DIVISION OF PUBLIC AND BEHAVIORAL HEALTH
NEVADA ADULT MENTAL HEALTH SERVICES
SCOPE: Medical Staff Department

SUBJECT: Therapeutic Plasma-Serum Level Guide for Antipsychotics and Mood Stabilizers

NUMBER:

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SUPERSEDES: New

I. PURPOSE: to provide guidance to the DPBH medical staff in prescribing antipsychotics and mood stabilizers as evidence-based treatment.

II. DEFINITIONS:

1. The **Minimum Plasma-Serum Level** is generally defined by a response threshold below which one is unlikely to find adequate response.

2. The **Maximum Plasma-Serum Level** is defined by the levels cited in Sections III.4. and III.5. (or the upper limit of the laboratory range).

3. Untherapeutic response is defined by the following findings:

    a. When adverse effects arise at low doses (e.g. as might be seen with poor metabolizers);

    b. When no adverse effects or efficacy are seen at standard doses to help rule out kinetic failure (due to ultra-rapid metabolism) or adherence issues;

    c. When there is decompensation or behavior change in a previously stable patient.

III. PROCEDURE:

1. Once the Minimum Level is exceeded, if there is inadequate response and no tolerability issues, the antipsychotic should be titrated until one of two endpoints is reached:

    a. Intolerability;

b. Maximum Level.

2. It is recommended that the medical staff consider ordering Plasma-Serum Levels for antipsychotics and mood stabilizers

   a. When the patient has an optimal drug response to benchmark the drug level(s); or
   b. When the patient has untherapeutic response to antipsychotics and/or mood stabilizers.

3. Plasma-Serum Levels for antipsychotics should be measured 12-hour post dose for oral formulations. Plasma-Serum Levels for long-acting injectable (LAI) antipsychotics should be measured just before the next injection.

4. If levels above the Maximum Level reported by the lab:

   a. Do not reflexively reduce medication dose(s).
   b. Document whether the patient is tolerating the particular plasma level.
   c. If there is suspicion of lab error, the level should be repeated.
   d. If the repeat level remains above the Maximum Level, one should investigate whether the patient needs this high level for response.
   e. If not, the dose should be reduced by no more than 5% per month to prevent unmasking of super-sensitivity psychosis or other rebound effects.

5. Antipsychotic Levels and average Expected Plasma Levels (in ng/ml) for Given Oral Doses

Medication	**Minimum Level**	**Maximum Level**
Aripiprazole Average Expected Level = 12 x oral dose (mg/d)	150 ng/mL	500 ng/mL
Clozapine Male nonsmoker: Average Expected Level = 1.08 x oral dose (mg/d) Female nonsmoker: Average Expected Level = 1.32 x oral dose (mg/d)	350 ng/mL	1000 ng/mL
Fluphenazine Nonsmokers: Average Expected Level = 0.08 x oral dose (mg/d)	0.8 ng/mL	4.0 ng/mL
Haloperidol Average Expected Level = 0.78 x oral dose (mg/d)	5 ng/mL	30 ng/mL

Olanzapine Nonsmoker: Average Expected Level = 2.0 x oral dose (mg/d)	40 ng/mL	200 ng/mL
Paliperidone Average Expected Level = 4.7 x oral dose (mg/d)	28 ng/mL	112 ng/mL
Risperidone + 9-OH Risperidone Average Expected Level = 7.0 x oral dose (mg/d)	28 ng/mL	112 ng/mL
Perphenazine Average Expected Level = 0.04 x oral dose (mg/d)	0.8 ng/mL	4.0 ng/mL

6. Mood Stabilizer Serum Levels

Divalproex, valproic acid		
Acute	100 mcg/mL	120 mcg/mL
Maintenance	80 mcg/mL	120 mcg/mL
Lithium		
Acute	1.0 mEq/L	1.4 mEq/L
Maintenance	0.8 mEq/L 0.6 meq/L in elderly	1.2 mEq/L (see III.6.b section)
Carbamazepine		
Acute	9 mcg/mL	12 mcg/mL
Maintenance	6 mcg/mL	12 mcg/mL

7. Principles of Using Mood Stabilizer Serum Levels

   a. For lithium and divalproex, different levels are used for acute symptoms than for maintenance. For patients with severe and/or persistent symptoms it is recommended that maintenance levels be no lower than the midpoint of the maintenance range cited in the section III.6.

   b. Chronic maintenance lithium levels greater than 1.0 incur greater risk for renal dysfunction and should only be used transiently whenever possible. In the elderly, the upper optimal limit should be 0.8 meq/L. For acute mania, levels up to 1.4 may be necessary. Once the patient is euthymic and stable, the level can be lowered.

c. The use of carbamazepine is strongly discouraged for several reasons:

(i) It will lower plasma antipsychotic levels 30%-80% thereby endangering the patient and others on the unit if antipsychotic levels are not appropriately adjusted within 10-14 days of starting carbamazepine;

(ii) It is less effective than lithium or VPA;

(iii) It carries a risk of hyponatremia.

d. Oxcarbazepine is not recommended to be used within the DPBH as a mood stabilizer for the following reasons:

(i) It is ineffective for acute mania and for inpatient aggression;

(ii) There is no long term data on suicidality risk reduction or risk for mania relapse;

(iii) There is no defined dose or serum level range;

(iv) It carries a greater risk for hyponatremia than does carbamazepine.

I. REFERENCES:

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II. ATTACHMENTS:

1. None