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COVID-19 Cost Scenario Modeling: Testing

Estimating the Cost of COVID-19 Testing for U.S. Private Insurance Providers

America's Health Insurance Plans

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Introduction

The COVID-19 pandemic has had an extraordinary, unprecedented, and severe impact on virtually all aspects of life in the United States. The continued and future impact of virus proliferation could be immense. To protect the health and well-being of people while taking appropriate steps to allow for the restoration of economic activity, extensive testing that is accurate and affordable is needed. However, one of the key sources of uncertainty in annual costs in 2020 and 2021 is the utilization of diagnostic (i.e., molecular or antigen) and antibody testing. The science behind testing is evolving quickly as research studies begin to show results and new types of tests are being offered. While testing has expanded, there is still much that the medical and public health communities are learning.

America's Health Insurance Plans ("AHIP") retained Wakely Consulting Group ("Wakely") to explore the potential COVID-19 testing costs to U.S. private insurance providers. These insurance providers include Commercial health insurers, Medicaid managed care organizations ("MMCOs"), and Medicare Advantage Organizations ("MAOs"), each of which is governed by different legislative, regulatory and contractual requirements. This report is a supplement to a separate analysis that Wakely conducted on estimated COVID-19 treatment costs for 2020 and 2021. For further information on non-testing treatment costs related to COVID, please see the paper here.

This document has been prepared for the sole use of AHIP. Wakely understands that the report may be made public. This document contains the results, data, assumptions, and methods used in our analyses and satisfies the Actuarial Standard of Practice (ASOP) 41 reporting requirements. Using the information in this report for other purposes may not be appropriate.

The opinions and estimates included in this report are those of the authors and may not represent those of others at Wakely. Actual results will differ, potentially significantly, from the estimates in this report.

Executive Summary

Diagnostic and antibody testing can occur for three different purposes. The grid below provides a framework for distinguishing the different testing purposes and to whom they would apply.

Purpose	Definition	People Being Tested
Medically Necessary	Health care services or supplies needed to diagnose or treat an illness, injury, condition, disease or its symptoms and that meet accepted standards of medicine.*	Patients under the care of a physician or other licensed practitioner who recommends testing based on direct exposure (e.g., family member), relevant symptoms or asymptomatic patients for whom the testing would alter the course of care.

Purpose	Definition	People Being Tested
Public Health	The ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice.**	Population-level testing protocol designed and validated for broad-based public health surveillance and research, and not designed to test individuals who want to know if they were previously infected with COVID-19.***
Occupational Health	Employers must provide a workplace free of known health and safety hazards.****	Screening of asymptomatic individuals or those with minor symptoms at employer or employer-directed sites.

*https://www.healthcare.gov/glossary/medically-necessary/;
**https://www.cdc.gov/publichealth101/surveillance.html;
***https://www.cdc.gov/coronavirus/2019-ncov/lab/serology-testing.html;
****https://www.osha.gov/workers/

Wakely developed a range of potential costs associated with outpatient (diagnostic and antibody) testing that may fall under the three purposes of tests listed above. The analysis does not distinguish between testing that is medically necessary and testing required for public health or occupational health purposes and does not intend to address or make any assumption about the extent to which health insurance providers or other payers ultimately bear the costs for tests that occur for each purpose. The estimates also do not include any testing that occurs in an inpatient setting. The analysis also does not assume that a vaccine will be available within the timeframe of the analysis.

On the low end of the range, the amount of testing would be constricted by limited supplies and/or access to accurate testing. On the high end, there are no supply constraints and testing is used as part of public health initiatives to allow people back to school and work. Methods to ensure widespread financing of such a scenario are unclear. While it is possible that state or federal governments may expand funding to support public health and return to work testing capacity, all testing costs are included since the level of actual government investment is unknown.

