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Chronic Disease Management: How IT and Analytics Create Healthcare Value Through the Temporal Displacement of Care

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Abstract

The treatment of chronic diseases consumes 86% of U.S. healthcare costs. While healthcare organizations have traditionally focused on treating the complications of chronic diseases, advances in information technology (IT) and analytics can help clinicians and patients manage and slow the progression of chronic diseases to result in higher quality of life for patients and lower healthcare costs.

We build on prior research to introduce the notion of temporal displacement of care (TDC), in which IT and analytics create healthcare value by displacing the time at which providers and patients make interventions to improve healthcare outcomes and reduce costs. We propose that healthcare value is created by strategic actions taken at specific points-in-time during the treatment process. Our theoretical development identifies TDC mechanisms through which IT and analytics displace later high cost interventions in favor of earlier preventative procedures.

We test our hypotheses using four years of data on 45,000 cardio-metabolic patients from the U.S. state of Vermont, which implemented a Patient-Centered Medical Home (PCMH) program. Our study includes four cohorts with increasing levels of IT and analytics use: (1) non-PCMH practices, (2) PCMH practices with basic IT systems installed, (3) practices that completed data quality sprints (DQS) to increase use of IT systems, and (4) practices that use analytics through the Vermont Healthcare Information Exchange (VHIE).

Our results provide insights into how TDC effects develop over time. In Year 1 after implementation, the DQS cohort demonstrates a marked increase in the use of preventative procedures such as eye exams and neuropathy screenings, the increase becomes more pronounced in Years 2 and 3, and the increase is even greater for the VHIE cohort. As the use of preventative procedures increases, emergency department utilization decreases, with a more pronounced decrease for the VHIE cohort than the DQS cohort. By Year 2, the DQS and VHIE cohorts experience a decrease in total healthcare costs, with a greater decrease for the VHIE cohort than the DQS cohort. By Year 3, the healthcare outcomes indicator of Hemoglobin A1c (HbA1c) level is statistically significantly lower, with a greater decrease for the VHIE cohort than the DQS cohort. The increased use of low-intervention healthcare treatments earlier in the process leads to a decrease in overall healthcare costs, which then leads to an improvement in healthcare indicators.

Keywords: Temporal, displacement, care, IT, analytics, chronic, disease, healthcare, outcomes, cost