

RWE evaluation of the mySugr priming dose algorithm

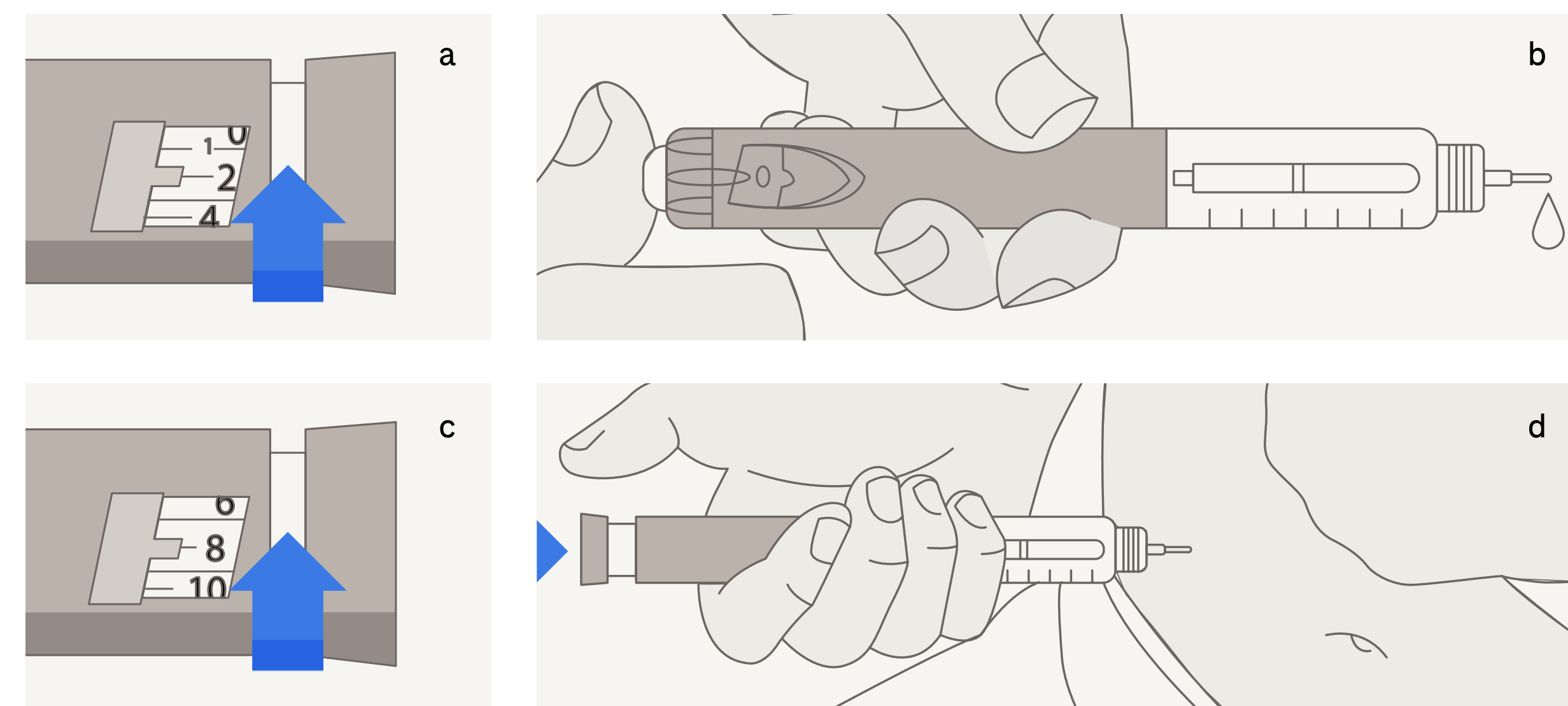
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Background