The key findings include:

- The annual estimated cost for diagnostic testing ranges from $6.0 to $25.1 billion, while the estimated cost for antibody testing ranges from $5.2 to $19.1 billion. The sum of these amounts does not represent our estimate of the high end cost of testing, as it is still unknown which type of testing will be more widely used and the extent to which the two types of testing may be substitutes for one another, especially in a mass testing environment. While it is expected that some people will get both tests, it is more likely that a person will get one test or the other. Thus, while there may be some overlap in the costs

of the two types of testing, there may also be reasons that there will be significant costs from both tests.

- There remain large levels of uncertainty on the level of utilization for tests. The difference between current levels of testing and recommended levels of testing to maintain a sentinel effect to reduce the spread of the virus produce large differences in overall utilization.
- Testing costs, especially where the test is given and the associated costs, also matter. Small differences in unit costs can produce large aggregate increases in costs. It is expected that higher costs per test will be associated with less testing, while mass testing would like result in lower per test costs.
- Given the uncertainty, there is a wide range of the overall cost for testing for COVID. At the upper end of estimates, the total annual costs of testing could have a material impact on overall costs to insurers.

The following summarizes the ranges of potential costs of diagnostic testing. For purposes of the analysis, we assumed that there would be no cost-sharing on the part of enrollees for COVID testing so all costs represent the full costs of the tests and services.

Table 1 – Range of Estimated Costs for Annual COVID-19 Testing
Diagnostic Testing (in billions of dollars)[1]

Diagnostic Testing	Medicare Advantage	Commercial	Medicaid MCOs	Total
Current Testing Levels				
Test Cost	$0.2 to $1.5	$2.3 to $13.3	$0.5 to $3.3	$3.1 to $18.0
Cost of Administration	$0.2 to $0.6	$2.1 to $5.2	$0.5 to $1.3	$2.9 to $7.1
Total Cost	$0.5 to $2.0	$4.4 to $18.5	$1.1 to $4.5	$6.0 to $25.1
% Cost of Care	0.2% to 0.7%	0.4% to 1.5%	0.4% to 1.6%	0.3% to 1.4%
Mass Testing Levels				
Test Cost	$0.7 to $1.7	$6.6 to $15.9	$1.6 to $3.8	$9.0 to $21.4
Cost of Administration	$0.2 to $0.5	$2.0 to $4.1	$0.5 to $1.0	$2.7 to $5.6
Total Cost	$1.1 to $2.0	$9.7 to $18.6	$2.4 to $4.5	$13.1 to $25.1
% Cost of Care	0.3% to 0.7%	0.8% to 1.5%	0.8% to 1.6%	0.7% to 1.4%

The lower ends of the ranges relate to scenarios where testing remains more limited and the cost of testing is relatively lower. The higher ends of the ranges reference scenarios where testing is broad (i.e. for return to work and school) and/or the cost of testing is relatively higher. This dynamic is similar for the antibody costs, as shows in the table below.

[1] Please note that the Total amounts may not be the sum of the lines of businesses due to rounding and the lowest/highest test costs may not align with the lowest/highest cost of administration so the Total costs may not be the sum of the test and administration costs. Please see the methodology for further details.

Table 2 – Range of Estimated Costs for Annual COVID-19 Testing Antibody Testing (in billions of dollars)[2]

Antibody Testing	Medicare Advantage	Commercial	Medicaid MCOs	Total
Current Testing Levels				
Test Cost	$0.2 to $0.9	$1.8 to $8.0	$0.4 to $2.0	$2.4 to $10.8
Cost of Administration	$0.2 to $0.5	$2.0 to $4.1	$0.5 to $1.1	$2.8 to $5.6
Total Cost	$0.4 to $1.3	$3.8 to $12.1	$0.9 to $3.0	$5.2 to $16.4
% Cost of Care	0.1% to 0.4%	0.3% to 1.0%	0.3% to 1.1%	0.3% to 0.9%
Mass Testing Levels				
Test Cost	$0.6 to $1.2	$5.3 to $11.5	$1.2 to $2.7	$7.1 to $15.4
Cost of Administration	$0.2 to $0.6	$2.0 to $5.1	$0.5 to $1.3	$2.7 to $7.0
Total Cost	$1.0 to $1.5	$9.1 to $14.2	$2.1 to $3.4	$12.2 to $19.1
% Cost of Care	0.3% to 0.5%	0.7% to 1.2%	0.7% to 1.2%	0.7% to 1.1%

