



# Precision implementation: Developing and validating predictive models of information technology tool adoption

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## BACKGROUND

- Implementation support strategies can help clinical practices with adoption and maintenance of evidence-based guidelines.
- Which clinics will benefit most from a particular implementation strategy and with how much assistance is unknown.
- New methods are needed to predict which practices will implement targeted changes with less vs. more / different kinds of support.

## STUDY OBJECTIVES

- To develop and validate predictive models that estimate the likelihood of adoption and sustained use of electronic health record (EHR)-related tool.

## SETTING

- EHR data from 351 community health centers in the OCHIN research network from 5/1/17 to 6/30/19 (1 year pre-and post-EHR tool implementation).

## MEASURES

- Tool adoption: any instance of tool use within 12 months of rollout.
- Tool sustainability:  $\geq 1$  tool use in the last 4 months of the 12-month follow-up period.
- Insurance support EHR tool tested:
  - Designed for clinic eligibility specialists
  - Documents health insurance assistance provided to CHC patient insurance
  - Assists with HRSA reporting
  - Clinics received basic training document

Figure 1: Percent of clinics that adopted and showed sustained use of the tool

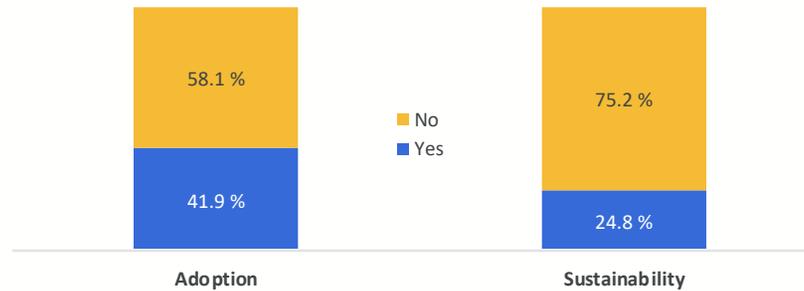


Table 1: Selected clinic characteristics by adoption or sustainability of the tool

|  | ADOPTION         |                  | SUSTAINABILITY  |                  |
|--|------------------|------------------|-----------------|------------------|
|  | No Mean (SD) / % | Yes Mean (SD)/ % | No Mean (SD)/ % | Yes Mean (SD)/ % |
| Total # of clinics                       | 180              | 130              | 310             | 77               |
| Years in EHR                             | 4.1 (2.5)        | 5.1 (2.8)        | 4.3 (2.6)       | 5.3 (2.6)        |
| School-based health center               | 35.6             | 17.7             | 32.6            | 14.3             |
| Clinic in state that expanded Medicaid   | 88.9             | 91.5             | 90.1            | 89.6             |
| Urban Clinic                             | 91.7             | 93.1             | 91.8            | 93.5             |
| Median patient age                       | 29.4 (15.2)      | 35.1 (11.5)      | 30.3 (14.7)     | 36.3 (10.8)      |
| % Hispanic patients                      | 24.4 (25.1)      | 29.7 (25.2)      | 25.8 (25.5)     | 29.1 (24.4)      |
| % Non-white patients                     | 31.2 (27.0)      | 25.2 (24.0)      | 29.5 (26.5)     | 26.3 (24.3)      |
| % of patients with 2+ chronic conditions | 30.3 (22.5)      | 38.1 (17.7)      | 31.5 (22.1)     | 39.9 (15.6)      |
| Total # of visits                        | 11,979 (22562)   | 41,909 (45203)   | 15,943 (27564)  | 50,515 (48245)   |
| % of visits that were ambulatory         | 62.8 (22.2)      | 52.6 (17.5)      | 61.1 (21.7)     | 50.6 (16.1)      |

These characteristics are a subset of characteristics that were included in predictive modeling. These were selected because they had the largest difference in distribution between adopters/sustainers and non adopters/sustainers

Table 2: Model performance and predictive variables

|                                  | ADOPTION                |  | SUSTAINABILITY                |  |
|----------------------------------|-------------------------|--|-------------------------------|--|
|                                  | Interpretation          |  | Interpretation                |  |
| Model fit AUC, (95% CI)          | 0.784 (0.710 - 0.858)   |  | 0.829 (0.746 - 0.912)         |  |
| Years in EHR                     | Higher odds of adoption |  | Higher odds of sustainability |  |
| Total # of visits                | Higher odds of adoption |  | Higher odds of sustainability |  |
| % of visits that were ambulatory | Lower odds of adoption  |  |                               |  |

## METHODOLOGY

- LASSO penalized logistic regression.
- Sample divided into a training sample (70%) and a testing sample (30%).
- Variables/domains in models: type of clinics, geographic variable, # and type of departments/clinic, patient panel, patient panel demographic characteristics, type and # of encounters, payer distribution, provider type, # of encounters with eligibility specialist.
- Predictive performance assessed using area under the ROC curve (AUC): ability to distinguish who used the tool from those who did not.

## RESULTS

- Models for adoption and sustainability show high classification accuracy.
- Out of the 25 variables entered in the model, three predicted adoption and one predicted sustainability.
- Number of visits was the strongest predictor of both adoption and sustainability.

## LIMITATIONS

- Not tested on other types of HIT tools.
- Limited to one EHR type.
- Limited to CHC settings.

## CONCLUSIONS

- EHR data can be used to predict EHR tool use.
- Next step: validate the model with a clinical tool.

## FUNDING/ CONTACT

- P50CA244289 National Cancer Institute, (PI: JE DeVoe)
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