelihood of initiating extended-release or long acting opioids in opioid-naïve patients.<sup>31</sup> Nevertheless, this was balanced with an increase in short-acting opioid prescriptions. White et. al. found that preauthorization requirements for certain parenteral antimicrobials decreased expenditures on parenteral agents by 32% and lead to higher microbial susceptibilities in isolates recovered from intensive care unit patients.<sup>32</sup>

On the other hand, studies of dermatology patients found that preauthorization caused delays of care for patients, these delays were as long as 55 days for skin biopsies and 6 days for medication prescriptions.<sup>13,14</sup> One study expectedly also found that approval of preauthorization led to higher likelihood of disease improvement.<sup>33</sup> In rheumatology patients, Wallace et al. found that preauthorization requirements for infusible medications were associated with delays of care and preauthorization denials were associated with higher exposure to glucocorticoids.<sup>34</sup>

A number of patient outcomes can be explored as follow up to the current study. For patients with low back pain, preauthorization have the potential of sparing patients from long and expensive MRI scans if their back-pain resolves with conservative treatment. However, delaying an MRI scan has the potential to delay surgical care and result in patients facing longer periods of low back pain, using more opioids for pain control, and having less satisfaction with their care. Furthermore, delaying or denying an MRI scan can potentially lead to missed diagnosis of spinal cord injuries, resulting in neurologic deterioration. Testing these hypotheses is critical to understanding the full impact of preauthorization on orthopaedic patient outcomes.

## **VI. The Importance of Regulating Preauthorizations through Legislation**

Many states have passed legislation to regulate the use of preauthorizations.<sup>16</sup> States such as Arkansas and Delaware require insurers to publish data on their preauthorization approval and denial trends.<sup>35</sup> At the federal level, the ACA prevents preauthorizations from interfering with emergency care and obstetrical and gynecological care.<sup>17</sup> The Improving Seniors' Timely Access to Care Act of 2019 targets Medicare Advantage plans, aiming to streamline medication prescription processing, regulating formularies, and limiting preauthorization requirements for certain surgical procedures.<sup>18</sup> Overall, aside from certain states passing their own legislation, the preauthorization process remains largely unregulated. A few key areas should be the targets of legislation.

Legislation should focus on three key areas, streamlining and standardizing the preauthorization process, protecting patients with chronic conditions, and increasing transparency about preauthorization process across individual insurers. Many states require insurers to provide electronic forms for providers to complete preauthorization requests, enacting such policies at the federal level can prompt the creation of a standardized and efficient preauthorization request form.

This would allow for clinical support staff to take on more responsibilities managing preauthorization request, potentially reducing the administrative burden on providers while accelerating preauthorization approvals for patients.

By creating lapses in prescription refills, preauthorizations can potentially harm patients with chronic conditions.<sup>10</sup> Legislation can be targeted towards medications used to treat chronic conditions, ensuring that patients maintain coverage during policy transition periods and preventing insurers from revoking preauthorization approvals for patients on stable medical management. Furthermore, implementing systems that reward providers who appropriately prescribe medications and other services by easing preauthorization requirements can reduce administrative burden on providers and insurers, and prevent delays of care for patients.

Requiring insurers to disclose data about their preauthorization practices can be beneficial to many parties. Patients selecting insurance policies can make more informed decisions about which insurer is most appropriate for their healthcare needs. Insurers would also be competing in a more transparent market, which may incentivize them to reduce preauthorization requirements to attract policy holders. Providers and policy makers would have access to data that allows them to better study the impact of preauthorization requirements and denials.

## **VII. Limitations**

The current study has several limitations that should be noted. The study is a retrospective analysis which relies on the use of billing data. This billing data is intended for functional rather than research purposes. The billing system allows for each request to take on a variety different history actions, therefore one approved request may have 5 history actions while another may have 10. Rather than manually bin each request, an algorithm was used to determine the final outcomes.

This algorithm was manually cross checked against a random sample of 100 requests to ensure accuracy, nevertheless, relying on an algorithm leaves potential for miscoding of some requests.

There are also limitations in the generalizability of this data. The data was collected from a single institution's spine center. All providers were orthopaedic spine surgeons, who regularly order spine MRI scans, and are therefore likely to deviate in their ordering patterns from other providers. Orthopaedic spine providers more likely to be familiar with the specific requirements to authorize a spine MRI and therefore the approval rates are likely overestimations relative to preauthorization requests among all providers.

