Timely examination becomes more and more important for the diagnosis of patients. When the patient arrives for reserving the examination, the scheduler needs to instantly assign a date to the patient by weighing the following factors: the acceptance of current lower-priority patient request may result in the rejection of future higher-priority and more urgent patients, whereas the rejection of the current patient may lead to the unused diagnostic capacity. To deal with this problem, this paper proposes a finite-horizon Markov decision process (MDP) model for optimal outpatients scheduling by considering their waiting time target, i.e., the maximal waiting time the patient can endure. Two types of outpatients with different waiting time targets and different rewards are considered. The objective is to maximize the expected revenue. Two time dimensions, i.e., days and time periods within a day, are used to model patient arrivals and their waiting time targets. A complete characterization of the optimal scheduling policy is given by proving the monotonicity and concavity properties of the reward functions, switching curves between different scheduling options of an incoming patient, and dynamic evolution of the optimal control policy. Extensive numerical experiments are performed to show the impact of different parameters and compare the optimal policy with other simple policies including two designed with the properties of the optimal policy.