This paper supplements a separate report on treatment costs related to COVID. In the treatment cost paper, testing costs for infected individuals were included for inpatient and outpatient services with costs correlated with the infection rate. This paper evaluates testing costs for infected and uninfected individuals that includes testing to support public health and occupational health. Testing utilization is also evaluated in relationship to issuer expectations (as measured by an AHIP survey) and mass testing (as recommended by the Harvard Global Institute[3]). While these papers supplement one another, the costs estimated in each paper should not be added together to calculate the total costs of COVID, given the potential overlap in testing costs and that more widespread testing may be inversely correlated with the infection rates. Importantly, our modeling was performed based on emerging data and information available to us as of May 20, 2020. Considering the extraordinary pace at which available data is evolving and changing, there is potential that analysis performed later could yield material updates to the scenario estimates detailed herein.

Methodology and Assumptions

The methodology applied in our analysis focused on two drivers of the aggregate incremental cost associated with COVID-19 testing: (1) the number of tests per person per year, and (2) cost per test and associated costs. The product of the two estimates produces aggregate costs for each line of business.

The starting population used in the analysis was sourced from figures published by Kaiser Family Foundation (KFF), The Centers for Medicare and Medicaid Services (CMS), Medicare Advantage enrollment reports, and projected to 2020 and 2021 benefit years using NHE estimates. A small adjustment was made to reduce the number of Medicaid managed care enrollees and to remove the estimated number of dual enrollees that would also be enrolled in Medicare Advantage plans,

[2] ibid
[3] https://www.npr.org/sections/health-shots/2020/05/07/851610771/u-s-coronavirus-testing-still-falls-short-hows-your-state-doing

to avoid double counting of these enrollees in both lines of business. Since the estimate is for an annual year of testing, 2020 and 2021 enrollment were averaged for the analysis.

To understand the percent impact of testing on overall healthcare costs, a set of baseline costs were developed for each line of business for what the costs would be without COVID-19. Overall baseline costs were estimated using the National Health Expenditure data[4] and the Medicare Trustee's report[5]. Medicaid MCO costs were assumed to increase at the same rate as the overall Medicaid spending estimated by the NHE. NHE estimates of the Commercial market exclude Medigap plans but include both self-insured and fully insured plans. Since the estimate is for an annual year of testing, 2020, and 2021 total expenditures were averaged for the analysis.

Various scenarios were run using various sources for the assumptions. The following summarizes the two key sets of testing scenarios for each of the diagnostic and antibody tests. Wakely did not include a scenario in which vaccines are widely available, would reduce the demand for testing. Wakely did also not include estimates of market shifts caused by COVID-related economic downturn.

Limited Testing Scenarios

The limited testing scenarios assumed testing is around current levels or increased moderately, but that testing capacity remains constrained or that demand for testing is muted. Several scenario were run with this concept, primarily changing the testing levels and cost of testing.

- **Utilization of the Test.** Utilization of tests ranged from 0.2 to 0.6 per member per year for each of diagnostic and antibody tests. The assumptions did not vary by line of business since testing may be needed at all levels, such as schools for children, employees, and nursing home residents.

- **Utilization of Administration of the Test.** In addition to the cost of the test, many tests will have associated costs if the member has an office visit, goes to urgent care, etc. It was assumed that 30% to 50% of diagnostic tests and 25% to 50% of antibody tests would have associated provider costs to support the administration of the tests. It is assumed the lower the number of tests, the more likely that testing will have associated provider costs. For antibody testing, there is less certainty on the evolution of the test and if provider administration will be necessary.

- **Cost of the Test.** The estimated cost of the test varied by line of business. It was assumed to be between $50 and $100 for diagnostic testing for Medicare and Medicaid and between $40 and $60 per test for antibody testing for Medicare and Medicaid. Commercial testing was assumed to be approximately 25% higher than the average cost for Medicare and Medicaid.

