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RESEARCH ARTICLE

Implementing High Dose Oral Methylprednisolone for a Multiple Sclerosis Relapse in the Outpatient Setting

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ABSTRACT

Background

Intravenous methylprednisolone is the standard of care for a multiple sclerosis relapse. However, intravenous medications can create several barriers for patients and healthcare organizations. A non-inferiority study by Le Page et al. demonstrated no difference between a patient's multiple sclerosis disability score when treated with high dose oral versus intravenous methylprednisolone. Implementing an oral methylprednisolone workflow for a multiple sclerosis relapse leads to healthcare cost savings and decreased healthcare utilization.

Methods

A neurology clinical pharmacist partnered with neurology providers to create and implement a standardized workflow for high dose oral methylprednisolone to treat multiple sclerosis relapses. From October 2018 – April 2022, patients were included in the retrospective analysis if they were prescribed oral methylprednisolone for a 3 or 5 day treatment course for the purpose of an multiple sclerosis relapse by a neurology provider from the same multiple sclerosis clinic. The primary outcome was evaluating healthcare utilization measured by infusion center chair time saved and direct health system cost savings.

Results:

Overall, 290 three-day oral methylprednisolone treatment courses and 50 five-day treatment courses were prescribed. This saved the infusion center 1,680 hours of medication administration time and contributed to an estimated $80,875 in health system cost savings.

Conclusion and Relevance:

Implementing a high dose oral methylprednisolone workflow for a multiple sclerosis relapse at an outpatient neurology clinic did help reduce health system cost and infusion center chair time.

Introduction

Multiple Sclerosis (MS) is an autoimmune disease that affects the entire central nervous system (CNS), including both the brain and spinal cord. Damage occurs to the myelin sheath of neurons which is responsible for the speed of nerve transmission as well as protecting the neuronal axon.[1] Disease modifying therapies (DMTs) are targeted to prevent relapse of disease with the goal of slowing down disease progression.[2] Regardless, relapses may occur even if patients are taking or not taking DMTs as prescribed. New or worsening inflammation of the CNS is commonly referred as an MS relapse. The inflammatory process becomes more diffuse and chronic contributing to accumulating disability over time.[3]

Glucocorticoids, such as methylprednisolone, are the most common medications used to treat an MS relapse as they help close the damaged blood-brain barrier and reduce inflammation in the CNS.[1,4,5,6] Methylprednisolone, administered as 1,000 mg intravenously (IV) for 3 to 5 days, is the standard of care for an MS relapse[1]. Treatment duration is often determined by the type and severity of the relapse.

Medications administered by IV come with several considerations. First, patients must have access to an infusion center or home-infusion service to receive IV medications. Accessing infusion services may be especially difficult for the estimated 15% to 19% of the United States population that live outside a major metropolitan area, defined as fewer than 50,000 people.[7] These patients may not have the time, physical ability, or transportation to travel to an infusion center for consecutive, daily infusions. Organizations face other barriers for outpatient infusions including, but not limited to, available chair time, staffing, suppliers, and equipment shortages which all can lead to treatment delays.

A non-inferiority trial comparing a one-to-one ratio of oral to IV methylprednisolone for treatment of an MS relapse found no difference between patient's disability score when 1,000 mg of oral methylprednisolone was administered versus 1,000 mg of IV methylprednisolone (81% vs 80%, respectively; 90% CI -9.5 to 10.4) one month after treatment. Insomnia was the only side effect more frequently reported in the oral methylprednisolone group (77%) compared to the IV group (64%).[8] Prescribing oral methylprednisolone in lieu of IV methylprednisolone may help overcome infusion center and patient challenges without sacrificing treatment efficacy.

The purpose of this project is to describe the process of implementing a clinical pharmacist led high dose oral methylprednisolone for an MS relapse in the outpatient setting and measure the change in healthcare cost savings and healthcare utilization.

Methods

To initiate this project, a physician partnered with the neurology clinical pharmacist to review the literature as well as to define and implement necessary workflows. The project team identified three key areas for standardization: order entry, patient education, and medication fulfillment. The clinical pharmacist collaborated with key stakeholders for the development of each of these items with oversight and approval by the collaborating physician.

A standard order for oral methylprednisolone was developed within the electronic medical record. Based upon the literature, this order included appropriately dosed oral methylprednisolone along with an oral proton-pump inhibitor (PPI). Given that 32mg is the largest available methylprednisolone tablet strength at the time of this project, the order was developed for a quantity of 15.5 tablets taken twice daily with food for a total daily dose of 992 mg/day. This order was developed to allow for synchronous electronic prescribing of both prescriptions through an electronic health record order panel.

Standard education was compiled to ensure patients were consistently educated on dosing side effects and how to access the medication. Formal education was provided to internal health system retail pharmacists regarding the medication course and commonly needed insurance overrides to avoid processing delays given use of high dose methylprednisolone is less familiar in the community setting. Additionally, internal pharmacies increased the minimum quantity of oral methylprednisolone to ensure adequate supply of high dose methylprednisolone and avoid treatment delays due to stocking issues.

The protocol is implemented when the patient contacts the neurology clinic with a suspected MS relapse. The neurology provider completes an assessment to determine if the patient is experiencing a new relapse. If the relapse is confirmed, the patient is referred to the clinic pharmacist to provide verbal and/or written education, help determine cost and affordability, and coordinate medication access.

