

FACULTY OF ENGINEERING
DEPARTMENT OF MANAGEMENT SCIENCE AND ENGINEERING

A Long Term Care home far from home - Models and approaches for bringing Long Term Care Residents back to their home communities

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Abstract: Ontario's Bill 7, More Beds, Better Care Act, and similar legislation and policies across Canada, incentivize hospitalized patients who are better suited for Long Term Care (LTC) homes, to be transferred from the hospital to LTC homes. Policies see patients transferred to the first available LTC home vacancy up to 150 kilometres away from their home community. Ontario, furthermore, implemented a fine of \$400 / day for patients refusing to be transferred. The need for moving these patients out of the hospital is abundantly clear. Across Canada 22% of hospital bed days are utilized by patients who are better suited for LTC homes. This contributes to hospital congestion, which is responsible for, among other things, ED overcrowding, ambulance offload delays, and inefficient patient throughput, commonly called Access Block. If we concede that transferring patients to LTC homes 150 kilometres from their home community is acceptable given the alternative, we should have policies to guide interfacility LTC home transfers to bring patients back to their home communities. In this talk, I will present models used to facilitate these transfers and guide policy makers. In one, we developed a new method to identify an optimal series of transfers which considers residents' care needs (i.e. required bed type, smoking, life partner), priority level, facility preferences, and the features of a vacant bed. We model this by generating a network of every resident on the waitlist and solving it as an elementary path problem, generating a chain of transfers starting with a vacancy. We use dynamic programming to solve this problem in practice. The mathematical models and algorithms used to generate these chains, as well as an overview of their potential impact, will be discussed. I will also discuss a more proactive approach in which we use Machine Learning to predict these patients at hospital admission. This allows hospitals more time to prepare for their transfer, hopefully leading to a more acceptable initial LTC home transfer. Using Data from Nova Scotia Health we tested three ML classifiers, Random Forest (RF), Artificial Neural Network (ANN), and eXtreme Gradient Boosting (XGB), to classify patients as needing a LTC home or not. From these models we develop guidelines for identifying patients based on diagnosis, age, and hospital entry.

Bio: Dr. Peter T. Vanberkel's primary research involves improving healthcare operations using stochastic operational research methods. He is a Professor with the Department of Industrial Engineering at Dalhousie and the Associate Dean of Research. Dr. Vanberkel is a registered professional engineer with Engineers Nova Scotia and has worked as a Staff Scientist and Industrial engineer at the IWK Health Centre, the Capital District Health Authority, Stylus Consulting Inc. and is co-founder of Stromline Technologies Inc. As a researcher, he has worked with The Netherlands Cancer Institute - Antoni van Leeuwenhoek Hospital, the British Columbia Cancer Agency, the Nova Scotia Health Authority, the IWK Health Centre, Eastern Health Newfoundland, Halifax Biomedical, Emergency Medical Care Inc. (Medavie EMS Group of Companies), the NS Department of Health and Wellness, Atlantic Veterinary College, and others. Dr. Vanberkel's research is funded by NSERC, CIHR, NSHRF, Atlantic Canada Opportunities Agency, Innovacorp and others.