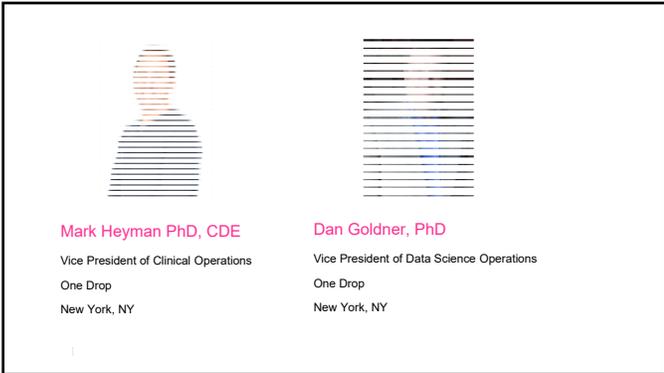
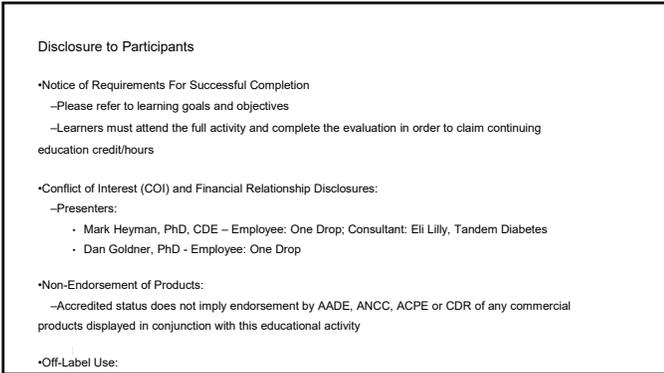




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Objectives

- Define machine learning
- Explain how machine learning can be used as a tool for diabetes education
- Recognize the limits of machine learning and the continued importance of CDEs

4

Data is Critical Tool in Diabetes Education

- Diabetes is a data-driven condition
- Diabetes data includes insulin doses, food intake, exercise, stress levels levels
- Data allows diabetes educators to learn about a person's behavior and the impact of these behaviors on their blood glucose levels
- Understanding a person's data allows diabetes educators to provide specific feedback and identify areas for change in diabetes management behavior



5

Limitations of Data

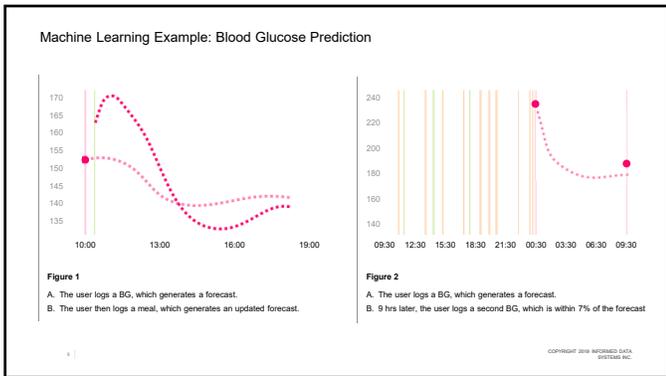
- Diabetes data is retrospective. A diabetes educator can look at what a person has logged in the past, and how past behavior has impacted past blood sugars.
- The past is not a perfect facsimile for future blood glucose behavior.
- Diabetes educators only can review and analyze a finite amount of data.
- If data is not logged or captured, it is not useful.



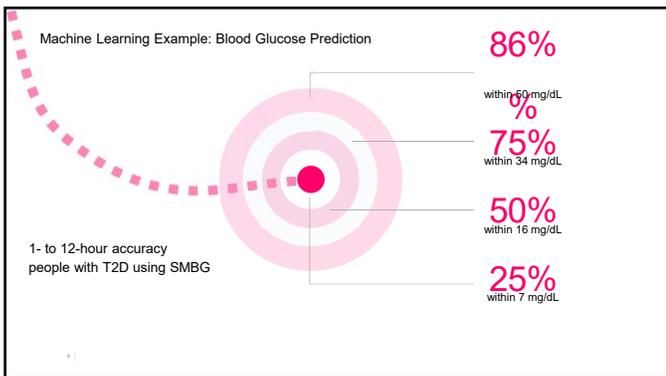
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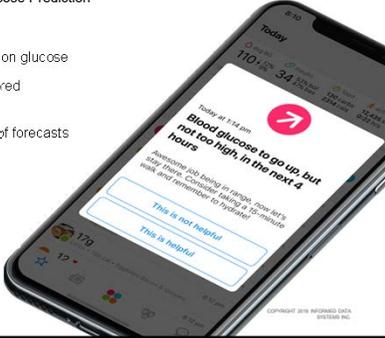
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Machine Learning Example: Blood Glucose Prediction

Immediate feedback engages attention on glucose

Encouragement and education are tailored to each user and each forecast

- 73% of users gave feedback on 60% of forecasts
- 92% of feedback was positive



10

Machine Learning Example: Blood Glucose Prediction

Forecast available 24/7

Target band customized for user's goals and meal patterns

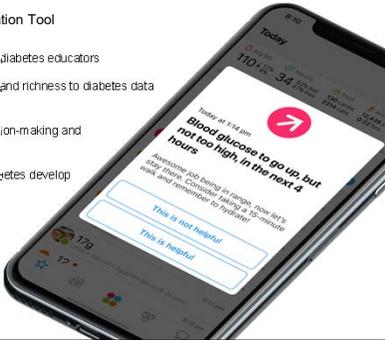
Individualized forecast confidence



11

Machine Learning as a Diabetes Education Tool

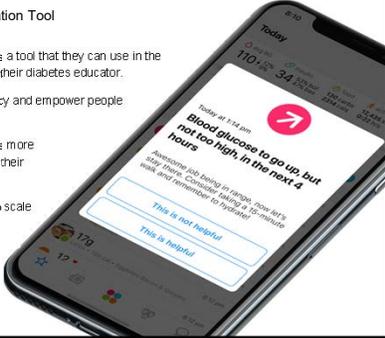
- Machine learning can be a valuable tool for diabetes educators
- The output of machine learning adds depth and richness to diabetes data in a way that is not possible with logbooks
- Realtime feedback allows for dynamic decision-making and opportunities for behavior change.
- Diabetes educator can help people with diabetes develop skills to respond to this real-time feedback.



