Arterial blood pressure is subject to a circadian rhythm that results in a fall of blood pressure during the night. In patients with diabetes, renal insufficiency, left-ventricular hypertrophy, sleep apnea, hypertension of pregnancy, and different forms of secondary hypertension a nocturnal fall of blood pressure is even abandoned or reverted. Diagnosis is made using 24-h blood pressure measurement, which is however used not frequently enough for a clinical assessment or adjustment of therapy. An adaption of the selection or the time of administration of antihypertensive drugs with respect to the circadian rhythm is beneficial to control blood pressure and reduce cardiovascular morbidity. This is particularly true for patients with a non- or inverted dipping blood pressure pattern, in which the bedtime dosing may result in a normalization of blood pressure and restoration of a normal circadian rhythm. The present manuscript reviews the chronopharmacotherapy of arterial hypertension and grant practical recommendations for their translation into clinical practice.