As a retrospective analysis, specific measures of administrative burden were not recorded. To estimate the hours required to complete the requests, the findings of Carlisle et. al. were used to calculate the total time.<sup>14</sup> To estimate the cost of labor, the Connecticut minimum wage of \$12.00 was used. The actual wages of administrators processing these requests is unknown, furthermore, the minimum wage has increased in the past few years. Furthermore, the actual cost paid by insurers to hospitals for each scan are unknown, as these prices are typically established through contractual agreements. Therefore, Medicare data and data published by a private hospital were used to establish a range of values per scan. Finally, the current study did not investigate patient outcomes. A follow up study should rely on prospective data collection to record outcomes such as pain control, patient satisfaction, and functional outcomes.

## **VIII. Conclusion**

The current study assessed the rates of preauthorization requirement and approval rates for commercial insurers of spine MRI scans for patients obtaining care at a single institution's spine center. The results demonstrate that preauthorization requirements are high and have continued to increase in recent years. Furthermore, the initial approval rate of preauthorization requests was

82.33%, with 96% of patients who required preauthorization ultimately obtaining the MRI scan. The estimated cost for the hospital to process 2,122 requests was at least \$5,092.80, not accounting for processing appeals and peer to peers. By implementing preauthorizations, insurers save between \$7.97 and \$161.86 per scan. Within the current study and across the literature of other fields, preauthorizations are shown to contribute a significant increase in administrative burden while preventing a modest amount of healthcare utilization. Increased administrative burden is linked to provider burn out and suboptimal patient care, combined with preauthorizations potential to delay or prevent necessary, the value of preauthorizations has been questioned. Future studies should assess the impact of preauthorization on patient outcomes, in order to develop evidence-based guidelines for the proper implementation of preauthorization requirements.

## References

1. Centers for Medicare & Medicaid Services. Prior Authorization of Repetitive, Scheduled Non-Emergent Ambulance Transport. <https://www.cms.gov/Research-Statistics-Data-and-Systems/Monitoring-Programs/Medicare-FFS-Compliance-Programs/Prior-Authorization-Initiatives/Prior-Authorization-of-Repetitive-Scheduled-Non-Emergent-Ambulance-Transport> Accessed December 17 2020.
2. Centers for Medicare & Medicaid Services. Prior Authorization Process for Certain Durable Medical Equipment, Prosthetics, Orthotics, and Supplies (DMEPOS) Items. <https://www.cms.gov/Research-Statistics-Data-and-Systems/Monitoring-Programs/Medicare-FFS-Compliance-Programs/DMEPOS/Prior-Authorization-Process-for-Certain-Durable-Medical-Equipment-Prosthetic-Orthotics-Supplies-Items> Accessed December 17 2020.
3. Centers for Medicare & Medicaid Services. Prior Authorization for Certain Hospital Outpatient Department (OPD) Services. <https://www.cms.gov/research-statistics-data-systems/medicare-fee-service-compliance-programs/prior-authorization-and-pre-claim-review-initiatives/prior-authorization-certain-hospital-outpatient-department-opd-services> Accessed December 17 2020.
4. Papanicolas I, Woskie LR, Jha AK. Health care spending in the United States and other high-income countries. *Jama* 2018;319:1024-39.
5. Bergeson JG, Worley K, Louder A, Ward M, Graham J. Retrospective database analysis of the impact of prior authorization for type 2 diabetes medications on health care costs in a Medicare Advantage Prescription Drug Plan population. *Journal of Managed Care Pharmacy* 2013;19:374-84.
6. Seabury SA, Goldman DP, Kalsekar I, Sheehan JJ, Laubmeier K, Lakdawalla DN. Formulary restrictions on atypical antipsychotics: impact on costs for patients with schizophrenia and bipolar disorder in Medicaid. *The American Journal of Managed Care* 2014;20:e52-60.
7. Goldstein EJ, Raper JL, Willig JH, et al. Uncompensated medical provider costs associated with prior authorization for prescription medications in an HIV clinic. *Clinical infectious diseases* 2010;51:718-24.
8. American Medical Association. 2019 AMA prior authorization (PA) physician survey. <https://www.ama-assn.org/system/files/2020-06/prior-authorization-survey-2019.pdf> Accessed: December 17 2020.
9. American Medical Association. 2017 AMA Prior Authorization Physician Survey. <https://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/public/arc/prior-auth-2017.pdf> Accessed: December 17 2020.
10. Resneck JS. Refocusing Medication Prior Authorization on Its Intended Purpose. *Jama* 2020;323:703-4.
11. Medicare Payment Advisory Commission. Health care spending and the Medicare program: a data book. [http://www.medpac.gov/docs/default-source/data-book/jun19\\_databook\\_entirereport\\_sec.pdf?sfvrsn=0](http://www.medpac.gov/docs/default-source/data-book/jun19_databook_entirereport_sec.pdf?sfvrsn=0). Accessed December 17, 2020.
12. Office of Inspector General. US Department of Health and Human Services. Some Medicare Part D beneficiaries face avoidable extra steps that can delay or prevent access to prescribed drugs. <https://oig.hhs.gov/oei/reports/oei-09-16-00411.pdf>. Accessed December 17 2020.

