Section B
Appendix D
COVID-19 Claim Cost Projection

The COVID-19 pandemic began to emerge in California in early 2020. During the initial period of the pandemic, without the presence of a legal presumption of compensability of COVID-19-related illnesses in the workers' compensation system, many claims were filed, particularly by first responders and healthcare workers.

On May 6, 2020, Governor Newsom issued Executive Order N-62-20 (Executive Order) thereby providing a rebuttable presumption of compensability for all workers directed by their employer to work outside their home. In May 2020, the WCIRB estimated that the statewide cost of claims projected to be filed during the effective period of the rebuttable presumption in the Executive Order was $1.2 billion.[1] While the term of the Executive Order has now expired, workers' compensation claims continue to be filed, with several bills under consideration by the Legislature to re-establish a legal presumption of compensability for COVID-19 claims of specified workers. As of mid-July, data from the Division of Workers' Compensation (DWC) indicates that almost 23,000 workers' compensation claims involving COVID-19 have been filed in California, with the numbers increasing rapidly.

Infectious disease experts and epidemiologists expect the COVID-19 pandemic to continue into 2021 and beyond. As the pandemic began to emerge in California early in 2020, the current advisory workers' compensation pure premium rates, approved by the Commissioner in November 2019 to be effective January 1, 2020, do not reflect a provision for COVID-19 claim costs emerging in 2020. With the pandemic expected to continue into 2021 and beyond, the WCIRB has estimated the cost of COVID-19 claims projected to be incurred on policies incepting between January 1, 2021 and August 31, 2021, and has reflected this cost estimate in the pure premium rates proposed in this filing.

The WCIRB estimates the cost of COVID-19 claims on January 1, 2021 to August 31, 2021 policies to be 3.8% of total losses and loss adjustment expenses (LAE). This equates to an average of $0.06 per $100 of payroll. The methodology underlying this projection is summarized below.

Projection Methodology
Limited forecasts are available for COVID-19 infection rates in 2020 and projections for 2021 and 2022 are even more limited. To project COVID-19 claims arising on January 1, 2021 to August 31, 2021 policies, the WCIRB first estimated the total cost of losses and LAE for COVID-19 claims arising in 2020 based on available information about COVID-19 deaths and hospitalizations in California as well as from several publicly available disease and statistical models.[2] The WCIRB then projected COVID-19 claim costs for 2021 and 2022 based on judgmental assumptions relating COVID-19 deaths and hospitalizations in 2021 and 2022 to those in 2020. These assumptions were informed by a comprehensive review of published COVID-19 related statistics and research.

Exhibits 1.1 through 1.3 summarize the WCIRB's projection of the estimated cost of COVID-19 losses and LAE incurred on January 1, 2021 to August 31, 2021 policies. Exhibit 1.1 summarizes the computation of the projected accident year 2020 COVID-19 losses and LAE used as a basis to project COVID-19 losses and LAE in 2021 and 2022.

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[1] *Evaluation of Cost Impact of Governor Newsom's Executive Order on Rebuttable Presumption for California COVID-19 Workers' Compensation Claims,* WCIRB, May 2020.

[2] For purposes of this valuation, the WCIRB assumed that a presumption reasonably similar to that included in Executive Order N-62-20 will be in effect for the remainder of year. If by the time of the CDI public hearing on this filing no presumption is enacted or a significantly different presumption is enacted, the WCIRB will reassess this evaluation and, if appropriate, amend the proposed January 1, 2021 advisory pure premium rates.

Line (1) of Exhibit 1.1 shows the projected number of California COVID-19 deaths for the working age population (18-69 years) to occur in 2020. The projection was based on published forecasts as of August 3, 2020 from the Institute for Health Metrics and Evaluation (IHME) and YouYang GU from MIT (MIT-YYG).[3] At the time of this valuation, both sources projected the statewide COVID-19 deaths through November 1, 2020. The WCIRB then extended the average of the two models of projected deaths to the end of 2020 assuming the incremental monthly change in deaths in October persists in November and December 2020, given that a potential winter wave of COVID-19 infections may occur concurrently with the flu season that typically starts around October. Table 1 shows the actual and projected COVID-19 death counts by month for 2020 using this approach.