Utilizing the methylprednisolone standard order, oral methylprednisolone and PPI prescriptions are electronically signed by the provider. Patients are offered to fill prescriptions at an internal health system retail pharmacy to prevent delays encountered at an outside community pharmacy as previously outlined. Alternatively, using the internal mail service pharmacy affords prompt prescription delivery directly to patients who do not live in the area or are unable to drive.

To review the impact of this project on healthcare utilization and cost, a retrospective analysis was conducted from October 2018 through April 2022 following oral methylprednisolone order panel implementation at a large academic medical center. Patients were included in the study if they were prescribed oral methylprednisolone for a 3 or 5 day treatment course by an internal neurology provider for the purpose of an MS relapse. Patients were excluded if they did not receive the standard dose of oral methylprednisolone outlined above for an MS relapse, prescribing occurred outside of the neurology department, or oral methylprednisolone was prescribed for an alternative indication.

Healthcare utilization was determined by reviewing infusion center hours saved. This was calculated by multiplying the total number of oral methylprednisolone prescriptions prescribed by the total days of therapy and average infusion appointment length. Appointment times for methylprednisolone are scheduled for 90 minutes to accommodate the one-hour medication administration and the time necessary for IV-line insertion, removal, and/or additional observation.

Cost savings were determined by comparing wholesale acquisition cost (WAC) in addition to other operational costs incurred by the infusion center. Average operating costs per appointment were calculated by taking the annual operating budget (minus medication expenses) divided by the total number of appointment hours per year. Figure 1 outlines how average appointment hours per year were determined. Of note, medication expenses were factored out of the yearly operating expense budget to reflect daily expenditures more accurately.

This project was determined not to meet the federal definition of research and the local institutional review board certified it as a quality improvement project.

Figure 1: Average Appointment Hours (per year)

Appointment hours (per year) = average number of appointments (per day) x total number of weekdays (in a year) x average appointment length (hours)

Results

From October 2018 through April 2022, 290 three-day oral methylprednisolone treatment courses and 50 five-day treatment courses were prescribed for an MS relapse. Avoiding the need for an IV medication administration saved the infusion center a total of 1,680 hours of chair time as well as saved patients 780 days of unnecessary healthcare exposure days. Additionally, it was estimated that one day of IV methylprednisolone treatment (methylprednisolone WAC plus infusion center operating expense per hour of chair time) costs amount to $204.58 in comparison to $132.37 for oral methylprednisolone, which contributed to an estimated $80,875 in health system cost savings from oral methylprednisolone over this time period.

Discussion

Multiple sclerosis relapses negatively impact a patient's quality of life. Methylprednisolone is initiated as soon as possible to help alleviate bothersome and disabling symptoms. Access to infusion centers can be difficult and inconvenient for patients. Some patients may live in rural areas and must drive several hours each day to access an infusion center. Additionally, ambulation can be difficult for patients during an MS relapse.

The COVID-19 pandemic has strained the health care system contributing to more access issues with staffing shortages, staff redeployment, and social distancing. The COVID-19 pandemic has also changed visitor policies at many infusion centers, preventing friends or family members from supporting the patient during their treatment.[9] In comparison to repeat trips to an infusion center, oral methylprednisolone treatment is convenient for patients to administer. Oral treatment frees up infusion chairs and healthcare staff time contributing to health system cost savings, improving healthcare access, and reduced cost of treatment. The cost savings found in this study may be an underestimate as it did not account for fixed costs (e.g., building rental, utility bills, infusion billing).

There are additional potential health benefits on top of the convenience and cost savings of oral methylprednisolone therapy. It is known

that certain DMTs make an MS patient more susceptible to having a severe case of COVID-19 or other viral illness as these medications alter their immune system and have a reduced ability to mount a proper antibody response to the vaccines.[10,11] Exposure to healthcare facilities and staff may inadvertently expose patients to COVID-19. Patients taking methylprednisolone in their own home can help avoid this potential exposure.

Neurology clinics across the country have successfully incorporated pharmacists into MS medication management workflows. In many clinics, pharmacists facilitate medication access, provide medication education, and ensure the patient completes all necessary baseline testing and vaccinations for specialty medications. Pharmacist involvement with patient care has helped decrease time to therapy initiation as well as decrease the amount of time providers spend on medication management.[12] Pharmacists can be utilized to help with these factors as well as mitigating barriers with oral methylprednisolone prescribing such as sufficient stocking and insurance barriers. Pharmacists can also aide rural community pharmacists by explaining the use and indication for high dose oral methylprednisolone and help facilitate insurance overrides. Additionally, utilizing internal health system retail pharmacies may help decrease some of these barriers given the formal education provided and familiarity with MS relapse oral methylprednisolone dosing.

There are two main limitations of this study to take into consideration. First, we were unable to determine if oral versus IV methylprednisolone provides any direct cost savings to the patient or patient's insurance company as each insurance plan may have a unique deductible, copay for methylprednisolone, or administration fee for IV administered medications. As IV methylprednisolone is administered at an infusion center, it is typically billed through medical benefits in comparison to oral methylprednisolone being bill through pharmacy benefits thus making it impossible to know the potential out of pocket cost to each individual patient. Second, this retrospective review did not evaluate patient satisfaction with receiving oral methylprednisolone at home rather than IV therapy in an infusion center. This is a possible direction for future studies to investigate.

Conclusion

Establishing a high dose oral methylprednisolone workflow in the outpatient setting for an MS relapse can help reduce infusion chair utilization, health system costs, decreasing travel barriers, and potential COVID exposures for at risk MS patients. Pharmacists can be an integral team member to facilitate implementation of this service.

Conflicts of Interest

The authors have no conflicts of interest to declare.

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