13. Rogers AT, Sutherland B, Loss MJ. Prior Authorizations for Diagnostic Skin Biopsies: Does Anyone Benefit? *JAMA dermatology* 2017;153:1091-2.
14. Carlisle RP, Flint ND, Hopkins ZH, Eliason MJ, Duffin KC, Secrest AM. Administrative Burden and Costs of Prior Authorizations in a Dermatology Department. *JAMA dermatology* 2020;156:1074-8.
15. Torrecillas VF, Neuberger K, Ramirez A, Krakovitz P, Meier JD. What Is the Impact of Prior Authorization on the Incidence of Pediatric Tonsillectomy? *Otolaryngology–Head and Neck Surgery* 2020:0194599820969631.
16. American Medical Association. 2018 Prior Authorization State Law Chart. <https://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/public/arc-public/pa-state-chart.pdf> Accessed: December 17 2020.
17. Patient protection and affordable care act. Public law 2010.
18. 116th Congress. H.R.3107 - Improving Seniors' Timely Access to Care Act of 2019. <https://www.congress.gov/bill/116th-congress/house-bill/3107/text>. Accessed December 17 2020.
19. Patel AT, Ogle AA. Diagnosis and management of acute low back pain. *American family physician* 2000;61:1779-86.
20. Cassidy JD, Côté P, Carroll LJ, Kristman V. Incidence and course of low back pain episodes in the general population. *Spine* 2005;30:2817-23.
21. Stanton TR, Henschke N, Maher CG, Refshauge KM, Latimer J, McAuley JH. After an episode of acute low back pain, recurrence is unpredictable and not as common as previously thought. *Spine* 2008;33:2923-8.
22. Stewart WF, Yan X, Boscarino JA, et al. Patterns of health care utilization for low back pain. *Journal of pain research* 2015;8:523.
23. Lurie JD, Birkmeyer NJ, Weinstein JN. Rates of advanced spinal imaging and spine surgery. *Spine* 2003;28:616-20.
24. Goodman RM, Powell CC, Park P. The impact of commercial health plan prior authorization programs on the utilization of services for low back pain. *Spine* 2016;41:810.
25. Del Carmen MG, Herman J, Rao S, et al. Trends and factors associated with physician burnout at a multispecialty academic faculty practice organization. *JAMA network open* 2019;2:e190554-e.
26. Hillmann W, Hayes BD, Marshall J, et al. Improving Burnout Through Reducing Administrative Burden: a Pilot of Pharmacy-Driven Medication Histories on a Hospital Medicine Service. *Journal of General Internal Medicine* 2020:1-3.
27. Wurm W, Vogel K, Holl A, et al. Depression-burnout overlap in physicians. *PloS one* 2016;11:e0149913.
28. Bianchi R, Schonfeld IS, Laurent E. Physician burnout is better conceptualised as depression. *The Lancet* 2017;389:1397-8.
29. Shanafelt TD, Bradley KA, Wipf JE, Back AL. Burnout and self-reported patient care in an internal medicine residency program. *Annals of internal medicine* 2002;136:358-67.
30. West CP, Dyrbye LN, Shanafelt TD. Physician burnout: contributors, consequences and solutions. *Journal of internal medicine* 2018;283:516-29.
31. Keast SL, Kim H, Deyo RA, et al. Effects of a prior authorization policy for extended-release/long-acting opioids on utilization and outcomes in a state Medicaid program. *Addiction* 2018;113:1651-60.

32. White Jr AC, Atmar RL, Wilson J, Cate TR, Stager CE, Greenberg SB. Effects of requiring prior authorization for selected antimicrobials: expenditures, susceptibilities, and clinical outcomes. *Clinical infectious diseases* 1997;25:230-9.
33. Popatia S, Flood KS, Golbari NM, et al. Examining the prior authorization process, patient outcomes, and the impact of a pharmacy intervention: A single-center review. *Journal of the American Academy of Dermatology* 2019;81:1308-18.
34. Wallace ZS, Harkness T, Fu X, Stone JH, Choi HK, Walensky RP. Treatment delays associated with prior authorization for infusible medications: a cohort study. *Arthritis care & research* 2020;72:1543-9.
35. Kebaish KJ, Galivanche AR, Grauer JN. Transparency in Prior Authorization: The Under-recognized Precedent Set by Arkansas. *Clinical spine surgery* 2020;33:325-7.