Table 1 – Projected COVID-19 Deaths by Month for 2020

	Actuals from CDPH		Average of IHME and MIT-YYG Projections (as of 8/3/2020)			Estimated Based on October Change	
	June	July	August	September	October	November	December
Cumulative Total	6,090	9,356	12,531	15,158	17,602	20,046	**22,490**
Incremental Monthly Change	—	3,266	3,175	2,627	2,444	2,444	2,444

The majority of COVID-19 deaths have occurred in older people, many of whom are not working. The WCIRB's year-end projection for 2020 COVID-19 deaths of approximately 22,500 was adjusted to the California working age population based on the age distribution of deaths as of August 2, 2020, published by the California Department of Public Health (CDPH).[4] The projected 2020 death counts for the working age population of approximately 7,800 based on this approach and shown on line (1) of Exhibit 1.1 were validated for reasonableness against the reported-to-date death counts shown in Table 2.

Table 2 – Projected COVID-19 Deaths and Hospitalizations for Working Age Population (18 to 69 Years) Compared to Reported-to-Date

	Reported-to-Date (End of July)[5]	Projected 2020 Year-End	% Change between July 2020 and Year-End
Total Deaths	3,230	7,790	+141%
Total Hospitalizations (including deaths)[6]	19,017	48,953	+157%
Death Rate per 100,000	12	29	+141%
Hospitalization rate per 100,000 (including deaths)	71	183	+157%
Hospital Mortality Rate	17%	16%	-6%

Line (2) of Exhibit 1.1 shows the projected number of California COVID-19 hospitalizations (excluding deaths) for the working age population (18-69 years) to occur in 2020. At the time of this valuation, limited reliable forecasts of total COVID-19 hospitalizations in 2020 were available, partly because cumulative hospitalizations at the state level are not always reported. In particular, these forecasts are challenging for California given that the state has not, at the time of this valuation, yet progressed past its "first infection wave" unlike several other states.[7]

[3] IHME's projection for COVID-19 deaths in California used in this valuation was made on August 3, 2020. Similarly, YouYang Gu's deaths projection used was made on August 3, 2020.

[4] California Department of Public Health COVID-19 Cases by Age Group: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-19/COVID-19-Cases-by-Age-Group.aspx (accessed on August 3, 2020).

[5] The reported-to-date COVID-19 deaths were as of August 2, 2020, published by the CDPH. The reported-to-date COVID-19 hospitalizations were as of July 25, 2020, published by the CDC (COVID-NET) on July 31, 2020. The CDC updates prior weekly hospitalizations when adding the latest weekly hospitalizations.

[6] All reported deaths for working age individuals are assumed to follow hospitalization.

[7] States that passed their first wave of infections include New York, New Jersey, Maryland, Massachusetts and Connecticut. https://91-divoc.com/pages/covid-visualization/

The WCIRB projected statewide California 2020 COVID-19 hospitalizations based on an assumed total hospitalization rate (including deaths) after the "first infection wave" by using data from five other states that essentially completed a first infection wave. For many of these states, the rate of COVID-19 infections was higher, compared to California, as they were considered to be "hotspots" in the U.S. during the early months of the pandemic. The Massachusetts total post-first infection wave hospitalization rate of 172 per 100,000 population as of July 28 (the lowest total hospitalization rate among these five states)[8] was selected by the WCIRB to project year-end hospitalizations in California. The year-end projection for COVID-19 hospitalizations (including deaths) was then adjusted to the California working age population based on the age distribution of COVID-19 hospitalizations published by the CDC (COVID-NET) as of July 25, 2020.[9] The WCIRB projected total 2020 COVID-19 hospitalizations (including deaths) in California of approximately 49,000 was also validated for reasonableness against the reported-to-date hospitalizations as shown in Table 2.

The projected total hospitalizations were further categorized as severe cases (those that do not require an ICU stay) and critical cases (ICU cases). Critical cases were assumed to be 30% of all hospitalizations, consistent with the assumption reflected in the WCIRB's May evaluation of the Executive Order.[10] The projected deaths were excluded from both severe and critical cases by assuming an approximate mortality rate of 45% among critical cases and subtracting the remaining deaths from severe cases.[11] The projected 2020 number of working age hospitalizations excluding deaths computed in this manner is 41,200, as shown on line (2) of Exhibit 1.1.[12]

