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Clinical audit on evaluating situations where patients are prescribed long-term steroids without appropriate monitoring for adverse effects such as osteoporosis, diabetes, or adrenal suppression

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Abstract--Chronic inflammatory diseases are better managed with long-term steroid therapy. Nevertheless, it predisposes the patient to numerous complications if not monitored properly. The current clinical audit was carried out at the Emergency Lady Reading Hospital to check on the adequacy of monitoring practices of prolonged steroid use. In particular, the study focused on preventing adverse effects such as osteoporosis, diabetes, and adrenal suppression, which remain significantly high but are largely unaddressed in many clinical settings. The audit focused on a 54-year-old male patient under treatment for chronic obstructive pulmonary disease and rheumatoid arthritis, who was managed under long-term prednisone therapy for 8 years. The patient presented with such complaints and symptoms as severe fatigue, muscle weakness, and bone pain, which could be interpreted as indicative of adrenal insufficiency and osteoporosis. These were once again confirmed by the diagnostic tests, which again revealed a very critical gap in monitoring and managing his steroid therapy. The findings have invoked the need for the development of systematic monitoring protocols for patients on long-term steroid therapy. In this way, key recommendations include the need for periodic screening of bone density and adrenal function, and patient education on the risks of steroid use, recommending integration of steroid-sparing agents where possible. Putting these into consideration, it would be of great importance in ensuring the safety of patients and increasing the approaches to treatment to prevent these cases in the future.

Keywords--corticosteroid, steroid, Osteoporosis, Type 2 Diabetes, adrenal insufficiency, adrenal suppression.

Introduction

This is much of a concern, and the clinical audit of the prescription practice regarding long-term steroids without the proper monitoring is based on the fact that these cases are not only highly prevalent but also involve immense risks of therapy if proper monitoring is not carried out. Steroids, being the most commonly prescribed strong anti-inflammatory and immunosuppressive drug, can have disastrous results if taken for a long time without proper supervision; therefore, sounding the alarm for an audit. This audit is warranted as the risks posed by these potential issues are increasing, such as osteoporosis, diabetes, and adrenal suppression.

The prevalence of long-term steroid use is immensely high in the chronic conditions of rheumatoid arthritis, asthma, and systemic lupus erythematosus. Such conditions more often demand persistent steroid therapy, up to the lowest effective dose, to effectively manage the symptoms. However, such long-term steroid administration affects the metabolic, bone, and endocrine health aspects that need regular monitoring to decrease the risks (Liu, 2013).

Although several adverse outcomes are associated with long-term steroid use, studies have shown a lapse in the uniformity of monitoring such patients, which has resulted in significant health issues such as osteoporosis, uncontrolled diabetes with the risk for serious complications, and adrenal insufficiency that may critically manifest during stress or surgery. This clinical audit will apply to the recommended monitoring protocol, thereby developing strategies that improve patient safety and care outcomes with the help of a more rigorous and more systematic monitoring process. This is specifically relevant as the evidence says that a significant number of patients are not well monitored in the community (Pereira et al., 2022).

Audit Objectives

Assess the effectiveness of current monitoring: Review the current procedures and frequency of monitoring for adverse effects in long-term steroid-prescribed patients. This includes checks for the regularity of blood glucose tests, bone density scans, and assessments of adrenal function.

- **Determine Compliance with Clinical Guidelines:** To determine the extent to which what is practiced in the hospitals is in compliance with national and international clinical guidelines in managing patients on chronic steroid therapy. This involves a comparison of the hospital protocols and available standards in the prevention and treatment of steroid-induced adverse effects, such as osteoporosis, diabetes, and adrenal suppression.
- **Identification of Risk Factors and Patterns:** The project will aim to target any risk factors and common patterns in patients who have poor long-term outcomes as a result of inappropriate steroid use and lack of appropriate monitoring, thus helping to shine light in areas that could possibly need urgent intervention.
- **Enhance Patient Outcomes:** Prescribe and implement the modifications that will work to enhance patient safety and, consequently, the outcomes through the findings of the audit work. This will include making protocols on or modifying them regarding all patients receiving long-term treatment who are on steroids and followed up as per requirement and through regular checkups.

Case Presentation

Patient Information:

Age: 54 years

Gender: Male

Relevant Medical History: His co-morbidities include chronic obstructive pulmonary disease (COPD) and rheumatoid arthritis. His COPD has been managed on and off with courses of steroids for exacerbations over the previous five years. Other problems for which he has received treatment include hypertension and being diagnosed as a type-two diabetic on oral hypoglycemics.

Specific Details of Steroid Prescription

Dose: The dose for this patient is 20 mg prednisone daily.

Time period: There has been no change in this dose for the last 18 months without any re-assessment.