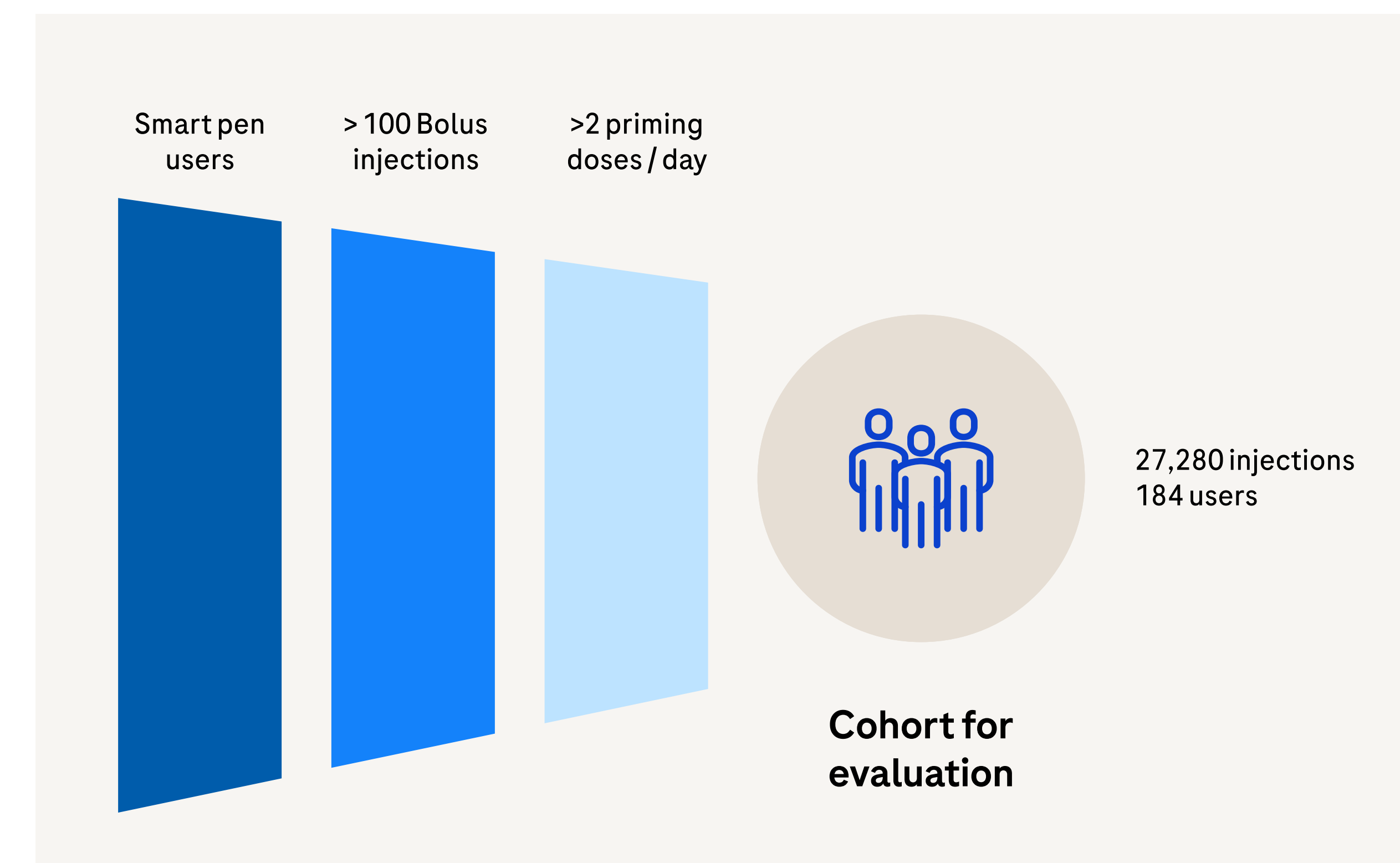
An accurate history of injected insulin doses is vital to calculate future dose sizes. Smart insulin pens along with mHealth applications can track these injections to provide a complete history, but require accurate priming dose annotation.