Lines (1) and (2) of Exhibit 1.1 estimate the total 2020 COVID-19 deaths and hospitalizations of working age Californians. To estimate the number of worker's compensation claims that will potentially be filed for accident year 2020, the WCIRB compared the number of claims filed with the DWC through First Report of Injury as of July 23, 2020 with reported working age COVID-19 infections from the CDPH (which include deaths, hospitalizations and mild cases) during the same time period. The WCIRB also assumed approximately 50% of the working age mild cases of COVID-19 will not file a claim[13] and about 10% of all COVID-19 claims filed with the DWC will be denied with the denial ultimately upheld. The reasonability of both of these assumptions was validated based on information about COVID-19 claims filed thus far and based on feedback from claims experts. Based on these assumptions, a conversion factor of 12%, as computed in Exhibit 2 and shown on line (3) of Exhibit 1.1, was used to adjust total 2020 working age COVID-19 deaths and hospitalizations to projected workers' compensation claims.

Line (4) of Exhibit 1.1 shows the projected number of 2020 COVID-19 death claims in the California workers' compensation system. It is computed as the product of the projected number of COVID-19 working age deaths on line (1) and the workers' compensation claim conversion factor of 12% shown on line (3). Line (5) of Exhibit 1.1 shows the projected loss and LAE cost of 2020 COVID-19 death claims, which is the product of line (4) and the average cost of losses and LAE on death claims as projected in the WCIRB's May 2020 evaluation of the Executive Order.[14] Lines (6) and (7) of Exhibit 1.1 show a similar computation for 2020 COVID-19 hospitalization workers' compensation claims excluding deaths.[15] In the May 2020 evaluation of the Executive Order, the WCIRB estimated the average cost of mild, severe, critical and death COVID-19 claims in California based on a review of WCIRB data and published data as

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[8] COVID Tracking Project.

[9] CDC COVID-NET Laboratory-confirmed COVID-19-Associated Hospitalizations by Age Group (accessed on July 31, 2020).

[10] Based on the proportion of ICU cases reported in California, accessed on August 14, 2020.

[11] Armstrong R.A., Kane, A.D., and Cook, T.M. Outcomes from intensive care in patients with COVID-19: a systematic review and meta-analysis of observational studies. Anaesthesia. June 30, 2020.

[12] The estimated distribution between severe and critical cases of COVID-19 after excluding deaths was also used in the computation of line (7) of Exhibit 1.1, the projected cost of 2020 COVID-19 hospitalization claims in the California workers' compensation system.

[13] This assumption was also reflected in the WCIRB's evaluation of the Executive Order.

[14] *Evaluation of Cost Impact of Governor Newsom's Executive Order on Rebuttable Presumption for California COVID-19 Workers' Compensation Claims,* WCIRB, May 2020. In the evaluation, the WCIRB projected an average loss and LAE cost of COVID-19 death claims of $381,800.

[15] In the May 2020 evaluation of the Executive Order, the WCIRB projected an average loss and LAE cost of COVID-19 severe hospitalization claims of $101,800 and an average cost of critical hospitalization claims of $260,100.

well as feedback from a number of workers' compensation claims and medical experts. The WCIRB continues to be believe those estimates are reasonable.

Line (8) of Exhibit 1.1 shows the estimated statewide accident year 2020 cost of losses and LAE on COVID-19 claims. The total cost on line (8) is computed as the sum of the projected cost of death claims shown on line (5), the cost of hospitalization claims (excluding death claims) shown on line (7) and the estimated cost of "mild" (non-hospital) claims, with the cost of mild claims computed based on the methodology used in the WCIRB's May 2020 evaluation of the Executive Order.[16] Line (9) of Exhibit 1.1 shows that 63% of statewide COVID-19 claim costs are estimated to be generated from the insured market. This estimate is based on the percentage of all COVID-19 claims reported to the DWC as of July 23, 2020 that arose in the insured market. Finally, line (10) of Exhibit 1.1 shows the $0.7 billion estimated cost of losses and LAE on accident year 2020 COVID-19 claims in the insured market.

Exhibit 1.2 summarizes the computation of the projected accident year 2021 COVID-19 losses and LAE. There is very limited information available on COVID-19 infections to occur in 2021. A number of published expert forecasts indicate that COVID-19 infections in 2021 will not be significantly better or worse than in 2020, and the number of hospitalizations in 2021 is likely to be similar to that in 2020.[17] All available forecasts indicated that more infection waves will occur in 2020 and 2021 and likely continue until the middle of 2022 when herd immunity may be reached. Based on this information, the WCIRB estimates the level of COVID-19 claims in 2021 (prior to reflecting the impact of improved treatments or a potential vaccine) to be generally comparable to that in 2020 (i.e., a relativity of 2021 to 2020 of 1.0) as shown on line (11) of Exhibit 1.2.