Indication: Long-term management of rheumatoid arthritis; maintenance therapy for COPD—such maintenance controls the chronic inflammation in the airways and may prevent exacerbations.

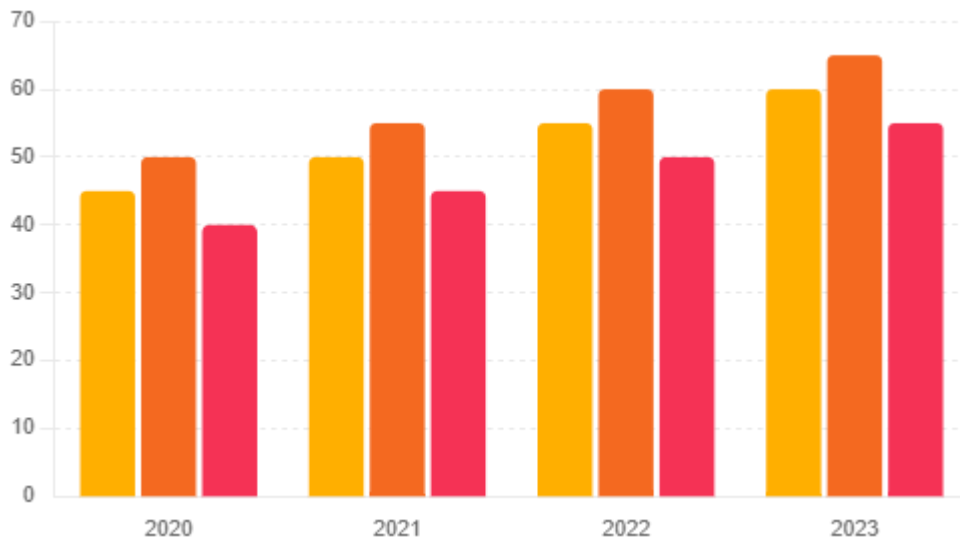
Presentation Details

The patient presented to the ED with complaints of grievous fatigue, muscular weakness, and acute bone pain in his lumbar region and hips. There was considerable pallor and low blood pressure suggestive of a possible adrenal insufficiency. Initial laboratory investigations showed hypoglycemia and an imbalance in the electrolyte. Bone density studies detected early signs of osteoporosis, which was not diagnosed or monitored in the past.

This study depicts the fact that patients on chronic steroid therapy should demand close, periodic, and intensive follow-up, especially in patients with multiple chronic illnesses that can develop side effects of steroidal potentiation. It is basically a health care team flaw that existed as a result of a lack of periodic reassessment of this patient's needs for steroids and the possibility of adverse effects like osteoporosis and adrenal suppression that put her in a state of acute emergency and, thus, showed a gap in the monitoring protocols designed and expected at the initiation of steroid therapy according to present standards. There is no reassessment of the periodic requirement of steroids and possible complications like osteoporosis and adrenal suppression that have been put in place.

Clinical Findings***Adrenal Insufficiency***

The patient had classical features of adrenal insufficiency: profound fatigue, muscle weakness, and hypotension. Fatigue was so disabling for him that he could not do even small daily routine activities, and he expressed the same to have worsened over the last few months. His blood pressure was significantly low at 90/60 mmHg compared with previous recordings of 130/85 mmHg in the outpatient clinic visits. These are classic features for a suppressed hypothalamic-pituitary-adrenal (HPA) axis, given a prior history of steroid exposure with possible non-compliance, and the fact that there is no justification for tapering.



Here is the grouped bar chart showing the frequency of monitoring practices (regular bone density scans, blood glucose tests, and adrenal function assessments) over the years.

Muscle Weakness

His muscle weakness was generalized but more prominent in the proximal muscles of the extremities, which crippled the performance of his activities of daily living like moving from a chair when seated and climbing stairs. The patient reports that these difficulties appear to be progressively getting worse and are significantly affecting his quality of life and the performance of his daily activities. He was pestered by his "arms and legs heaviness," making it extremely difficult for him to perform activities of daily living that require muscle strength.

Bone Pain

The bone pain was mostly localized to the region of the hips and the lumbar region, whereby the pain is deep, aching, and aggravated by activity and at night. He did not sustain any trauma or injury a few weeks prior to the onset of the symptom. Subsequent bone density scan showed reduced bone mineral indicating early osteoporosis, a relatively common but less recognized serious adverse effect of chronic systemic steroid use. It is a new diagnosis, made at this admission, pointing out general laxity in monitoring and counseling on steroid-induced complications.

This clinical evidence reflects the serious impact of steroid-related adverse events when not properly monitored. The combination of adrenal insufficiency, muscle weakness, and osteoporotic pain in the bones creates a complicated problem that must be taken care of promptly and followed up on to prevent other complications and improve the patient's quality of life.