[4] https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData
[5] https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/ReportsTrustFunds

- **Cost of Administration of the Test.** Since it is unknown how many tests will have associated costs for the administration of the test and in what setting the tests will be administered, estimates were made for a range of administrations costs. These united costs were reasonably higher than a primary care office visit to account for some tests occurring in higher-cost settings (e.g., urgent care). Diagnostic testing administration costs were higher than antibody testing since we believe that it is more like that diagnostic testing will occur in higher-cost settings. The estimated cost of the administration of the tests is between $95 and $130 for diagnostic testing for Medicare and Medicaid and between $90 and $125 per test for antibody testing for Medicare and Medicaid. Similar to the testing costs, Commercial administration was assumed to be approximately 25% higher than the average cost for Medicare and Medicaid.

The lower end assumption of testing utilization was based on the predominant range selected from survey data provided by AHIP members and collected on May 13, 2020.[6] The higher end of testing utilization assumed that utilization would be triple the lower estimate. This estimate is in line with the higher end of most survey respondents. While most of the survey respondents assumed a lower testing utilization, there was a notably portion that had amounts around the higher end of this scenario.

AHIP survey data and information from CMS on Medicare reimbursement for the current testing was used to develop the range of assumptions for testing costs for each test. There was also an allowance that tests are still being developed and that it is possible that the cost of testing may decrease slightly from what is currently available for both tests.

Once the utilization and unit cost assumptions were combined to generate multiple scenarios of costs, the total estimated cost of testing was compared against the total baseline annual expenditures by line of business. The estimated cost of the testing under the limited testing scenarios, including the cost of administration, produced a range of results. The lowest estimates of $6.0 billion for diagnostic testing and $5.2 billion for antibody testing result from the lowest utilization and lower unit cost assumptions. These assumptions are highlighted in the table below.

Table 3 – Assumptions for COVID-19 Testing – Low Estimate

Assumptions	Utilization PMPY	Annual Utilization (millions)	Unit Cost - Medicare Advantage	Unit Cost - Commercial	Unit Cost - Medicaid MCOs
Diagnostic Testing	0.20	51.1	$50	$65	$50
Administration of Diagnostic Testing	0.10	25.5	$95	$120	$95
Antibody Testing	0.20	51.1	$40	$50	$40

[6] There were 21 respondents, representing 16% of Medicare Advantage enrollment, 42% of Commercial enrollment, and 34% of Medicaid, and MCO enrollment, that answered the survey. Each respondent answered questions, for each type of test, on the estimated number of tests per insured person per year, and the expected range of average cost of the test. There was an array of answers from the survey results.

Administration of Antibody Testing	0.10	25.5	$90	$115	$95

Mass Testing Scenarios

The mass testing scenarios assumed significantly more testing would be needed to contain the virus and for people to return to school and work. However, as an initial matter, there is a lack of clarity around how testing fits into a public health and return to work strategy. At present, each employer is considering whether testing has a role in return to work decisions. The full extent to which testing will be used is unclear. In addition, the CDC has recently found that there is no role at this time for antibody testing in return to work or return to school situations.[7]

While this paper has considered the mass testing scenario in the context of health insurance provider costs, the analysis does not assume that all testing should ultimately be borne by health insurance providers.

Several scenario were run, primarily changing the testing levels and cost of testing.

- **Utilization of the Test.** Utilization of tests ranged from 0.75 to 1.0 per member per year for each of diagnostic and antibody tests. These are averages so it's possible that certain members might get multiple tests where others may not get any. The assumptions did not vary by line of business since testing may be needed at all levels, such as schools for children, employees, and nursing home residents.

- **Utilization of Administration of the Test.** It was assumed that 10% to 20% of diagnostic tests and 10% to 25% of antibody tests would have associated provider costs to support the administration of the tests. For mass testing, it is assumed that the test would likely need to be able to be self-administered or with minimal interactions with health care services. For antibody testing, there is less certainty on the administration of the test and if provider administration will be necessary.