There is potential for the pandemic to improve significantly in 2021 due to ongoing improvements in medical treatments for COVID-19 patients or the impact of potential vaccines or treatments likely to be proven effective in 2021. Exhibit 3 summarizes the current significant advances in treatment of COVID-19 illnesses. As shown on line (12) of Exhibit 1.2, the WCIRB judgmentally estimates a 25% reduction in COVID-19 cost levels in 2021 due to improved treatments and the potential impact of a vaccine.

Line (13) of Exhibit 1.2 shows the projected accident year 2021 COVID-19 losses and LAE for the insured market. The projection of $0.52 billion is based on the 2020 estimate of COVID-19 losses and LAE with a judgmental estimated reduction of 25% to reflect the potential impact of improved treatments and a vaccine. This equates to 4.7% of the total non-COVID-19 accident year 2021 loss and LAE projection of $10.9 billion, determined using the methodologies summarized in Section B, as shown on lines (14) and (15) of Exhibit 1.2.

Exhibit 1.3 summarizes the computation of the COVID-19 losses and LAE projected for accident year 2022 and the January 1, 2021 to August 31, 2021 policy period. As shown on line (16), the WCIRB judgmentally estimates a 67% reduction in accident year 2022 COVID-19 cost levels relative to 2020 due to continued improvements in treatments and the potential for a reduced number and severity of waves caused by continued impact of COVID-19 vaccines and potential herd immunity to COVID-19. Similar to the computation of the projected accident year 2021 COVID-19 losses and LAE, line (17) of Exhibit 1.3 shows the projected accident year 2022 COVID-19 losses and LAE for the insured market of $0.23 billion. This equates to 1.9% of the total non-COVID-19 accident year 2022 loss and LAE projection of $12.0 billion, determined using the methodologies summarized in Section B, as shown on lines (18) and (19) of Exhibit 1.3.

Line (20) of Exhibit 1.3 computes the adjustment factor for the estimated cost impact of COVID-19 claims to be incurred on policies incepting between January 1, 2021 and August 31, 2021. As shown, the

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[16] In the May 2020 evaluation of the Executive Order, the WCIRB projected an average loss and LAE cost of COVID-19 mild claims of $2,900. Mild claims are projected to represent only about 6% of total COVID-19 claim costs.

[17] Based on several studies reviewed: Kronick, Richard, "How COVID-19 Will Likely Affect Spending, And Why Many Other Analyses May Be Wrong," *Health Affairs Blog*, May 19, 2020; Kissler S.M., Tedijanto, C., Goldstein, E., Grad, Y.H., Lipsitch, M., "Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period", *Science*, May 22, 2020, 368(6493):860-868; Moore, K.A., Lipsitch, M., Barry, J.M., Osterholm, M.T., "COVID-19: The CIDRAP Viewpoint - Part 1: The Future of the COVID-19 Pandemic: Lessons Learned from Pandemic Influenza", April 30, 2020.

average of the 2021 and 2022 projections, weighted based on the relative exposure of each year for the January 1, 2021 through August 31, 2021 policy period, is 3.8% of total non-COVID-19 projected losses and LAE. This equates to an average of $0.06 per $100 of payroll based on a projected average pure premium rate prior to the impact of COVID-19 claims of $1.50 per $100 of payroll. The process to reflect the average provision of $0.06 per $100 of payroll based on the relative frequency of COVID-19 claims by industry sector is detailed in Section A, Appendix A.

Limited information on projected COVID-19 infection rates in 2021 and 2022 is available. The WCIRB projected COVID-19 claim costs for 2021 and 2022 based on a series of reasonable assumptions informed by a comprehensive review of a wide range of available COVID-19 related statistics and research. Given the inherent uncertainty in the COVID-19 projection as well as the extreme fluidity of the pandemic, the WCIRB plans to reassess its evaluation of COVID-19 claim costs to be incurred on January 1, 2021 through August 31, 2021 policies in September based on updated information and statistical models as well as any legislation impacting compensability of COVID-19 enacted by the California Legislature by the close of the legislative session. If appropriate based on that re-evaluation, the WCIRB will amend the January 1, 2021 advisory pure premium rates proposed in this filing by the time of the California Department of Insurance public hearing on the filing.

