Essential for the calculation of photon fluence distributions for intensity modulated radiotherapy (IMRT) is the use of a suitable objective function. The objective function should reflect the clinical aims of tumor control and low side effect probability. In this work, a constrained optimization method, was implemented and tested, which is closely related to the demanded clinical aims, avoiding drawbacks like infeasibility of a solution, intensive user interaction, or the input of optimization parameters or radiobiological parameters not sufficiently known. Tumor control was guaranteed by setting a lower boundary for target dose. The aim of low complication is fulfilled by minimizing the dose to organs at risk. If only one type of tissue is involved, there is no need for radiobiological parameters. For different organs, a threshold dose, a relative seriality of the organs or an upper dose limit could be set. However all parameters were optional, and could be omitted. The approach was benchmarked, simulating a head and neck and a lung case. The number of portals was varied. The dose to regions at risk could be significantly reduced using 7 or more ports of beam incidence. The gain using more than 7 ports was small. With an exponent to the dose, relative seriality of organs was modeled. With that the maximum dose to regions at risk could be controlled. This approach increased calculation time significantly. The alternative of setting an upper limit is faster and allows direct control of the maximum dose.