Mechanical ventilation is a central feature of intensive care unit support and is used to save countless lives. The common clinical practice is to ventilate patients with acute respiratory distress syndrome with a targeted tidal volume (VT) of 6 ml/kg. However, this target VT is not easily achieved in the intensive care unit for a variety of reasons such as inadequate oxygenation even with fractional inspired oxygen (Fi02) 100%. In these clinical settings (with Fi02 100%, and VT 6ml/kg), there is no clear guideline for how to deviate tidal volume from 6ml/kg and how to adjust positive end expiratory pressure (PEEP) in order to achieve adequate oxygenation. We hypothesize that there is a significant variation in physicians' definitions of patient parameters, consequently resulting in a variation in ventilator adjustment. We have developed an algorithm based on Fuzzy Logic. The algorithm uses input values (PEEP, oxygen saturation (SaO2), and peak airway pressure (PAP)) to produce output values (change in VT from baseline 6ml/kg and change in PEEP) while maintaining adequate oxygenation and safe peak airway pressure. The parameterization of the algorithm is able to encapsulate the expertise of an individual physician. A Monte-Carlo simulation was used to test the sensitivity of the output values to simulated varying of the specifications of the input fuzzy sets. The VT output had standard deviations up to 0.5 ml/kg. The PEEP output had standard deviations up to 0.95 cm H2O. The biggest variation in VT occurred when SaO2 was between 85 and 95%. The biggest variation in PEEP occurred when PAP was between 30 and 34 cm H2O. Our algorithm shows that the variation of the outputs is dependent on the variation of the specification of the input sets. Further testing would involve replacing the simulation of variable input parameterization with actual physician input.