12

Machine Learning as a Diabetes Education Tool

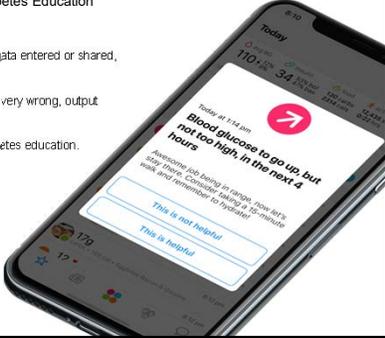
- Machine learning gives people with diabetes a tool that they can use in the real-world, not just when they are talking to their diabetes educator.
- Real-time feedback can increase self-efficacy and empower people with diabetes.
- Machine learning gives people with diabetes more 'grist for the mill' when they do interact with their health care team.
- Machine learning provides an opportunity to scale diabetes education.



13

Limitations of Machine Learning in Diabetes Education

- Machine learning requires data. The more data entered or shared, the richer the output will be.
- Data quality matters. If the data going in are very wrong, output will suffer.
- Machine learning is not a substitute for diabetes education.



14

The Role of the Diabetes Educator with Machine Learning

- Diabetes educators play an important role in a world with machine learning.
- Machine learning cannot take over the role of coach, confidante, sounding board or accountability partner. However machine learning enhances these roles.
- Machine learning provides the diabetes educator a tool that can make the education rich, engaging and personalized to each individual.



15

The Importance of the Human Touch

- Human relationships are a critical aspect of diabetes education.
- A relationship with a diabetes educator is something that a machine will never be able to replace.
- As machine learning becomes a more wide-spread tool in diabetes education, diabetes educators need to be intentional about how they use this tool to enhance the human interaction with people with diabetes.



16

Meet Tonya

- Tonya is a Certified Diabetes Educator working in a busy endocrinology clinic in an urban area.
- When she first heard about machine learning in diabetes, she was skeptical, but after talking to her patients who use it, she began to see how it can be useful.
- Tonya has found that machine learning has allowed her to focus more on supporting her patients in changing their behavior, which is what she is really good at.



17

Meet Tony

- Tony is 54 years old and has been living with type 2 diabetes for 14 years.
- He says the most stressful part of diabetes is that it feels like a guessing game that he can never get right.
- About a year ago, Tony started logging all his diabetes data in an app that uses machine learning.
- Since then, diabetes has become much less stressful because it has been easier to make healthy decisions.
- With this diabetes educator and machine learning by his side, he feels supported and empowered with his diabetes.



18

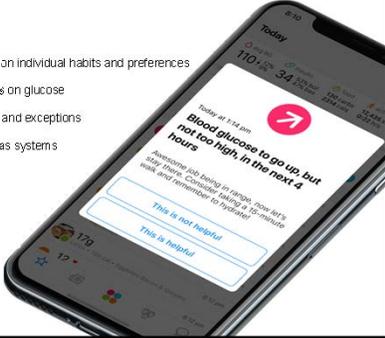
Future Uses of Machine Learning

For People with Diabetes:

- Diet analysis and recommendations, based on individual habits and preferences
- Personalized fitness goals, mindful of effects on glucose
- Dosing calculators that anticipate variations and exceptions
- Automated insulin delivery / artificial pancreas systems

For Diabetes Educators:

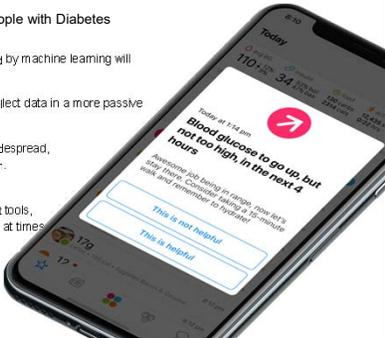
- Scheduling and triage
- Data analysis and interpretation
- Intervention recommendations



19

The Future of Machine Learning for People with Diabetes

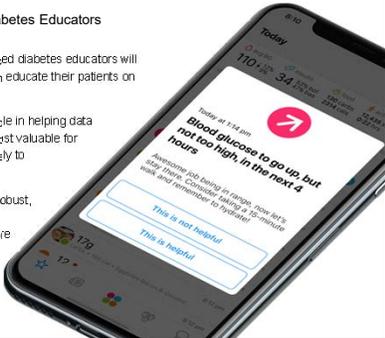
- With bigger data sets, predictions generated by machine learning will become more accurate and more robust.
- Using new technology, it will be easier to collect data in a more passive unobtrusive manner.
- Decision support tools will become more widespread, helping reduce data-related diabetes burden.
- Even though people with diabetes will have cutting edge information and support tools, making healthy decisions will still be difficult at times.



20

The Future of Machine Learning for Diabetes Educators

- As machine learning becomes more advanced diabetes educators will need to expand their knowledge so they can educate their patients on this tool and use it effectively in their work.
- Diabetes educators can play an important role in helping data scientists understand what information is most valuable for people with diabetes and how most effectively to communicate this information to them.
- As data science capabilities become more robust, diabetes educators may move away from interpreting data, allowing them to focus more on content and behavior change.



21

Questions?

22

Thanks!

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23
