In response to growing challenges in healthcare delivery, this research develops an optimization framework to streamline patient flow and resource allocation in hospital emergency departments. Leveraging techniques from operations research and queuing theory, we design a multi-objective model that minimizes patient wait times and operational costs while maximizing service quality. The model incorporates real-time data inputs and is solved using a combination of heuristic and exact algorithms, ensuring both scalability and precision. Simulation studies using hospital data reveal that our approach can improve throughput by 25% and reduce critical delays, thereby enhancing overall patient outcomes. The study offers a practical tool for healthcare administrators to optimize emergency care under varying demand conditions.