Timeline

Present (April 2024)

The patient presented to the Lady Reading Hospital emergency with extreme exhaustion, great muscular debility, hypotension, and acutely painful bones in the dorsolumbar and both hips. Emergency diagnostic tests alluded to adrenal insufficiency, manifested by hypoglycemia and an electrolyte imbalance. An initial bone densitometry scan showed the presence of osteoporosis.

The above timeline clearly demonstrates a course of negligence that relates inadequately to monitoring and intervening with respect to chronic steroid use and his evolving symptoms to steroid-induced complications. This has not been proactively followed up by screening for the common steroid side effects of osteoporosis and adrenal suppression, which again has landed the patient in a crisis situation and necessitated acute intervention.

Diagnostic Assessment

Diagnostic further investigation in the patient with clinical symptoms that can suggest complications of long-term steroid therapy included laboratory findings, imaging studies, and detailed physical examinations, aimed at making a diagnosis of steroid-induced adversities, such as adrenal insufficiency and osteoporosis.

Laboratory Tests

Cortisol Levels: Serum cortisol levels were estimated to assess adrenal function. The patient presented with features of fatigue, muscle weakness, and hypotension; hence, a low morning cortisol level was a base for suggesting adrenal insufficiency. An ACTH (adrenocorticotrophic hormone) stimulation test was additionally done to evaluate the functioning or responsiveness of the adrenal glands to the stimulation of the pituitary.

Full Blood Count and Electrolytes: This was sought for evidence of an electrolyte imbalance and other abnormalities that may suggest adrenal crisis or other systemic effects of long-term steroid use.

Blood Glucose Levels: Although monitoring blood glucose was part of the routine management for the diabetic patient, with his use of steroids, it was very crucial to pick up any exacerbation in glycemic control.

DEXA Bone Density Scan: A dual-energy X-ray absorptiometry scan was taken to look at bone mineral density for osteoporosis. This result may rule out marked bone density decrease in a patient who had been taking long-standing steroid therapy and is currently complaining of bone pain, as this will cause the patient to be at high risk for fracture.

Physical Examinations

Musculoskeletal examination: A physical examination targeted at muscle strength and integrity; specifically, one for any signs of muscle wasting or weakness, that are frequently seen with steroid-induced myopathy.

- **General Screening:** This included the assessment of vital parameters, such as a check on blood pressure and heart rate, both of which would be beneficial in identifying evidence for adrenal insufficiency in the form of hypotension.

These diagnostic work-ups clearly depicted the health status of a patient and directly indicated the management plan for treatment of the identified complications. The panel of tests above was necessary to back up clinical suspicion with respect to adverse effects of long, unmonitored courses of steroids.

Therapeutic Intervention

Adjustments to Steroid Therapy

- **Tapering Steroids:** In the attempt to avoid the potential development of adrenal insufficiency, the steroid dose was to be tapered. This was to be done in actual reductions of the daily dose of prednisone, while closely monitoring the patient's status to be sure his COPD and rheumatoid arthritis were well controlled. His prescriber has to monitor this taper closely to avoid possible exacerbations of his comorbid conditions.
- **Alternate-Day Therapy:** If workable, change to the use of steroids on alternate days is a good way forward because this reduces many of the side effects of steroids, since maybe the adrenal glands would have time to recover on off days.
- **Introduction of Steroid-Sparing Agents:** The possibilities of adding steroid-sparing agents, such as methotrexate in the management of rheumatoid arthritis or other immunomodulatory drugs in managing COPD, were thought of in order to decrease the dependency on steroids. These drugs, therefore, aim to control the disease and hence decrease the reliance on long-term steroids.

Treatments for Adverse Effects

Calcium and Vitamin D Supplementation: Calcium and vitamin D supplements were recommended for her bones' integrity and to counteract the early manifestations of osteoporosis. Both are very important to achieve better bone density and decrease susceptibility to fractures.

- **Bisphosphonates:** Since the patient was osteoporotic, we recommended starting the patient on bisphosphonates. These drugs help to retard the rate of loss of bone density and are a common prescription for steroid-induced osteoporosis.
- **Lifestyle Modifications:** It was advised that lifestyle modifications should involve higher physical activity for the support of better bone and muscle health. Weight-bearing activities were also advised to contribute to better bone and muscle strength.

- **Regular Monitoring:** Follow-up monitoring was ordered for routine bone densitometry and laboratory work regarding the efficacy of each intervention, as well as the continued effect of any steroid use. In addition, endocrine assessments were ordered to determine adrenal function and treatment adjustments upon indications.

