4-2023

Preventable Tacrolimus Toxicity

Brooke Parker
Providence

Jessica Sterner
Providence

John Mele
Providence

Laura DeWald
Providence

Cassidy Johnston
Providence

Preventable Tacrolimus Toxicity

Brooke Parker (Psych) | Jessica Sterner (TY) | John Mele (TY) | Laura DeWald (IM) | Cassidy Johnston (TY)

Providence Health & Services | Spokane Teaching Health Clinic

Purpose/Background

Patient was a 24-year-old female with history of idiopathic pulmonary HTN s/p bilateral lung transplant in 2019 on tacrolimus, mycophenolate, and prednisone for chronic rejection who was admitted for suspected community acquired pneumonia. Imaging results were sent to outside lung transplant team for review, and they believed findings were due to chronic rejection rather than acute pneumonia. Patient was given the option to be treated for possible pneumonia and discuss goals of care in current hospital or be transferred to the lung transplant team in a different city for aggressive management. Patient chose aggressive treatments, but arrangements could not be made for transport until a few days later. In the meantime, patient was given IV antibiotics and restarted on her immunosuppressive medications. Patient became altered and developed symptoms of worsening hypoxia, hallucinations, and tremors. Antibiotic coverage was subsequently broadened, a steroid taper was started, and a tacrolimus level was ordered for her morning labs the following day. Before labs resulted, patient's symptoms continued to worsen and ultimately, she was transferred to the intensive care unit. On review of morning labs, her tacrolimus level was supratherapeutic. Patient was subsequently given a delayed diagnoses of tacrolimus toxicity.

Methods

- Chart review
- Direct patient care

Learning Objectives

•What is Tacrolimus and what is it used for?
•What are the monitoring parameters?
•How do you correctly draw a trough level?
•What is the therapeutic window of Tacrolimus?
•What are the signs and symptoms of tacrolimus toxicity?
•How can we change the system to prevent Tacrolimus toxicity in the hospital?

Figure 1: Errors, Gaps, and Areas of Improvement

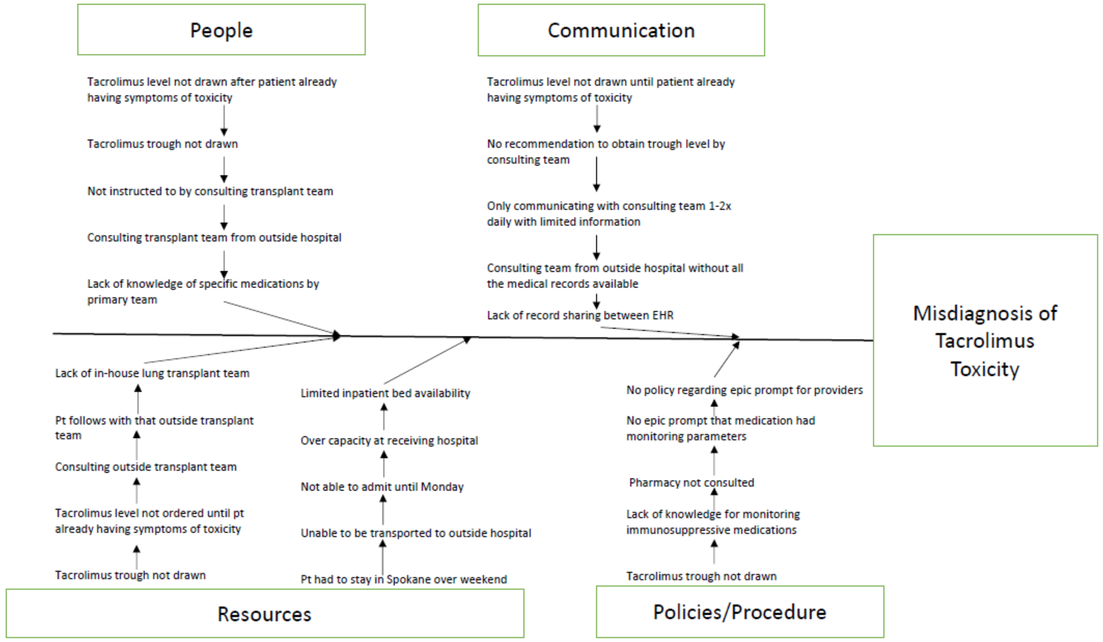

Figure 1 demonstrates five areas in which patient care was potentially compromised. The cumulative effect of which was a misdiagnosis of Tacrolimus Toxicity.

Suggestions for Improvement:

· Increase specialist lectures at noon conferences or CME events
· Promote healthy relationships and communication between nursing staff and providers
· Educate patients at discharge on importance of PCP relationship to decrease ED overcrowding and subsequently increase better patient to healthcare worker ratios
· Standardize EHR between facilities
· Create policy on testing immunosuppressive/other potentially toxic drug troughs prior to prescribing
· Create scoring system to prioritize patient transfers

Learning Objectives Continued

•Tacrolimus an immunosuppressive agent that works by suppressing cellular immunity (inhibits T-lymphocyte activation) by binding to an intracellular protein, FKBP-12 and complexes with calcineurin dependent proteins to inhibit calcineurin phosphatase activity
•Tacrolimus is used to prevent organ rejection in transplant patients, graft versus host disease, as well as in Myasthenia gravis for chronic immunosuppressive therapy.
•Trough level should be checked 2-3 days after starting the medication and after any increase in dose. When in the hospital, should be checked on admission then every 2-3 days thereafter.
•How to get a trough level: drawn 30 minutes prior to the next dose at least 12 hours after immediate release dose or 24 hours after the extended-release formulation.
•The therapeutic window is different for different types of transplant. Will do lung since that is applicable to our case.
For lung transplant:
- •When in combo with azathioprine or mycophenolate mofetil:
- •Months 1-3: 10 – 15 ng/mL
- •Months 4-12: 8-12 ng/mL
- •Whole blood trough concentrations: 5-15 ng/mL

•Symptoms of tacrolimus toxicity: Nephrotoxicity, Hypertension, Neurotoxicity including tremor and HA, visual abnormalities, and seizures which are more rare, metabolic abnormalities including hyperglycemia, HLD, hyperkalemia, and hypomagnesemia

References

Hardinger, K. (2021, 12 3). *Pharmacology of cyclosporine and tacrolimus.* Retrieved from UpToDate: https://www.uptodate.com/contents/pharmacology-of-cyclosporine-and-tacrolimus?search=Tacrolimus%20Toxicity&source=search_result&selectedTitle=2~145&usage_type=default&display_rank=1