Implementation of COVID-19 Testing Strategies in Community Health Centers
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Statistical power and sample size

For the overall primary outcome of number of COVID-19 tests, we used an interrupted time series design, comparing the aggregated number of tests across the 6 RADx-MA before and after implementation. We conducted a simulation study to estimate power to detect a 3.5% acceleration in weekly testing at an $\alpha = 0.05$ significance threshold. Population parameters were determined based on a preliminary analysis of a testing time series from 4 CHCs with available testing data between May 1 and July 11, 2000 (when testing was more widely available in Massachusetts). We observed an average of 212 tests per day, a flat time-trend, and no significant autocorrelation after adjusting for seasonality related to the day of the week. Further, we assumed 518 days in the time series with an equal number of days pre- to post-implementation. Based on these assumptions we estimated greater than 90% power to detect 3.5% weekly acceleration in testing.

Study Design

This study uses an interrupted time series analysis of COVID-19 testing data aggregated from six CHCs. Our original analysis planned to analyze the time series of daily COVID-19 testing volume, but daily data were noisy with a non-linear pre-implementation period. Because estimates from interrupted time series data can be sensitive to the choice of curve function pre- and post-interruption we decided to aggregate the data to weekly testing (which was linear pre-implementation) and implement an interrupted time series analysis.

Statistical analysis

Summary statistics were generated from the analytic dataset comprised of EHR-derived data, survey data, transformed facilitation data and publicly available contextual data to characterize the study sample.

Interrupted Time Series

We characterized the implementation timeline of the planned testing acceleration strategies including funding notification and the start date of implementation activities. For the implementation activities start date, we considered that the CHCs made decisions about staffing and activities at the point of funding notification with the understanding that significant resources for RADx-MA were coming. They were then asked to start implementation activities with practice facilitation support on December 1, 2020. We considered both timepoints in the analyses and interpretation. We aggregated daily testing across the six CHCs and compared post-implementation testing trend with pre-implementation testing trend. Tests per week were modeled using segmented generalized linear model with number of weeks since start of pre-implementation period, indicator for pre- vs. post-implementation date, number of weeks post-implementation, weekly number of new state-wide covid cases, interactions of new covid cases with post-implementation week, and season of year to control for seasonality. Weekly number of new covid cases was included on the log-scale, centered at the number of cases on the implementation week, and divided by 10 to aid in interpretation. The coefficients of interest were for (a) the post-implementation week and (b) the interaction of post-implementation covid cases and post-implementation week. The former estimates the change in covid testing trend post-implementation relative to pre-implementation holding new covid cases at the implementation week level. The latter estimates the percentage change in covid testing trend post-implementation relative to pre-implementation for a 10% increase in new covid cases. We used heteroscedastic and autocorrelation consistent standard errors implemented using the Sandwich package in R[11-13]. We consider $\alpha=0.05$ as the threshold for statistical significance.