- **Cost of the Test.** The estimated cost of the test varied by line of business. It was assumed to be between $40 and $70 for diagnostic testing for Medicare and Medicaid and between $30 and $50 per test for antibody testing for Medicare and Medicaid. Commercial testing was assumed to be approximately 25% higher than the average cost for Medicare and Medicaid.

- **Cost of Administration of the Test.** The cost of any administration on the test was assumed to be mostly from primary care visits, but also recognized some testing may be happening at urgent care and/or emergency rooms, (although less so than diagnostic testing). The estimated cost of the administration of the tests is between $90 and $125 for diagnostic and antibody testing for Medicare and Medicaid. Similar to the testing costs,

[7] https://www.cdc.gov/coronavirus/2019-ncov/lab/resources/antibody-tests-guidelines.html

Commercial administration was assumed to be approximately 25% higher than the average cost for Medicare and Medicaid.

Since the utilization estimates from the survey data seemed to be based on current testing ability rather than a scenario where supplies are unlimited and testing may be mandatory to return to work/school, we referenced other studies for our mass testing assumptions. In particular, the Harvard Global Institute[8] which currently estimates that around nine hundred thousand tests are needed daily to control the spread of the virus.

Survey data and information from CMS on Medicare reimbursement for the current testing was used to develop the range of assumptions for testing costs for each test. There was also an allowance that tests are still being developed and that it is possible that the cost of testing may decrease slightly from what is currently available for both tests, especially if mass testing is required.

Once the utilization and unit cost assumptions were combined to generate multiple scenarios of costs, the total estimated cost of testing was compared against the total baseline annual expenditures by line of business. The estimated cost of the testing under the mass testing scenarios, including the cost of administration, produced a range of results. The highest estimates of $25.1 billion for diagnostic testing and $19.1 billion for antibody testing result from the highest utilization and higher unit cost assumptions. These assumptions are highlighted in the table below.

Table 4 – Assumptions for COVID-19 Testing – High Estimate

Assumptions	Utilization PMPY	Annual Utilization (millions)	Unit Cost - Medicare Advantage	Unit Cost - Commercial	Unit Cost - Medicaid MCOs
Diagnostic Testing	1.00	255.4	$70	$90	$70
Administration of Diagnostic Testing	0.10	25.5	$125	$155	$125
Antibody Testing	1.00	255.4	$50	$65	$50
Administration of Antibody Testing	0.10	25.5	$125	$155	$125

Reliances and Limitations

Reliances

Wakely relied significantly on the survey data for utilization and unit cost assumptions. AHIP surveyed their members and received 21 responses, representing 16% of Medicare Advantage

[8] https://www.npr.org/sections/health-shots/2020/05/07/851610771/u-s-coronavirus-testing-still-falls-short-hows-your-state-doing

enrollment, 42% of Commercial enrollment, and 34% of Medicaid MCO enrollment. Each respondent answered questions on the average cost and utilization of the diagnostic and antibody testing. The survey included ranges for each assumption and the respondent selected the range estimated to be most likely. For utilization, there was skewing to lower testing levels on a per member per year basis. Average or unit cost information was more widely distributed, likely due to the uncertainty as new tests are developed.

Wakely relied on the following public data sources to inform the assumptions used in the analyses:

- KFF (enrollment figures by line of business)
- CMS Medicare Advantage enrollment reports
- Managed Medicaid enrollment data (https://data.medicaid.gov/)
- U.S. Census Bureau, Current Population Survey Table Creator (2018)
- National Health Expenditures 2011-2027, by source of coverage for hospital, physician and clinical services, and prescription drugs. Centers for Medicare & Medicaid Services, Office of the Actuary
- Harvard Global Institute[9]
- Rate of Infections (https://www.nytimes.com/interactive/2020/03/17/upshot/hospital-bed-shortages-coronavirus.html)
- CMS documents on new testing codes and associated Medicare reimbursement[10]

Limitations

- **Coverage Status.** Wakely assumed that coverage status would stay relatively constant for its primary analyses. While Wakely did provide preliminary sensitivity analyses on this topic changes in insurance coverage status (e.g., shift in number of insured, shift of coverage of status from commercial to Medicaid, etc.) potentially could have a material impact.
- **Out of Network Costs and Cost-Sharing.** Wakely also did not adjust for potential out of network costs. If individuals receive testing in out of network setting costs for commercial carriers could be significantly higher.