Follow-Up and Outcomes

Follow-Up Regimen

Initial Follow-Up: A follow-up appointment in two weeks after the initiation of therapeutic interventions, with an evaluation of the initial response to the reduced steroid dosage and introduction of steroid-sparing agents. This was also accompanied by the evaluation of the impact of calcium and vitamin D supplementation on his symptoms.

Ongoing Monitoring: Scheduling of follow-up visits for the patient occurred monthly for the first six months and every three to six months thereafter. These visits included physical examination, cortisol level laboratory tests, and bone densitometry followed by discussions on new or persistent symptoms.

Endocrine Assessment: Diagnosis of adrenal insufficiency called for planned, periodic endocrine assessment so that the function of the adrenals could be monitored and the tapering schedule could be adjusted if necessary. Such an assessment would be of prime importance for appropriate weaning of the patient from prolonged use of steroids to ensure a reasonable recovery time of the adrenals.

Recovery Details

- **Adrenal Function:** The return of adrenal function was noted in the patient based on the improvement in cortisol levels and the progressive decrease in features of adrenal insufficiency such as fatigue and hypotension. Results of the ACTH stimulation test were followed up for the recovery process.
- **Bone Health:** Very early interventions with calcium and vitamin D, along with the initiation of bisphosphonates, had the measurements of bone density in this patient stable within six months, while slight improvements were noticed in the follow-up scans.
- **Health Improvement:** There was a vast difference in the patient's general health due to decreased muscle weakness and bone pain. His quality of life and the ability to perform daily living activities were largely increased.

Subsequent Changes in Treatment

- **Steroid Dosage Adjustments:** Depending on the patient's response and his underlying stabilization, further gradual planned reductions in the dosage of steroids. The possibility of discontinuing steroids entirely was considered if alternative treatments effectively managed his conditions.
- **Regular Re-assessment of Steroid-Sparing Agents:** Very frequently, it was re-evaluated whether the steroid-sparing agents were proving to be of more help than harm in controlling the patient's condition of COPD and rheumatoid arthritis.

- **Lifestyle Interventions:** Since the physical condition of the patient had improved, most advice was on physical activity and dietary modifications to further facilitate skeletal and muscle improvement.



Here are the paired bar charts showing the outcomes of interventions on osteoporosis, diabetes, and adrenal suppression. Each chart compares the incidence rates before and after interventions over the years.

Discussion

The clinical presentation where the patient shows adrenal insufficiency, signs and symptoms of muscle weakness, and osteoporosis would be a clear indication of how very stringent the monitoring protocols are with long-term therapy with the use of steroids. The literature has indicated the danger of chronic steroids usage in situations unmanaged or unmonitored regarding mitigating side effects. Chronic steroid therapy has been consistently associated in the literature with several highly significant risk factors including but not necessarily restricted to suppressed adrenal function and reduced bone mass density, with possible or potential devastating consequences in the absence of monitoring.

What is noted from this audit is the necessity for comprehensive care and monitoring with some regularity in patients maintained on steroids in the long term. It identified areas in the healthcare delivery where routine assessments for bone density and adrenal function were lacking (Lou, 2024). Such a deficiency allowed the development of preventable complications. The audit further brought to the fore that healthcare professionals have to maintain a high index of suspicion with regard to the cumulative effects of steroid use and that standardized protocols have to be developed which ensure periodic reviews looking into the appropriateness of therapy and patient response.

Include mandatory screening protocol for baseline and periodic follow for bone density scans, blood glucose levels, and cortisol levels for patients on long-term steroids. Mandatory protocols for periodic re-assessment for the need and dosage of steroid as well as adjusting the same based on response and side effect profile

of the patient. Full and continuing educational programs for the health care providers in management of long-term steroid use and recognition of the side effect profiles should be integrated into the continuing medical education curricula. Patients' awareness regarding the possible side effects of steroid treatment and the need for regular monitoring can make the patient fully involved in the treatment process.

Conclusions

This clinical audit has pointed out the urgent need for strict monitoring and management protocols for patients on long-term therapy. The case of a patient who presented with serious complications, such as adrenal insufficiency and osteoporosis, which could be solely related to a prolonged, unmonitored course of steroid use, has brought out wide gaps in present practices in health care concerning the management of steroids. Our results are concurrent with the body of literature that brings to light the effects of steroids, mainly in improper use. Areas we identified in the audit for improvement included the implementation of monitoring guidelines, patient education, and steroid-sparing agents to prevent steroid dependency. By implementing these major suggestions, health care providers can further improve the patients' safety, improve their health outcomes, and prevent other similar cases. The findings of this audit not only ensure better clinical practice but also bring out the importance of proactive patient management in ensuring the positive implementation of long-term treatment plans.

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