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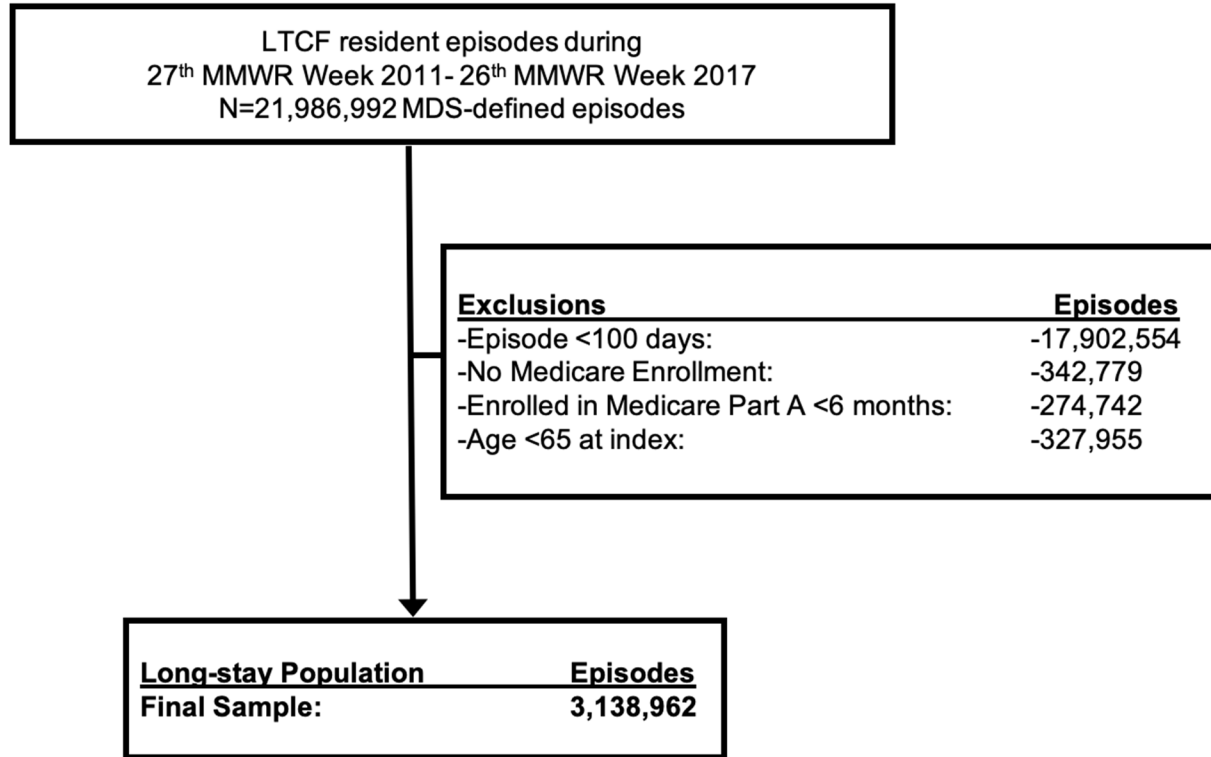
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This supplementary material has been provided by the authors to give readers additional information about their work.

eFigure 1. Flow Diagram

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│            LTCF resident episodes during          │
│   27ᵗʰ MMWR Week 2011- 26ᵗʰ MMWR Week 2017        │
│        N=21,986,992 MDS-defined episodes          │
└─────────────────────────────────────────────────┘
                    │
                    │        ┌──────────────────────────────────────────────────────┐
                    │        │ **Exclusions**                        **Episodes**     │
                    ├────────│ -Episode <100 days:                     -17,902,554    │
                    │        │ -No Medicare Enrollment:                   -342,779    │
                    │        │ -Enrolled in Medicare Part A <6 months:    -274,742    │
                    │        │ -Age <65 at index:                         -327,955    │
                    │        └──────────────────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────────┐
│ **Long-stay Population**        **Episodes** │
│ **Final Sample:**                3,138,962   │
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Abbreviations: LTCF, long-term care facility; MMWR. Morbidity and Mortality Weekly Report; MDS, Minimum Data Set.

