

**Dr. James Higgins**

*"A Dedicated Anesthesia Block Room Produces a Positive Return on Investment While Reducing Surgical Backlog When Implemented Using a Combination of Machine Learning, Discrete Event Simulation and Optimization Modelling"*

Although the benefits of a block room are well established, it can be financially challenging to initiate and maintain the required space, equipment and staff. Significant investments and ongoing expenses required for an operational block room include capital investment for property, plant and equipment (PPE) and labour costs. However, such costs can be offset by increased revenue accrued from higher procedure throughput rates. While the concept of revenue was typically not discussed in the context of Canadian healthcare given that hospitals used to be funded entirely through a predetermined fixed budget irrespective of procedure throughput, the ongoing Health Sector Funding Reform (HSFR) has changed this via the creation of Quality Based Procedures (QBPs). QBPs are bundled payments made to a hospital based on volume-based activity; simply put, the more procedures that are done, the more the hospital will be paid by the government. The aim of QBPs are to incentivize healthcare providers to adopt best practices for delivering efficient and effective patient care.

By accounting for necessary potential capital investments, revenue and expenses, key metrics such as Return-on-Investment (ROI) and Net Present Value (NPV) can be calculated to 1) facilitate the budgeting of capital to fund a block room, and 2) guide a hospital's management team as to whether or not a block room is a financially viable option for their institution.

As previously described, the major operational benefit of a block room is facilitating an increased patient throughput rate, while not changing required OR time. This would generate the increased revenue via QBPs, although capital investment as well as variable expenses would be incurred. In order to determine the specific values and the financial performance metrics derived (ROI, NPV), we propose to generate an operational model via discrete event simulation and/or integer linear optimization and corresponding accounting model of the OR current state with no block room, and compared this to a potential future state with an active block room.