Toolbox: Lithium therapeutic drug monitoring - Efficacy and safety parameters

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LITHIUM SERUM CONCENTRATIONS AND ADVERSE EFFECT MONITORING

For Patients Initiating Lithium Therapy

- Obtain at baseline (prior to lithium start):
  - Serum creatinine (SCr) and BUN
  - Electrolytes (Na and K)
  - CBC
  - TSH/Full Thyroid Panel
  - Pregnancy test (in females)
- Trough serum lithium levels drawn in the morning (at least 12 hours after the last dose, but before morning dose)
  - No earlier than the 5th day of lithium therapy, but preferably no later than the 7th day

For Patients on Continuation Lithium Therapy

With Dose or Medication Changes	***Without any Dose or Medication Changes***
• Trough serum lithium level drawn no earlier than the 5th day, but preferably no later than the 7th day, after any lithium dose changes • Trough serum lithium level drawn no earlier than the 5th day, but preferably no later than the 7th day, after the initiation *OR* deletion of any ***scheduled*** medications known to interact with lithium • ***ACE Inhibitors*** (↑ 30-60%) ***ARB's*** (↑ up to 3-fold) ***Metformin*** (poss. renal effects) ***Diuretics*** (↑ up to 3-fold) ***NSAID's*** (↑ up to 3-fold) ***Others*** • Trough serum lithium level drawn every 72 hours (in the morning) throughout the course of any ***PRN "as needed"*** medications known to interact with lithium (see above) • This is easier to accomplish on an inpatient basis than outpatient. The use of PRN interacting meds on an outpatient basis is quite problematic for monitoring, and is probably easier to accomplish using symptom-based (i.e. side effects) monitoring rather than serum levels. Ideally, these types of drug interactions should be avoided, if possible.	• Inpatient: Trough lithium levels can be measured as deemed clinically necessary based upon patient stability, from weekly to every 4 weeks (or less frequent) • Outpatient: Trough lithium levels can be measured as deemed clinically necessary based upon patient stability, from monthly to every 6 months (or less frequent) • A trough lithium level should be measured anytime: • A clinical change in the patient's status occurs • A lithium-related adverse effect is suspected • Depending on location, seasonal changes in lithium level have been noted, particularly in summertime when increased heat leads to sweating, which may affect the patient's serum level • Increases or decreases in lithium concentrations are possible, depending on the change in the patient's fluid and electrolyte intake/output

- Other follow-up/repeat lab measurements should include:
  - Serum creatinine (SCr) and BUN: Approx. 1-4 weeks after lithium initiation, then every 3-12 months
  - Electrolytes (Na and K): Approx. 1-4 weeks after lithium initiation, then every 3-12 months
  - CBC: Approx. 1-4 weeks after lithium initiation, then every 3-12 months
  - TSH/Full Thyroid Panel: Approx. 3 months after lithium initiation, then every 3-12 months
  - Frequency of monitoring is based upon patient stability and concern of potential manifesting adverse effects

In general, the "more stable" the patient is, the less frequent the monitoring required. As concerns about drug interactions, adverse effects, compliance, etc. increase, more frequent monitoring may be necessary.

CLINICAL EFFICACY

Monitoring for Symptom Severity		
Name	**Description**	**Frequency**
Young Mania Rating Scale (YMRS)	• Clinician-rated scale based upon patient interview and clinician observation of patient's symptoms • 26 item scale; scores range from 0-60 (higher scores = worse symptoms) • 15-30 minutes to complete • Generally administered by trained clinicians • Common scale used in mania studies	• At baseline • Weekly (early in episode) • Monthly or less frequent (later in episode/stable)
Manic State Rating Scale (MSRS)	• Clinician-rated scale based upon patient interview and clinician observation of patient's symptoms • 26 item scale; each item rated from 0-5 on both frequency and intensity; scores range from 0-260 (higher scores = worse symptoms) • 15-30 minutes to complete • Generally administered by trained clinicians or other clinical staff observing patient • Less commonly used scale	
Bech-Rafaelsen Mania Scale	• Clinician-rated scale based upon patient interview and clinician observation of patient's symptoms • 11 item scale; scores range from 0-44 (higher scores = worse symptoms) • 15-20 minutes to complete • Generally administered by trained clinicians • Least commonly used scale	
Clinical Global Impression Scale (CGI)	• Clinician-rated scale based upon clinician observation of patient's symptoms • 1 item scale; scores range from 1-7 (higher scores = worse symptoms) • 1-2 minutes to complete • Generally done by trained clinicians • Very commonly used scale, but not specific to mania (examines global patient status)	
Global Assessment of Functioning Scale (GAF)	• Clinician-rated scale based upon clinician observation of patient's symptoms • 1 item; scores range from 1-100 (higher scores = improved symptoms) • 1-2 minutes to complete • Generally administered by trained clinicians or other clinical staff observing patient • Very commonly used scale, but not specific to mania (examines global patient status)	

Other rating scales are also available, including those specifically for children (with some being completed by parents). Mood charting programs are also available for outpatients to complete on a daily or weekly basis. The results are subsequently reported to the clinician treating the patient. Rating scales can be performed as frequently as deemed clinically necessary, with outpatients generally requiring less frequent monitoring. Changes in clinical status can also trigger a rating scale measurement.

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