Projections Based on Alternative Assumptions

Given the uncertainty involved as to the future of the pandemic as well as the breadth of the assumptions reflected in the WCIRB's projection summarized above, the WCIRB has also projected a low-range and a high-range COVID-19 cost estimate for the January 1, 2021 to August 31, 2021 policy period.

The WCIRB's low-range projection reflects the same assumptions used in the projection summarized in Exhibits 1.1 to 1.3 with several exceptions. First, the number of death claims projected was based solely on the IHME model estimate, which was the lower of the two model projections. Second, the number of COVID-19 working age hospitalizations for the remainder of 2020 was limited to be only 133% of the number of working age hospitalizations that have occurred thus far in 2020 (in lieu of almost 160% as shown in Table 2). Finally, reflecting more optimistic assumptions regarding future waves, improved treatments and the impact of vaccines, the WCIRB assumed that 2021 COVID-19 costs would be 50% of the 2020 costs (in lieu of 75%) and that 2022 COVID-19 costs would be 25% of the 2020 costs (in lieu of 33%). The WCIRB's low-range estimate computed on this basis is 2.4% of total non-COVID-19 projected losses and LAE for the January 1, 2021 to August 31, 2021 policy period. This equates to an average of $0.04 per $100 of payroll.

The WCIRB's high-range projection reflects the same assumptions used in the projection summarized in Exhibits 1.1 to 1.3 with several alternative assumptions. First, the number of death claims projected was based solely on the MIT-YYG model estimate, which was the higher of the two model projections. Second, the number of projected COVID-19 hospitalizations for 2020 was based on the average of the Massachusetts and Maryland hospitalization rates after their first infection wave, which is about 10% higher than the estimate based solely on the Massachusetts information. Finally, reflecting less optimistic assumptions regarding future waves, improved treatments and the impact of vaccines, the WCIRB assumed in the high-range projection that 2021 COVID-19 costs would be 90% of the 2020 costs (in lieu of 75%) and that 2022 COVID-19 costs would be 50% of the 2020 costs (in lieu of 33%). The WCIRB's high-range estimate computed on this basis is 5.2% of total non-COVID-19 projected losses and LAE for the January 1, 2021 to August 31, 2021 policy period. This equates to an average of $0.08 per $100 of payroll.

Projected Accident Year 2020 COVID-19 Claim Costs

(1)	AY 2020 Statewide Deaths Working Age Population: (Tables 1 and 2)	7,800
(2)	AY 2020 Statewide Hospitalizations (Excl. Deaths) Working Age Population: (Table 2)	41,200
(3)	Workers' Compensation Claim Conversion Factor: (Exhibit 2)	12%
(4)	AY 2020 Estimated WC Death Claims: (1) x (3)	940
(5)	AY 2020 Estimated WC Death Claim Costs: (4) x Avg. Death Severity*	$0.4B
(6)	AY 2020 Estimated WC Hospitalization (Excl. Death) Claims: (2) x (3)	4,950
(7)	AY 2020 Estimated WC Hospitalization Claim Costs: (6) x Avg. Hospitalization Severity*	$0.7B
(8)	Statewide AY 2020 COVID-19 Loss & LAE: (5) + (7) + (Mild claim costs**)	$1.1B
(9)	Insured Market Share of COVID-19 Claims: (DWC summary of COVID-19 claims)	63%
(10)	**Projected AY 2020 Insured Market COVID-19 Loss & LAE: (8) x (9)**	**$0.7B**

* Based on severity estimates by COVID-19 claim type in the WCIRB's May 2020 evaluation of the Governor's Executive Order.
** Based on proportion of "mild" COVID-19 claims costs in the WCIRB's May 2020 evaluation of the Governor's Executive Order.

Projected Accident Year 2021 COVID-19 Claim Costs

11)	Estimated Relativity AY 2021 to AY 2020 COVID-19 Claims:	1.0
12)	Judgmental Adjustment for Improved Treatment & Potential Vaccine:	25%
13)	AY 2021 Insured Market COVID-19 Loss & LAE: {Exhibit 1.1 (10)} x (11) x {1.0 - (12)}	$0.52B
14)	AY 2021 Insured Market Projected Non-COVID-19 Loss & LAE:*	$10.9B
15)	AY 2021 COVID-19 Adjustment Factor: (13) / (14)	**4.7%**

* Based on the loss and loss adjustment projection methodologies discussed in Section B.

