

## Toward an Agent-Based Patient–Physician Model for the Adoption of Continuous Glucose Monitoring Technology

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### Abstract

Health care is a major component of the U.S. economy, and tremendous research and development efforts are directed toward new technologies in this arena. Unfortunately few tools exist for predicting outcomes associated with new medical products, including whether new technologies will find widespread use within the target population. Questions of technology adoption are rife within the diabetes technology community, and we particularly consider the long-term prognosis for continuous glucose monitoring (CGM) technology.

We present an approach to the design and analysis of an agent model that describes the process of CGM adoption among patients with type 1 diabetes mellitus (T1DM), their physicians, and related stakeholders. We particularly focus on patient–physician interactions, with patients discovering CGM technology through word-of-mouth communication and through advertising, applying pressure to their physicians in the context of CGM device adoption, and physicians, concerned about liability, looking to peers for a general level of acceptance of the technology before recommending CGM to their patients.

Repeated simulation trials of the agent-based model show that the adoption process reflects the heterogeneity of the adopting community. We also find that the effect of the interaction between patients and physicians is colored by the nature of the environment as defined by the model parameters.

We find that, by being able to represent the diverse perspectives of different types of stakeholders, agent-based models can offer useful insights into the adoption process. Models of this sort may eventually prove to be useful in helping physicians, other health care providers, patient advocacy groups, third party payers, and device manufacturers understand the impact of their decisions about new technologies.

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**Abbreviations:** (ABS) agent-based simulation, (CGM) continuous glucose monitoring, (T1DM) type 1 diabetes mellitus

**Keywords:** agent-based models, continuous glucose monitoring, innovation diffusion, technology adoption, word-of-mouth learning

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