Different approaches have been introduced to detect priming doses, from simple thresholds to more complex solutions, such as the mySugr priming dose algorithm that uses both threshold and dose sequence information. In this study, we evaluate this algorithm using real world evidence and benchmark it against a threshold based algorithm.



Methods

To build a ground truth set of priming dose annotations, we leveraged smartpen data imported through the mySugr application. Specifically, we took data from mySugr users with at least 100 bolus injections and included days with at least three marked airshots. These criteria yielded 27,290 injections from 184 users.



The mySugr priming dose algorithm predicts priming doses based on two parameters:

- Priming dose threshold
- Time between priming dose and bolus injection

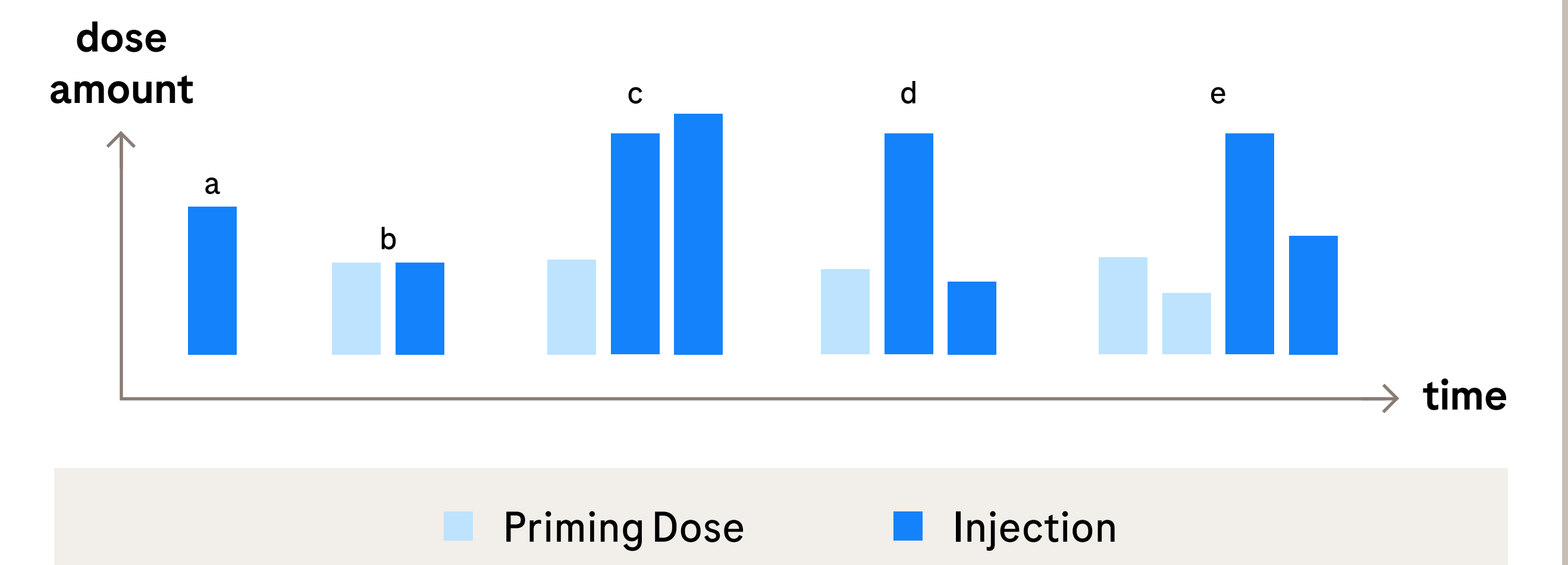


Figure 2:

Examples of different injection scenarios (a-e). Users might (a) not prime, (b) inject the same amount as used for priming, (c, d) split their bolus into multiple injections or (e) perform multiple primings, possibly with different dose sizes.

