horn cells of the spinal cord and the motor nuclei of the brainstem, but the primary effect is atrophy of skeletal muscles. The age of onset is variable, but the earlier the onset, the more disseminated and severe the motor weakness. The disorder may be manifested early—often at birth—and almost always before 2 years old; death may occur as a result of respiratory failure by 2 years old (Iannaccone and Burghes, 2002; Lunn and Wang, 2008). The manifestations (Box 30-7) and prognosis are categorized according to the age of onset, severity of weakness, and clinical course; some children may fluctuate between exhibiting symptoms of types 1 and 2 or types 2 and 3 in regard to clinical function (Sarnat, 2016a). Some experts also categorize SMA according to the highest level of motor function (Lunn and Wang, 2008); type 1 includes "nonsitters," type 2 includes "sitters," and type 3 includes "walkers" (Iannaccone, 2007). A severe rare fetal form of SMA, classified as type 0, is reported to be quite lethal in the perinatal period; motor neuron degeneration may be noted as early as midgestation in type 0 (Sarnat, 2016a). Type 4 may present between 20 and 30 years of age and may be referred to as *proximal adult type SMA* (Sarnat, 2016a).

Box 30-7

Clinical Manifestations of Spinal Muscular Atrophy*

Type 1 (Werdnig-Hoffmann Disease)

Clinical manifestations within first few weeks or months of life

Onset within 6 months of life

Inactivity the most prominent feature

Infant lying in a frog-leg position with legs externally rotated, abducted, and flexed at knees

Generalized weakness

Absent deep tendon reflexes