[9] https://www.npr.org/sections/health-shots/2020/05/07/851610771/u-s-coronavirus-testing-still-falls-short-hows-your-state-doing
[10] https://www.cms.gov/files/document/mac-covid-19-test-pricing.pdf and https://www.cms.gov/files/document/cms-2020-01-r.pdf

- **Price Changes.** The cost data used was from the survey data. The actual cost of testing, especially antibody testing and any mass-produced testing, is currently unknown and could significantly impact the ultimate cost of testing. Similarly, if testing can be done without associate costs (for example, testing done at home) the associated costs included for testing may overstate the overall testing costs.

- **Regional Variation.** Wakely relied on national estimates to make it estimates. Individual states or insurers could deviate materially from the estimates. Furthermore, the estimates were derived with an underlying assumption that the pandemic would be relatively distributed nationwide. The extent to which testing rates or costs are materially different in different parts of the country, the results could differ from those estimated above.

- **CARES Act.** The CARES Act included an increase of 20% to the inpatient prospective payment system DRG rate for Medicare beneficiaries who have COVID during the public health emergency. To ease in comparison, Wakely did not include the additional increase. The extent to which, the public health emergency is maintained and more diagnoses for Medicare occur in an inpatient setting, these estimates may represent an under-estimate of costs.

- **Economic Impacts.** There is the potential for severe economic effects of the pandemic and related policies to materially increase or decrease the impact on health insurers. Given the uncertainty, Wakely did not adjust coverage utilization patterns as a result of potential job loss or income loss that may occur.

The information contained in this report is not intended nor is appropriate or sufficiently detailed to use in product pricing in any line of business.

Disclosures and Limitations

Responsible Actuary. Julie Peper is the actuary responsible for this communication. She is a Member of the American Academy of Actuaries and a Fellow of the Society of Actuaries. She meets the Qualification Standards of the American Academy of Actuaries to issue this report. Michael Cohen, PhD, also contributed to this report.

Intended Users. This information has been prepared for the sole use of the America's Health Insurance Plans (AHIP) and cannot be distributed to or relied on by any third party without the prior written permission of Wakely. Wakely understands that the report may be made public. Distribution to such parties should be made in its entirety and should be evaluated only by qualified users. The parties receiving this report should retain their actuarial experts in interpreting results.

Risks and Uncertainties. The assumptions and resulting estimates included in this analysis are inherently uncertain. Users of the results should be qualified to use it and understand the results and the inherent uncertainty. **Actual results may vary, potentially materially, from our**

estimates. Wakely does not warrant or guarantee the projected values included in the analysis. It is the responsibility of the organization receiving this output to review the assumptions carefully and notify Wakely of any potential concerns.

Conflict of Interest. We are financially independent and free from conflict concerning all matters related to performing the actuarial services underlying these analyses. In addition, Wakely is organizationally and financially independent to AHIP.

Data and Reliance. We have relied on others for data and assumptions used in the assignment. We have reviewed the data for reasonableness, but have not performed any independent audit or otherwise verified the accuracy of the data/information. If the underlying information is incomplete or inaccurate, our estimates may be impacted, potentially significantly.

Subsequent Events. Subsequent events may impact the findings in this report. Changes in state policy, economic conditions, federal legislation, rate of COVID-19 infection and treatment patterns, and other factors and emerging data could result in material changes to this analysis.

Contents of Actuarial Report. This document and the supporting exhibits/files constitute the entirety of the actuarial report and supersede any previous communications on the project.

Deviations from ASOPs. Wakely completed the analyses using sound actuarial practice. To the best of our knowledge, the report and methods used in the analyses comply with the appropriate ASOPs with no known deviations. A summary of ASOP compliance is listed below:

ASOP No. 23, Data Quality

ASOP No. 41, Actuarial Communication