The space of probability measures on a partially ordered set (poset) inherits a family of partial ordering relations that are called stochastic orderings. We define a stochastic iteration to be the repeated application of some self mapping on this space of probability measures that is isotone (increasing or decreasing) with respect to a given stochastic ordering. The theory of fixed points for isotone mappings on posets then give us a variety of iteration methods for constructing random distributions. In turn, these results yield new types of simulation algorithms for queueing theory. (Received September 25, 2012)