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# Decreasing Length of Stay in Patients Receiving High Dose Methotrexate A Quality Improvement Project

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## Goal

Decrease length of stay by checking methotrexate levels more frequently and changing the methotrexate level for discharge from  $<0.1\mu\text{M}$  to  $<0.2\mu\text{M}$ .

## Background

- In patients receiving high dose methotrexate, the greatest concern is renal toxicity
- The elimination half-life of high dose methotrexate is within the range of 8 to 15 hours
- After IV administration, approximately 80-90% of the methotrexate is excreted within the urine as unchanged drug within 24 hours
- The majority of patients will have a serum methotrexate level  $<0.1\mu\text{M}$  between 24 and 48 hours
- There is limited data detailing a safe methotrexate level for hospital discharge and no data to support that discharge with a methotrexate level of  $<0.1\mu\text{M}$  is safer than  $<0.2\mu\text{M}$
- The cost of checking a stat serum methotrexate level is \$64.45
- The cost of an additional night stay in the hospital is significantly more expensive
- It is cost effective to check methotrexate levels twice daily in an effort to decrease length of stay in patients receiving high dose methotrexate

## Old Protocol

- 24 hours after methotrexate infusion is complete a methotrexate level is checked and leucovorin dose is based on the methotrexate level
- Methotrexate levels are then checked every 24 hours until levels are  $<0.1\mu\text{M}$
- When levels are  $<0.1\mu\text{M}$  then the patient may be discharged on leucovorin 15mg PO every 6 hours for a total of 24 hours

## New Protocol

- 24 hours after the completion of the methotrexate infusion, a methotrexate level will be checked and leucovorin started
- The methotrexate level will then be checked twice daily, at 4:00 and 13:00 until the level is  $<0.2\mu\text{M}$
- In patients with a normal creatinine ( $<1.2$ ) and normal CrCl ( $>60$  mL/min) or stable creatinine (no change  $>0.3\text{md/dL}$  during the hospital stay), once levels are  $<0.2\mu\text{M}$  the patient is discharged to home and given a script to have a methotrexate level checked 24 hours later in the MPA to ensure that the level is  $<0.1\mu\text{M}$
- In patients with a level  $<0.2\mu\text{M}$  and abnormal or unstable creatinine, they will remain in the hospital until the methotrexate level is  $<0.1\mu\text{M}$

## Subjects

- Diagnosis included primary CNS lymphoma, peripheral T cell lymphoma, DLBCL of the testicle, T-ALL, B-ALL, DLBCL with double hit
- Chemotherapy regimens received included HyperCVAD, DeAngelis protocol, and high dose methotrexate and rituxan
- Ages of patients ranged from 27 to 79

## Results

- A total of 21 hospitalizations were reviewed prior to instituting the new protocol
- The average length of stay was 4.47 days
- In reviewing the 21 hospitalizations, 8 hospitalizations could have had reduced length of stay by at least 1 day implementing the new protocol
- One hospitalization could have been reduced by 2 nights if the new protocol had been implemented
- A total of 43 hospitalizations for high dose methotrexate were reviewed using the new protocol
- The average length of stay with the new protocol was 3 days
- Average LOS was reduced by 1.47 nights
- There were 7 hospitalizations where the patient was discharged with a methotrexate level  $>0.1\mu\text{M}$
- All 7 had an outpatient methotrexate level the following day, all methotrexate levels were  $<0.1\mu\text{M}$

## Conclusions

- The average length of stay was decreased by 1.47 days implementing the new protocol.
- The new protocol is safe with regards to discharging patients with slightly higher methotrexate levels, all repeat methotrexate levels as an outpatient were at the goal of  $<0.1\mu\text{M}$
- The new protocol for discharging patients receiving high dose methotrexate is both safe and cost effective.
- The new protocol is now the new standard of care in patients receiving high dose methotrexate.