SOCIETY OF ACTUARIES

Health Care Cost Trends

Illustrative Forecasts of the Impact of COVID-19 on Health Care Costs

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1. Executive Summary

The Society of Actuaries has developed and released a health care cost forecast model to illustrate the potential impact of the COVID-19 outbreak on insurance plan health care costs in the United States. Users of the model may include insurance company actuaries seeking an additional reference point for 2021 cost development, regulatory actuaries seeking additional insights and validation of costs as part of rating submissions for 2021, and insurance purchasers seeking a deeper understanding of the forces driving 2021 health care costs and premiums. The model is publicly available on the Society of Actuaries website and will be updated periodically to reflect the latest data on both the outbreak and insurance health care costs.

The model is not intended as a replacement for existing modeling tools developed by insurers or regulators. Rather, the model's primary purpose is to illustrate the key outbreak-related forces that are affecting the trajectory of health care costs. In addition, the model can provide a common reference point to facilitate dialogue with respect to the regulatory review of 2021 health insurance rate filings.

This report presents a set of illustrative forecasts produced by the model. The assumptions feeding into these forecasts were constructed to provide a sense of the range of possibilities for the future trajectory of the COVID-19 outbreak. This range of outbreak scenarios, in turn, leads to a range of forecasts for insurance health care costs. Results are presented relative to a hypothetical baseline scenario in which the COVID-19 outbreak never occurred. This report highlights how much, in percentage terms, insurance health care costs could change due to the outbreak in 2020, 2021 and 2022.

Key findings are as follows:

- The net impact of the outbreak on projected future health care costs depends on future rates of infection and future levels of social distancing, each of which are subject to significant uncertainty. Higher levels of social distancing have a downward impact on the volume of elective and non-urgent services and their respective health care costs, while higher levels of infection have an upward impact on a range of inpatient and outpatient treatment services.
- Another important source of projection uncertainty is the ratio of clinical (i.e. symptomatic) cases of COVID-19 infection to subclinical (i.e. asymptomatic). This ratio is still unknown. All else equal, the lower the ratio of clinical to subclinical cases, the lower the risk posed by the virus to that portion of the population that has not yet been infected, and the lower the estimated cost per infection.
- Each month in which a high level of social distancing is enforced leads to an approximate 4% decline in projected annual insured health care costs relative to the baseline "No COVID" scenario. Around 40% to 60% of this decline, however, is expected to be recouped at a later date when social distancing is relaxed, allowing patients and physicians to reschedule some of the services that had previously been deferred.
- Projected treatment costs for patients infected with COVID-19 range from under 1% of baseline costs in the most favorable infection rate scenario, to up to 18% of baseline costs in the most unfavorable scenario.
- If all insured persons received one COVID-19 test per year, the total cost would be roughly 1% of the baseline annual cost for a typical plan. Such a high level of utilization might be unlikely. If the peak daily testing rate in May of 2020 (in the United States) were to continue across 12 consecutive months, the result would be about 0.5 tests per capita per year.
- If a vaccine were to become available, and if all plan members were to be vaccinated, the estimated cost would be about 2% of baseline annual costs for a typical plan. If the vaccine were to confer perpetual immunity, this would be a one-time cost.

2. Lines of Business Covered by the Model

To study how insurance health care costs might be affected by the COVID-19 outbreak, the Society of Actuaries has developed a model that covers five key lines of business within the U.S. insurance market:

- Individual health insurance, commonly offered as comprehensive major medical coverage for commercial non-group consumers.
- Small Group, typically defined as employer-sponsored commercial health insurance plans with employee counts commonly limited to no more than 50 or 100 employees, as defined under State law. Often these coverages have limited rating factors defined by the Affordable Care Act, such as the location of the business, the ages of enrollees, and in some cases, tobacco usage among enrollees.
- Large Group, typically defined as employer-sponsored health insurance plans with employee counts above the Small Group thresholds.
- Medicare Advantage, a type of health plan offered by an insurer that contracts with Medicare to provide common Medicare hospital, medical and pharmaceutical benefits.
- Medicaid, the U.S. public health insurance program for people with low income offered through federal-state partnerships. In many cases, Medicaid is administered through private managed care or fee for service insurance plans that contract with states to provide comprehensive health care services.

3. The Main Effects of the Outbreak on Health Care Services

Across the five insurance lines of business covered by the model, the COVID-19 outbreak has had two main effects on health care costs:

- The volume of many non-urgent or elective services has declined during the first half of 2020 due to the constraints posed by social distancing; and
- Patients with COVID-19 have required both outpatient and inpatient care.

Thus far, the net effect of these two forces on total health care costs has been downward. In the coming months, however, as social distancing policies are relaxed, utilization of elective services is likely to increase, and may temporarily peak above normal historical levels as providers and patients reschedule some of the services that were previously postponed. With respect to the cost of caring for patients infected with COVID-19, these costs will vary as a function of future infection rates. Successful suppression of the outbreak would result in low COVID-19 treatment costs, while a surge in the infection rate would lead to higher treatment costs. An additional component of future insurance costs will be any potential diagnostic and/or antibody tests for COVID-19 infections covered by insured plans, as well as the potential cost of vaccinations, assuming a vaccine eventually becomes available.

4. The Model's Approach for Projecting the Impact of the Outbreak

The model's projected net effect of various shifts in health care costs is a function of the assumed outbreak scenario. The longer the assumed period of social distancing, the greater will be the cumulative downward impact on insurance costs for deferrable or elective health care services. In addition, the greater the percentage of the population that ultimately is infected by COVID-19, the greater will be the costs associated with caring for infected patients.

DEFERRAL AND RECOUPMENT OF NON-URGENT CARE AND ELECTIVE SERVICES

To illustrate the model's approach for estimating the impact of the outbreak on non-urgent care and elective services, consider a hypothetical scenario in which there is no social distancing whatsoever, other than during a single month in which social distancing is assumed to be at a high level (note that the model operates in monthly time steps, projecting the costs in each month as a function of assumptions that are correspondingly expressed on a per-month basis). Further, to isolate the impact of social distancing, this hypothetical scenario assumes that there are no COVID-19 infections. Under this scenario, there is a downward impact on the volume of non-urgent and elective services, but there are no costs for treating newly infected patients. While this is not a realistic scenario, it is useful for illustrating the model's calculation approach.

Running this scenario through the model for each line of business produces a 37% to 54% decline (relative to the baseline) of health care costs in the single month of high social distancing, followed by two months in which health care costs temporarily rise above the baseline monthly level as physicians and patients reschedule some of the services that had previously been canceled or postponed. By the fourth month, equilibrium is restored such that projected costs are about equal to baseline costs.

Table 1

COST IMPACT OF A HYPOTHETICAL SCENARIO IN WHICH SOCIAL DISTANCING IS AT THE HIGHEST LEVEL FOR MONTH 1, AND THEN DROPS TO A NEGLIGIBLE LEVEL FOR SUBSEQUENT MONTHS

Line of Business	Projected Cost Impact as % of Baseline Monthly Cost				
	Month 1	Month 2	Month 3	Month 4	Total
Individual	-47%	20%	9%	1%	-18%
Small Group	-47%	20%	9%	1%	-18%
Large Group	-44%	18%	8%	0%	-17%
Medicaid	-37%	18%	7%	0%	-12%
Medicare Advantage	-54%	23%	7%	0%	-24%
Average	-46%	20%	8%	0%	-18%

The net effect of projected deferrals and recoupments is an 18% drop (the average across all lines of business) of monthly costs per each month of high social distancing, as shown in the bottom right-hand corner of Table 1. Equivalently, one month of high social distancing translates into a 1.5% decline in annual costs (1.5% = 18% divided by 12). Keep in mind, however, that the initial drop in costs is expected to be larger than 1.5%, and only when social distancing is relaxed does the net effect decline towards 1.5% due to the recoupment of services that were previously deferred. Depending on the future timeline of the outbreak, recoupment of deferred or postponed services could be realized either in the same plan year in which the initial decline of services occurred, or in a subsequent plan year.

The 1.5% rule-of-thumb – which suggests that each month of high social distancing translates into a 1.5% net decline in annual costs -- is applicable to relatively short periods of high social distancing. Over longer periods, however, the share of postponed or canceled services that ultimately are recouped could potentially decline. As a default, the model assumes that deferred-but-not-yet-recouped services can accumulate to no more than 200% of the baseline monthly level (i.e. two months' worth of normal service volumes). If deferred services accumulate above this level (as is possible over a long period of social distancing), the excess is assumed to be eliminated, and thus never recouped.

Consider another extreme scenario in which the highest level of social distancing is in force across 12 consecutive months, after which social behavior abruptly shifts back to normal. As in the prior example, assume that there are no COVID-19 infections, thereby isolating the impact of social distancing on costs. The model's forecast for this scenario is shown in Table 2:

Table 2

COST IMPACT OF A HYPOTHETICAL SCENARIO IN WHICH SOCIAL DISTANCING IS AT THE HIGHEST LEVEL FOR ALL 12 MONTHS OF YEAR 1, AND THEN DROPS TO A NEGLIGIBLE LEVEL IN SUBSEQUENT YEARS

Line of Business	Projected Cost Impact as % of Baseline Annual Cost				
	Year 1	Year 2	Year 3	Year 4	Sum
Individual	-47%	13%	0%	0%	-33%
Small Group	-47%	13%	0%	0%	-34%
Large Group	-44%	13%	0%	0%	-31%
Medicaid	-37%	12%	0%	0%	-24%
Medicare Advantage	-54%	16%	0%	0%	-38%
Average	-46%	14%	0%	0%	-32%

As in the prior example, each month of high social distancing translates into a 46% initial drop in monthly costs (and because high social distancing is assumed across all 12 months of year 1, the annual costs also drop by 46%). In year two, however, when normal social behavior is restored, the rebound in costs is significantly smaller than in the prior example. As a result, the net impact of each month of social distancing is a 2.7% decline in annual costs (2.7% = 32% / 12) rather than a 1.5% decline.

TREATMENT COSTS OF PATIENTS WITH COVID-19

The model calculates per-member-per-month COVID-19 treatment costs as follows:

> Treatment Cost per Member in a Projection Month =
> Assumed % of Members Newly Infected * % Symptomatic * Average Cost per Symptomatic Infection

The average cost per symptomatic COVID-19 infection is informed by studies on recent COVID-19 treatment data. This average varies by line of business. To calculate total treatment costs, the cost-per-symptomatic-infection is multiplied by the assumed percentage of members who are newly infected, and by the assumed percent that is symptomatic. All else equal, the lower the percent of infected persons who are symptomatic (and the greater the percent who are asymptomatic, or who have mild symptoms that require no medical care), the less risk the virus poses to the population that has not yet been infected. Note that the term “clinical” is often used to describe symptomatic cases, while “subclinical” is used to describe asymptomatic cases.

As of June 15, 2020, about 2 million COVID-19 cases had been reported in the United States (U.S.), which is equivalent to about 0.6% of the total U.S. population. However, there could potentially be many subclinical cases that have not been reported. While some researchers have made efforts to estimate the ratio of subclinical to clinical cases for COVID-19, a consensus is yet to emerge. A wide range of uncertainty exists, and this must be kept in mind while producing estimates of total COVID-19 treatment costs.

To assess the potential magnitude of treatment costs, consider an extreme scenario in which 60% of the population becomes infected with COVID-19 by the end of 2020. In theory, a 60% cumulative infection rate may be sufficient to achieve herd immunity. In this extreme scenario, the projected cost of treating infected patients is approximately 9% of the baseline annual costs (with some variation by line of business) assuming that half of all cases are subclinical (Table 3).

This hypothetical scenario compresses the outbreak into a short time interval (a single month). In fact, if 60% of the population were to ultimately be infected, the costs shown in Table 3 would most likely be spread out over a longer time interval. For example, if 30% of the population were infected in 2020 and an additional 30% were infected in 2021, then, assuming that half of all cases are subclinical, projected treatment costs would be about 4.5% of baseline costs in each of the two years.

Table 3

PROJECTED COSTS OF TREATING COVID-19 PATIENTS ASSUMING THAT 60% OF THE POPULATION IS ULTIMATELY INFECTED

Subclinical Cases Per Each Clinical Case	Subclinical Cases as % of Total Cases	Clinical Cases as % of Total Cases	Total COVID-19 Treatment Costs as a % of Baseline Annual Costs
0.0	0.0%	100.0%	18.4%
0.5	33.3%	66.6%	12.2%
1.0	50.0%	50.0%	9.2%
2.0	66.6%	33.3%	6.1%
4.0	80.0%	20.0%	3.7%

These results were computed for a large group plan with a rating area factor of "1". Results differ slightly by line of business.

5. Health Care Cost Projections Under Three Outbreak Scenarios

The net impact of the outbreak on total insured health care costs will be a function of the decline in elective and non-urgent services, and the increase in costs associated with COVID-19 treatment. A long period of social distancing accompanied by a low rate of infection would be expected to produce a decline in costs, relative to a baseline scenario in which the outbreak never occurred. Conversely, a short period of social distancing accompanied by a rapid rate of infection could potentially produce an increase in costs.

With this in mind, the following scenarios were developed to provide a sense of the net effect of the outbreak on health care costs:

Table 4

OUTBREAK SCENARIOS CONSIDERED IN THIS REPORT

Scenario	Scenario Name	Full Recovery By	% of Population Infected	Total Months of Strong Social Distancing
1	Successful Suppression of Outbreak	End of 2020	2%	3
2	Large Second Wave	June 2021	10%	7
3	Massive Second Wave	October 2021	30%	10

Scenario 1 is the most favorable. In this scenario, the worst impact of COVID-19 has already occurred, in Spring 2020. Social distancing returns to normal and few new cases emerge by the end of 2020, and normal patterns of health care services are restored. In this scenario, only 2% of the population becomes infected with the coronavirus in 2020, and no additional infections are assumed for 2021 and beyond. Only 3 months of strong social distancing are assumed for 2020. Normal levels of social activity are assumed for 2021 and beyond.

Scenario 2 assumes that the first wave is followed by an even larger second wave, with a total of 10% of the population becoming infected (across both waves), and with a total of 7 months of strong social distancing. By May of 2021, infection rates are negligible and normal social contact patterns have been resumed.

Scenario 3 assumes that the first wave is followed by a massive second wave. Across both waves, a total of 30% of the population becomes infected, and strong social distancing spans a total of 10 months.

For each of these three scenarios, a one-to-one ratio of subclinical to clinical cases is assumed (i.e. 50% of total cases are assumed to be clinical).

For a Large Group Policy and a rating area factor of 1.00, the scenarios described above were run through the model, producing the following results:

Figure 1

PROJECTED MONTHLY HEALTH CARE COSTS AS A PERCENT OF A BASELINE SCENARIO IN WHICH THE OUTBREAK NEVER OCCURRED

These results were computed for a large group plan with a rating area factor of "1". Results differ slightly by line of business.

Table 5

PROJECTED ANNUAL HEALTH CARE COSTS AS A PERCENT OF A BASELINE SCENARIO IN WHICH THE OUTBREAK NEVER OCCURRED

Scenario	2020	2021	2022
1. Successful Suppression	94.1%	100.0%	100.0%
2. Large Second Wave	80.8%	104.6%	100.0%
3. Massive Second Wave	82.2%	102.6%	100.0%

These results were computed for a large group plan with a rating area factor of "1". Results differ slightly by line of business. The cost of testing and vaccinations are excluded from these results.

Across all scenarios, relative to a baseline in which the outbreak never occurred, projected health care costs decline in 2020 (relative to the baseline) but rebound in 2021 (Table 5). This down-and-up pattern arises because, in 2020, the projected downward impact associated with the deferral of elective and non-urgent services is larger than the projected upward impact associated with the treatment of COVID-19 infections. In 2022, with the outbreak in the rear view mirror, projected costs are equal to baseline levels.

A better understanding of the "down in 2020, up in 2021" cost dynamics can be obtained by exploring Scenario 2 in greater detail. In this scenario, social distancing induces over a 20% decline in total costs in 2020, but this decline is partially offset by COVID-19 treatment costs which amount to about 2.5% of baseline costs (Table 6). The net effect is a 19% cost reduction relative to the baseline. In 2021, as social distancing is relaxed and infection rates decline, elective services rebound, while direct treatment costs are minimal. The net effect is a 5% increase in total costs in 2021. The rebound of elective/non-urgent services entails not only a resumption of normal service volumes, but the

rescheduling of some services that had previously been canceled. By 2022, both the outbreak and the service rebound are in the past, and, as a consequence, projected costs are restored to baseline levels.

Table 6

LARGE SECOND WAVE (SCENARIO #2): PROJECTED HEALTH CARE COSTS AS A PERCENT OF A BASELINE SCENARIO IN WHICH THE OUTBREAK NEVER OCCURRED

	2020	2021	2022
Baseline	100.0%	100.0%	100.0%
Costs After Adjusting for Change in Elective Services	78.3%	103.9%	100.0%
COVID-19 Treatment Costs	2.5%	0.7%	0.0%
Total Cost	80.8%	104.6%	100.0%

The three illustrative scenarios considered in this analysis should not be misconstrued as an exhaustive representation of the range of possible futures. Scenarios can be constructed in which projected costs do not follow the "down in 2020, up in 2021" pattern that is evident in the forecast results shown in Tables 5 and 6. For example, consider a scenario in which strong social distancing remains in place across 24 consecutive months. This would delay the rebound in the volume of elective services until 2022, and would likely lead to a "down in 2020, down in 2021, up in 2022" cost pattern. Of course, even if governments relax or eliminate social distancing requirements, patients may not fully resume their prior patterns of health care consumption. This inertia, in turn, could perhaps lead to a long recovery period and reduce the chance or magnitude of a rebound in the volume of elective/non-urgent services in 2021.

Keep in mind that the three illustrative scenarios presented in Figure 1 and Table 5 assume that 50% of infected persons are clinical (i.e. symptomatic). However, researchers have not yet reached a consensus regarding the ratio of clinical to subclinical cases. It is useful, therefore, to perform a sensitivity test for the percent of total cases that are clinical (Table 7).

Table 7

MASSIVE SECOND WAVE (SCENARIO #3): PROJECTED HEALTH CARE COSTS AS A PERCENT OF A BASELINE SCENARIO IN WHICH THE OUTBREAK NEVER OCCURRED

Clinical Cases as % of Total Cases	2020	2021	2022
100%	85.1%	104.2%	100.0%
50%	82.1%	102.6%	100.0%
20%	80.4%	101.7%	100.0%

6. COVID-19 Testing and Vaccination Costs

An additional consideration is the cost of COVID-19 testing in insured plans, as well as the cost of vaccinations should a vaccine eventually be made available. The forecasts presented thus far have excluded COVID-19 testing and vaccination costs. These costs are best considered separately for sake of clarity. When developing scenarios for these costs, the following questions should be considered:

- Will future COVID-19 vaccination and testing costs be borne by public health funding, employers or be part of insurer plans?
- Is a vaccine expected to become available? If a vaccine is expected, then what is its anticipated release date? What percentage of plan members would be vaccinated, and could this percentage vary by age or health status?

- With what frequency are plan members expected to be tested for COVID-19? Will this frequency rise or fall over time? Will it vary as a function of the infection rate or the level of social distancing?

With respect to testing, the peak testing rate for the U.S. since the outset of the outbreak is about 500,000 per day[1], equivalent to 0.15% of the population. If this testing rate were to persist across a 12-month period, the result would a per capita annual testing rate of about 50% (i.e. 0.5 tests per person). For a typical plan, this translates into total annual testing costs equal to about 0.5% of baseline annual costs.