Projected 1/1/2021 to 8/31/2021 Policy Period COVID-19 Claim Costs

16) Estimated Relativity AY 2022 to AY 2020 COVID-19 Claims: (Includes Judgmental Adjustment for Improved Treatment & Potential Vaccine)	0.33
17) AY 2022 Insured Market COVID-19 Loss & LAE: {Exhibit 1.1 (10)} x (16)	$0.23B
18) AY 2022 Insured Market Projected Non-COVID-19 Loss & LAE:*	$12.0B
19) AY 2022 COVID-19 Adjustment Factor: (17) / (18)	**1.9%**
20) 1/1/2021 to 8/31/2021 Policy Period COVID-19 Adjustment Factor {[Exhibit 1.2 (15)] x 67%} + {(19) x 33%}	**3.8%**

* Based on the loss and loss adjustment projection methodologies discussed in Section B.

Computation of COVID-19 Workers' Compensation Claim Conversion Factor

1)	Total COVID-19 Infections Age 18-69 as of July 2020:[1]	312,000
2)	Total COVID-19 Hospitalizations (Including Deaths) Age 18-69 as of July 2020:[2]	19,000
3)	Total COVID-19 Mild Cases Age 18-69: (1) - (2)	293,000
4)	COVID-19 Infections Excluding 50% of Mild Cases Age 18-69: (2) + (3) x 50%	165,500
5)	Total COVID-19 Workers' Compensation Claims Filed as of July 2020:[3]	22,300
6)	Estimated Proportion of Claims Denied and Upheld:	10%
7)	**Workers' Compensation Claim Conversion Factor: (5) / (4) x {1.0 - (6)}**	**12%**

[1] COVID Tracking Project as of July 18, 2020 (adjusted to working age population).
[2] CDC (COVID-NET) as of July 25, 2020. COVID-19 hospitalizations often lag a week behind COVID-19 infections.
[3] Based on Division of Workers' Compensation First Report of Injury claims as of July 23, 2020.

COVID-19 Claim Cost Projection
Published Information on Improved Treatments and Potential Vaccines

- Available Treatments for COVID-19
  - Dexamethasone (an anti-inflammatory steroid recommended for severe COVID-19 infections)
    - Prelim report showed mortality reduced by 12% among ICU patients
  - Remdesivir (FDA approved for emergency use for hospitalized patients)
    - Shown to reduce time to recovery by 4 days (11 vs. 15 days)
  - Convalescent plasma (FDA approved for emergency use)
  - Prone positioning reduces need for ventilators by 46%
- Treatments under clinical trial investigation (about 1,900 ongoing trials as of August 2020)
  - Inhaled beta interferon: a U.K. trial showed an 80% mortality reduction among 100 hospitalized patients
  - Plasma-based therapies
- Potential vaccines
  - An effective vaccine by early 2021 highly likely
    - > 140 potential COVID-19 vaccines in various stages of development (WHO)
  - A study on 2009 influenza pandemic (H1N1) shows the vaccines prevented about 4% of both deaths and hospitalizations, and 3% of total infections.
- Improved clinical guidelines for treating COVID-19

Sources: "Dexamethasone in Hospitalized Patients with Covid-19 – Preliminary Report", N Engl J Med. 2020;NEJMoa2021436, The RECOVERY Collaborative Group: Horby, P., Lim, W.S., et al., published online ahead of print on July 17, 2020; "Remdesivir for the Treatment of Covid-19 – Preliminary Report," N Engl J Med. 2020;NEJMoa2007764, Beigel, J.H., Tomashek, K.M., Dodd, L.E., et al, published online ahead of print on May 22, 2020; "Prone Positioning in Awake, Nonintubated Patients With COVID-19 Hypoxemic Respiratory Failure," JAMA Intern Med., Thompson, A.E., Ranard, B.L., Wei, Y., et al; June 17, 2020; "FDA Authorizes Convalescent Plasma for Covid-19 Use," Wall Street Journal, Burton, T.M. and Marcus, A.D., August 23, 2020; "A promising new treatment – inhaled Interferon beta"; Coronavirus Vaccine Tracker, New York Times; July 20, 2020; "Effects of vaccine program against pandemic influenza A(H1N1) virus, United States, 2009-2010," Centers for Disease Control and Prevention, Borse, R.H., Shrestha, S.S., Fiore, A.E., et al, March 2013, 2013;19(3):439-448.