Results

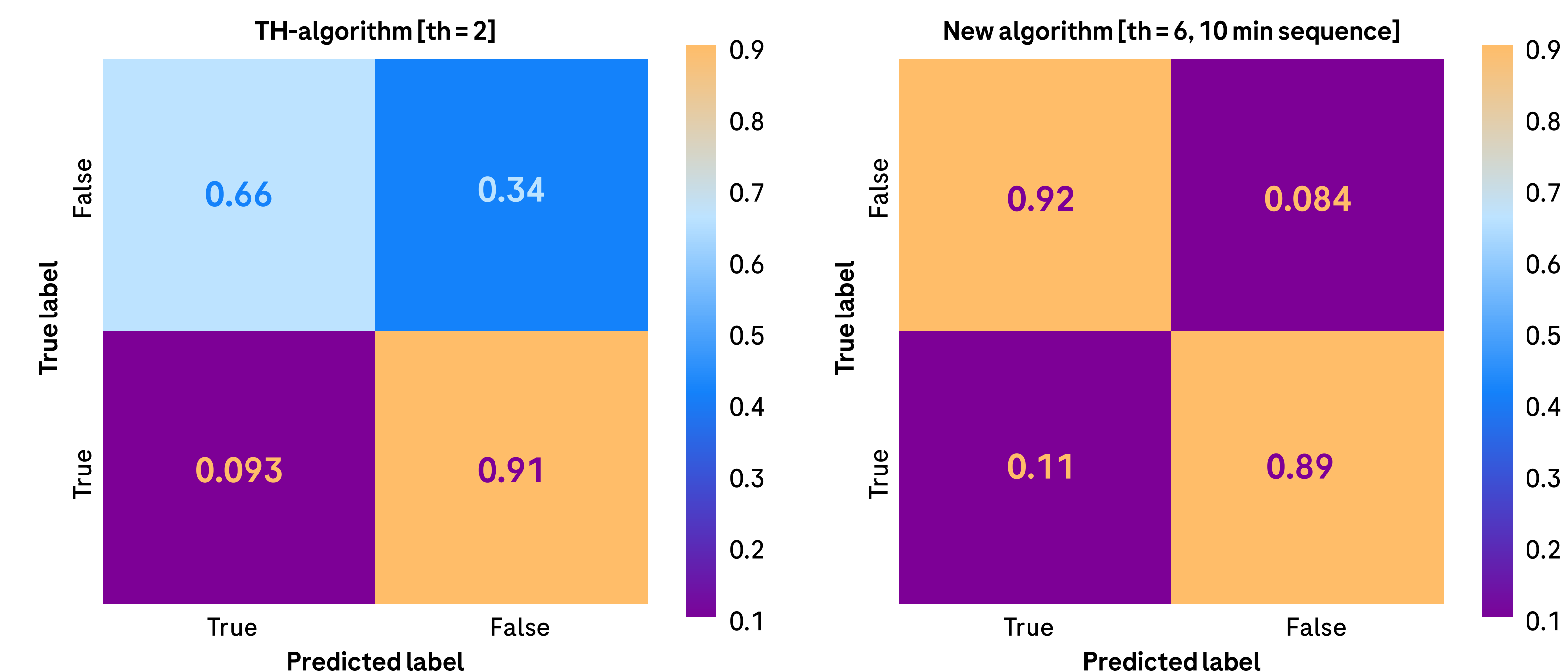


Figure 3: Comparison of the threshold algorithm and the proposed mySugr algorithm