With respect to vaccinations, assuming that 50% of plan members received a vaccination, and assuming that a single vaccination shot would be sufficient to confer perpetual immunity, the one-time total vaccination cost would be slightly over 1% of the baseline annual costs for a typical plan.

[1] https://covidtracking.com/data/us-daily

Appendix. Detailed Assumptions for Each of the Three Scenarios

Table 4, presented earlier in this report, provides a high-level overview of the assumptions that define three illustrative scenarios that were examined in this report. This appendix provides a greater level of detail.

The model operates in monthly time increments. Monthly costs are determined as a function of monthly assumptions. The two most important assumptions are (1) the monthly rate of new infections, described in Figure A1, and (2) the level of social distancing, shown in Figure A2 via the model's concept of "Return Stage". Return stages are defined by an index that runs from 1 to 10, where "1" represents the highest level of social distancing, and "10" represents a normal level of social behavior. Note that Figure A1 shows the cumulative percentage of the population has been infected, so the rate of new infections would be the slope of this curve.

Figure A1

CUMULATIVE INFECTED PERSONS AS A PERCENT OF THE COVERED POPULATION

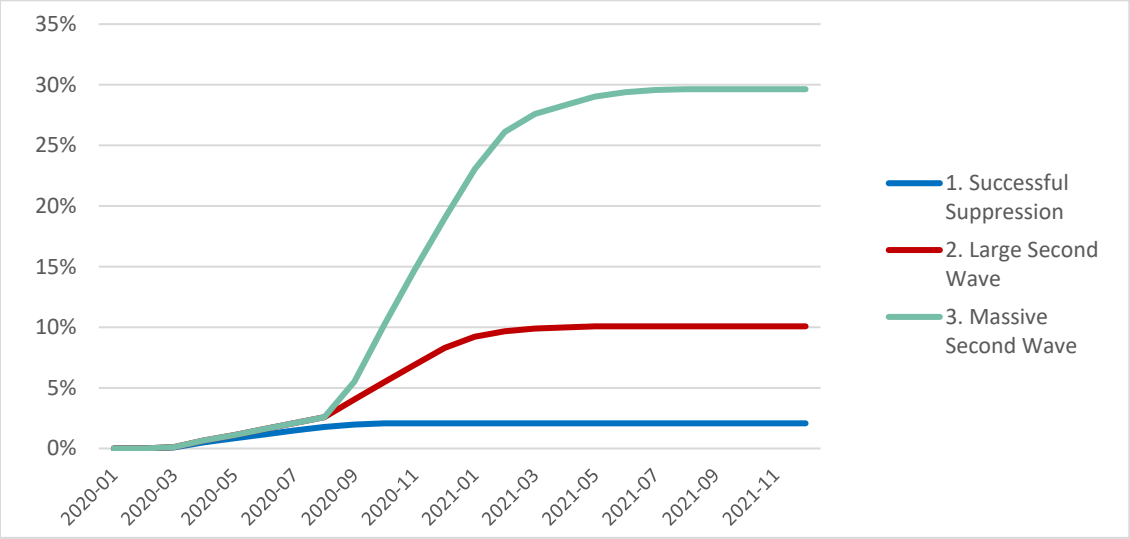
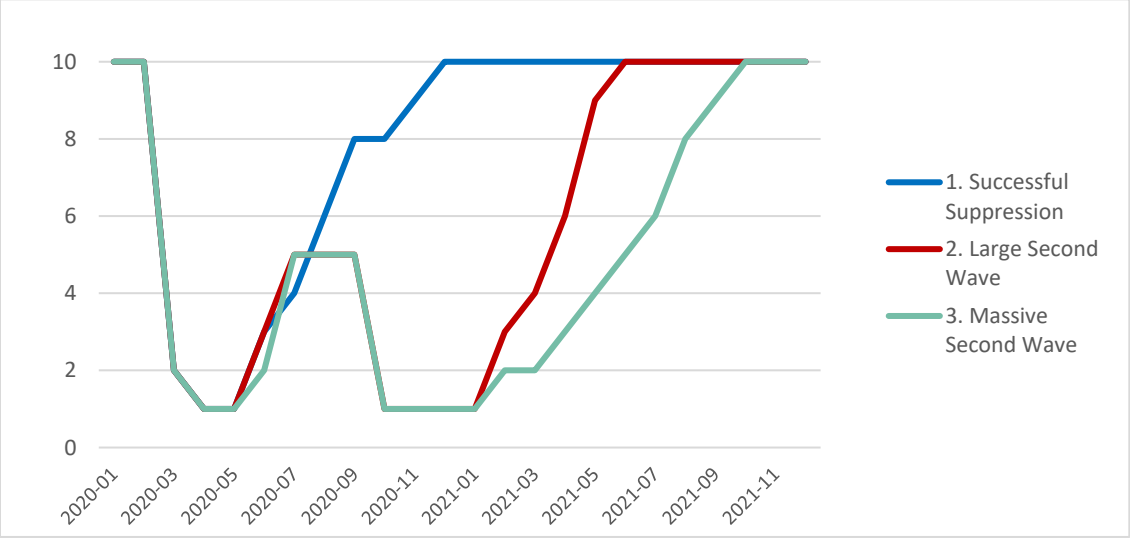


