HYPOMAGNESEMIA

DEFINITION: Total serum Mg\(^{2+}\) levels less than the normal range (1.5-2.3 mg/dL).

INCIDENCE IN CRITICAL ILLNESS: 15-60%.

ETIOLOGY:

- Inadequate intake of magnesium.
- Renal losses: Diuretic use; alcohol abuse; diabetes; acute tubular necrosis; administration of aminoglycoside, amphotericin, cyclosporine, cisplatin, digoxin.
- Gastrointestinal losses: Vomiting; diarrhea; nasogastric suction; pancreatitis.
- Acute intracellular shift of magnesium: Refeeding; insulin administration; excessive catecholamines, metabolic acidosis.
- Miscellaneous: Burns; massive blood transfusion; cardiopulmonary bypass; hepatic transplantation; severe sepsis; large-volume plasma expansion.

CLINICAL MANIFESTATIONS:

- Cardiovascular: Atrial fibrillation/flutter; ventricular tachycardia (torsade de pointes).
- Metabolic: Frequently identified in conjunction with hypokalemia, hypocalcemia and hypophosphatemia.
- Neuromuscular: Seizures; bronchospasm (smooth muscle contraction).

TREATMENT:

- Caution: When renal dysfunction is present.
- Recommendations: Limited (lack of adequately controlled studies).
- Intravenous:
  - Preferred in symptomatic, critically ill patients.
  - MgSO\(_4\) (1 gm = 4 mmol); MgCl\(_2\) (1 gm = 4.5 mmol).
  - Torsade de pointes: 1-2 gm MgSO\(_4\) bolus over 5 minutes.
  - Example of urgent treatment: Consider 2-3 gm MgSO\(_4\) bolus followed by infusion of 10 gm MgSO\(_4\) over 5 hours.
  - ICU sliding scale repletion regimens.
- Enteric:
  - Magnesium oxide (400 mg = 6 mmol); magnesium gluconate (500 mg = 1.2 mmol).
  - Chronic losses: Consider 800-1600 gm magnesium oxide per day.

KEY REFERENCES: