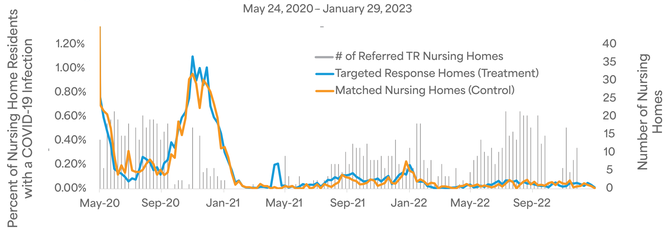
APPLYING **COST-BENEFIT ANALYSES** TO QUALITY IMPROVEMENT INITIATIVES

Across the states of Colorado, Illinois, Iowa and Oklahoma, Centers for Medicare & Medicaid Services (CMS) has referred 916 nursing homes to Telligen for COVID-19-related interventions. Stakeholders interested in understanding the costs and benefits of quality improvement initiatives (QIIs) should harness appropriate data and evaluation methods to develop quantifiable estimates of intervention value. We present Midwest QIN-QIO's evaluation methods and identify implications for the accuracy and conclusions stemming from return on investment (ROI) and cost-benefit analyses.

Methods

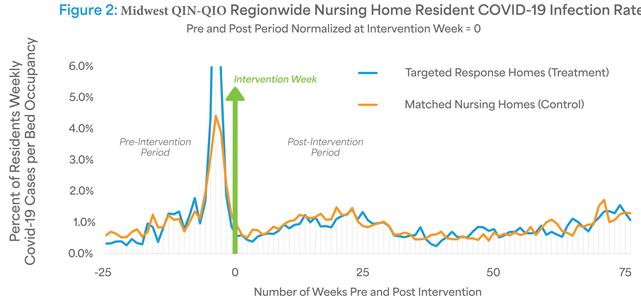
We evaluate the effects of the targeted response (TR) intervention by tracking resident infection rates in nursing homes with a completed quality improvement plan (QIP) over the study period. We compare performance of TR nursing homes to a propensity score matched control group. As a robustness check, we also use mean rates of all non-TR nursing homes as a control group.

Figure 1: Midwest QIN-QIO Regionwide Nursing Home Resident COVID-19 Infection Rates
May 24, 2020 - January 29, 2023



Each TR nursing home has a unique date of QIP completion which defines their 100-week analysis window separated into 25 weeks prior to and 75 weeks following the completion of the intervention. **Figure 2** illustrates the comparison of rates between the TR and matched control group homes with pre- and post-period normalized at intervention week.

Figure 2: Midwest QIN-QIO Regionwide Nursing Home Resident COVID-19 Infection Rate
Pre and Post Period Normalized at Intervention Week = 0



The benefits are measured in the post-intervention period using the difference-in-difference method to calculate average treatment effect. The result is used to estimate prevented COVID-19 cases, deaths, hospitalizations and avoided hospital expenditures based on published literature. Costs are based solely on CMS investment in the intervention.

Results

Targeted response interventions In 916 nursing homes resulted in:

$136.9 million in overall savings of hospital expenditures

34% reduction in COVID-19 infection rates compared to matched control group

15,496 prevented COVID-19 cases among nursing home residents

5,733 prevented hospitalizations due to COVID-19

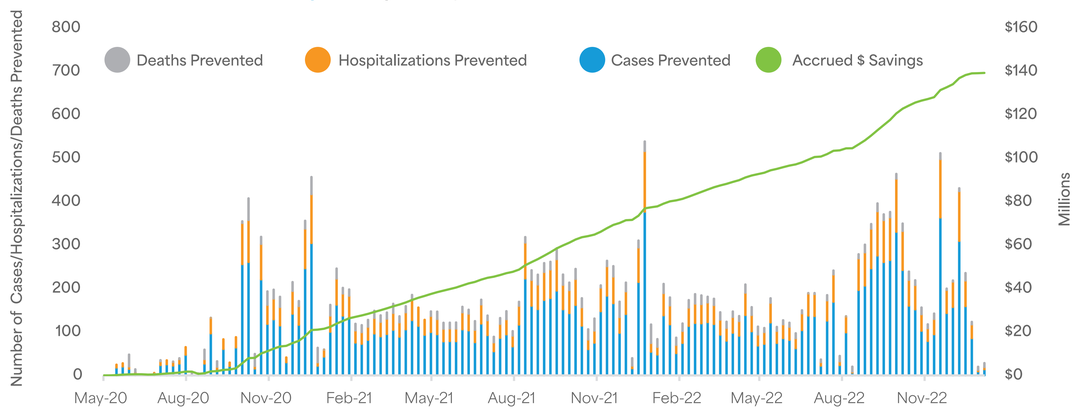
1,803 prevented deaths due to COVID-19

ROI RETURN ON INVESTMENT

For every **$1 dollar spent**, **$57 dollars were saved**

The regionwide return on investment expressed as a ratio is 57.0, indicating that every dollar spent on the QII saved $57.00 in healthcare costs.

Figure 3: Targeted Response Estimated Benefits over Time



Analysis Period: 05/24/2020 to 01/29/2023	Estimated Reduction in Weekly Resident COVID-19 Rates				Benefits				Costs	Return on Investment	
Midwest QIN-QIO QIN Aggregate TR QII ROI for 916 Nursing Homes	Average Treatment Effect on Infection Rate	Average Treatment Effect on Death Rate	Infection Rate Reduction	Death Rate Reduction	Cases Prevented	Hospitalizations Prevented	Deaths Prevented	Medical Costs Prevented	CMS Investment	ROI Rate	Total Return
Mean Nursing Home Control Method	-1.13%	-0.16%	-58%	-68%	41249	15262	5877	$370,927,273	$2,444,295	151.8	$368,482,978
Propensity Score Matched Control Method	-0.42%	-0.05%	-34%	-40%	15496	5733	1803	$139,343,996	$2,444,295	57.0	$136,899,701

Conclusions

916 NURSING HOMES CMS referred 916 nursing homes from CO, IA, IL and OK to Midwest QIN-QIO for COVID-19 related interventions.

Telligen's delivery of targeted response support to these nursing homes for COVID-19-related initiatives yielded demonstrable benefits.

Although control groups help in accounting for time elements affecting the outcomes, the results are still highly sensitive to how those groups are selected and how the study is designed.

As illustrated in the **Figure 3** table, using only pre-post (i.e., before and after) calculations, or a mean or median control group, may lead to inaccurate estimates of the intervention benefits.

The estimated benefits are also highly sensitive to assumptions and the methodological decisions, such as:

- The length of pre- and post-intervention time window
- The baseline matching in the propensity score model using closest month COVID-19 trends, vaccination data and community rates
- Control group considerations, such as small sample size, same state restriction and cross contamination / spread of the intervention to the control group
- Inclusion or exclusion of outlier rates
- Data accuracy and limitations related to different variants of the virus and their impact on hospitalization rates

MIDWEST QIN-QIO

QIN–QIO
Quality Innovation Network - Quality Improvement Organizations
CENTERS FOR MEDICARE & MEDICAID SERVICES
iQUALITY IMPROVEMENT & INNOVATION GROUP

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