Figure A2

RETURN STAGE



The starting point for the model's projections is 2019 national-level cost data gathered from industry sources, as well as estimates for the cost of diagnosing and treating COVID-19 infections. At a high level, these costs are summarized in Table A1. Note that while the table includes a hypothetical unit cost for COVID-19 vaccinations, a vaccine does not yet exist.

Table A1

SUMMARY OF COST DATA

	Large Group	Small Group	Individual	Medicare Advantage	Medicaid
Baseline Cost Per Member Per Month	$517	$529	$557	$1,166	$359
Average Cost per Clinical COVID-19 Infection	$1,907	$1,907	$1,649	$3,452	$947
Unit Cost: COVID-19 Diagnostic Test	$65	$65	$65	$50	$50
Unit Cost: COVID-19 Antibody Test	$65	$65	$65	$50	$50
Unit Cost: COVID-19 Vaccination	$150	$150	$135	$110	$80

Table A2

PROJECTED COVID-19 TESTING, TREATMENT AND VACCINATION COSTS AS A % OF BASELINE LEVELS

	Large Group	Small Group	Individual	Medicare Advantage	Medicaid
COVID Treatment Costs Assuming 10% Infected	3.1%	3.0%	2.5%	2.5%	2.2%
Diagnostic Testing Assuming 0.5 Tests Per Member	0.5%	0.5%	0.5%	0.2%	0.6%
Diagnostic Testing Assuming 1.0 Tests Per Member	1.0%	1.0%	1.0%	0.4%	1.2%
Vaccination Costs Assuming Half of Members Get Vaccine	1.2%	1.2%	1.0%	0.4%	0.9%

About The Society of Actuaries

With roots dating back to 1889, the *Society of Actuaries* (SOA) is the world's largest actuarial professional organizations with more than 31,000 members. Through research and education, the SOA's mission is to advance actuarial knowledge and to enhance the ability of actuaries to provide expert advice and relevant solutions for financial, business and societal challenges. The SOA's vision is for actuaries to be the leading professionals in the measurement and management of risk.

The SOA supports actuaries and advances knowledge through research and education. As part of its work, the SOA seeks to inform public policy development and public understanding through research. The SOA aspires to be a trusted source of objective, data-driven research and analysis with an actuarial perspective for its members, industry, policymakers and the public. This distinct perspective comes from the SOA as an association of actuaries, who have a rigorous formal education and direct experience as practitioners as they perform applied research. The SOA also welcomes the opportunity to partner with other organizations in our work where appropriate.

The SOA has a history of working with public policymakers and regulators in developing historical experience studies and projection techniques as well as individual reports on health care, retirement and other topics. The SOA's research is intended to aid the work of policymakers and regulators and follow certain core principles:

Objectivity: The SOA's research informs and provides analysis that can be relied upon by other individuals or organizations involved in public policy discussions. The SOA does not take advocacy positions or lobby specific policy proposals.

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