eFigure 2. United States Weekly Influenza and RSV Positive Tests Reported from the CDC Clinical and Public Health Laboratories Between 2011-2017
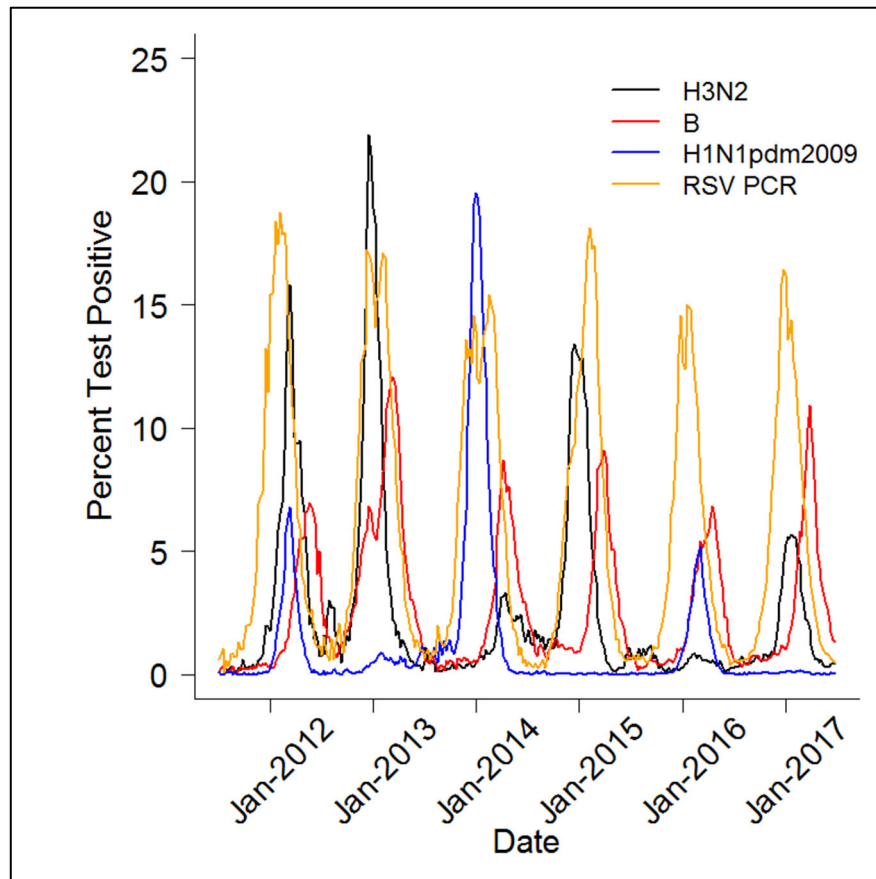
Each line represents the weekly percentage of tests resulting in positive for each respective viral strain during each CDC MMWR week between 2011-2017.

Abbreviations: H3N2, influenza A subtype H3N2; B, influenza B; H1N1pdm2009, influenza A H1N1 2009 pandemic subtype; RSV, respiratory syncytial virus; PCR, polymerase chain reaction.

eFigure 3. Weekly Observed Cardiorespiratory Hospitalizations Among LTCF Residents from 2011-2017
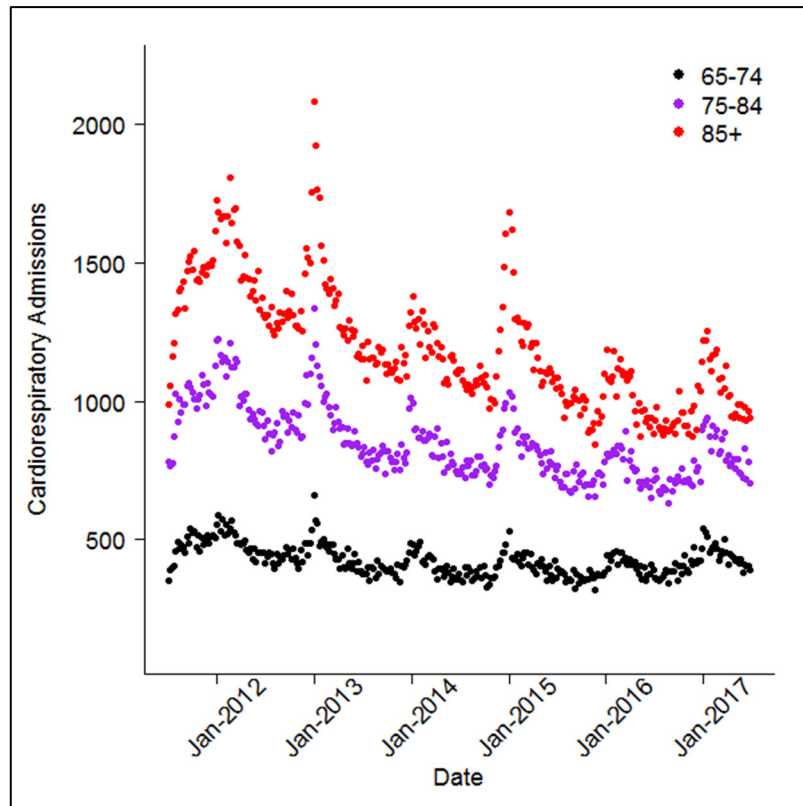