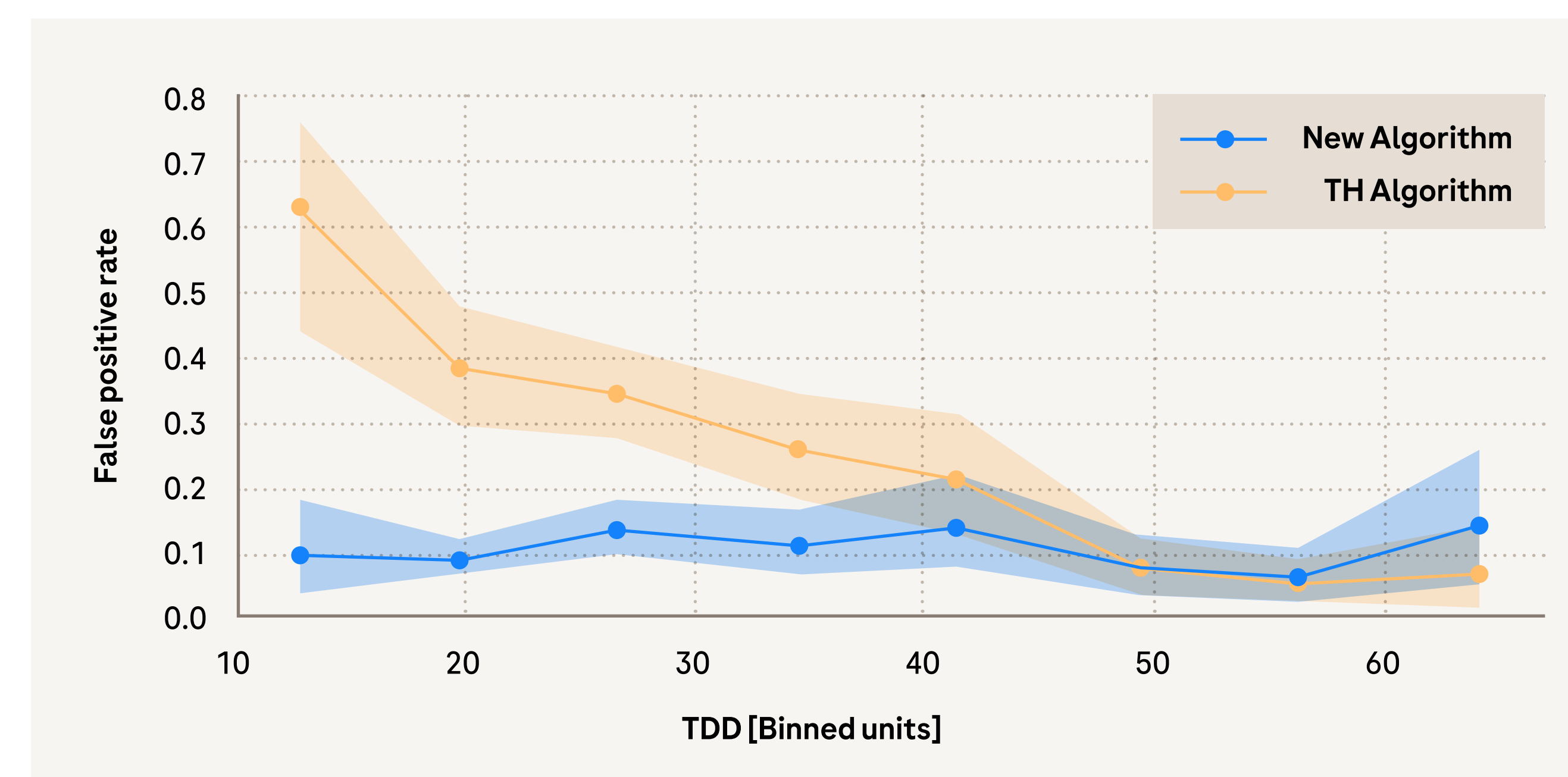


Figure 4: Association between the false positive rate and the total daily dose of insulin (TDD)

Conclusions

- The mySugr algorithm showed improved accuracy
- It showed a reduction in wrongly annotated injections by 2% and reduction of wrongly annotated priming doses from 34% to 8%
- The new mySugr algorithm improved performance especially for users with low TDD.

References

- J. Wrede. A Novel Algorithm to Detect Priming Doses from Smart Insulin Pens. Presented at: Advanced Technologies & Treatments for Diabetes 2021