Each dot represents the amount of inpatient cardiorespiratory admissions observed among U.S. LTCF residents aged 65-74, 75-84, and ≥85 during a given CDC MMWR week between 2011-2017.

eTable 1. Attributable Cardiorespiratory Hospitalizations Estimated Using Final Negative Binomial Model

| Age	Attributable cardiorespiratory hospitalizations, [a] n (95% CI)	Person-years, n (%)	Attributable cardiorespiratory hospitalization rate (per 100,000 person-years), n (95% CI)
Influenza and RSV			
65-74	741 (415-1,067)	783,660	95 (53-136)
75-84	2,345 (1,795-2,896)	1,640,294	143 (109-177)
85+	7,852 (7,204-8,501)	2,655,918	296 (271-320)
Total	10,939 (9,413-12,464)	5,079,872	215 (185-245)
Influenza Only			
65-74	453 (199-707)	783,660	55 (25-90)
75-84	1,825 (1,395-2,256)	1,640,294	111 (85-138)
85+	4,604 (4,090-5,119)	2,655,918	173 (154-193)
Total	6,883 (5,684-8,082)	5,079,872	135 (112-159)
RSV Only			
65-74	500 (191-810)	783,660	64 (24-103)
75-84	871 (345-1,397)	1,640,294	53 (21-85)
85+	4,824 (4,199-5,449)	2,655,918	182 (158-205)
Total	6,196 (4,736-7,656)	5,079,872	122 (93-151)

Note- [a]Estimates for each age stratum were rounded to nearest whole number, and so may not precisely add up to the total row. **Abbreviations:** confidence interval, CI.

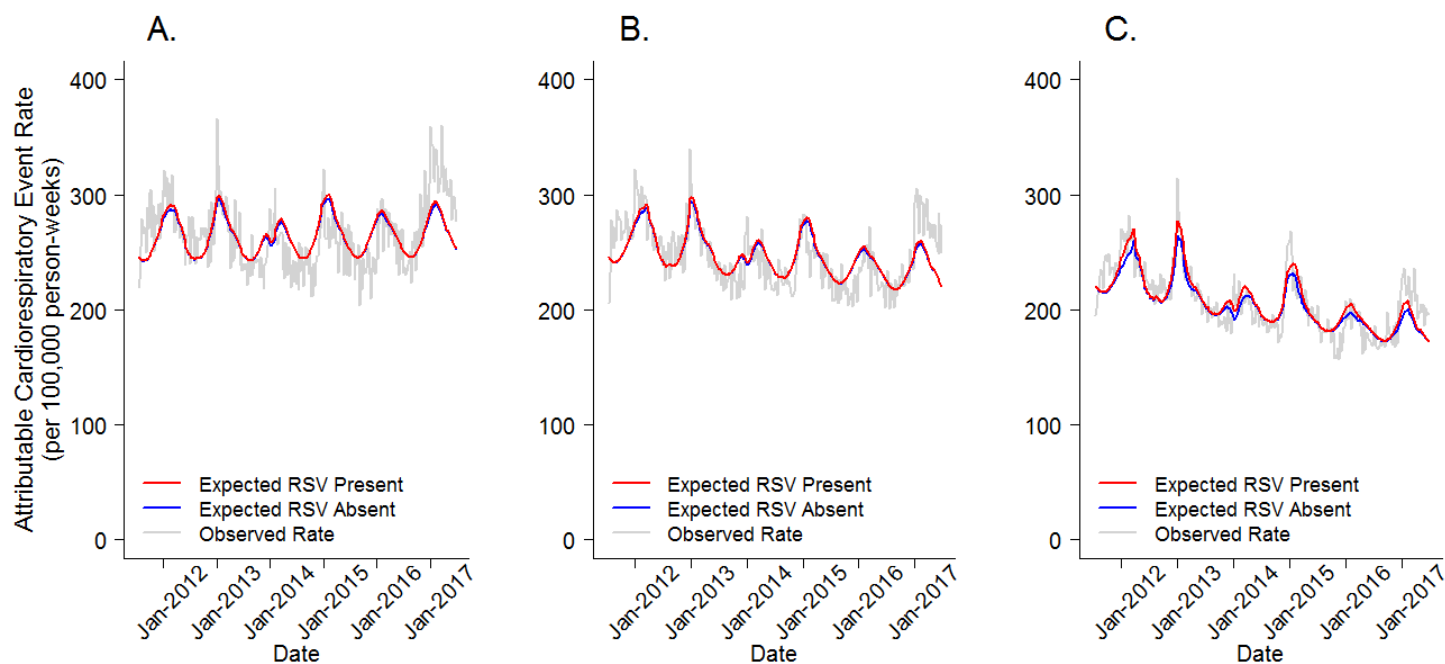**eFigure 4.** Influenza and RSV-Attributable Events
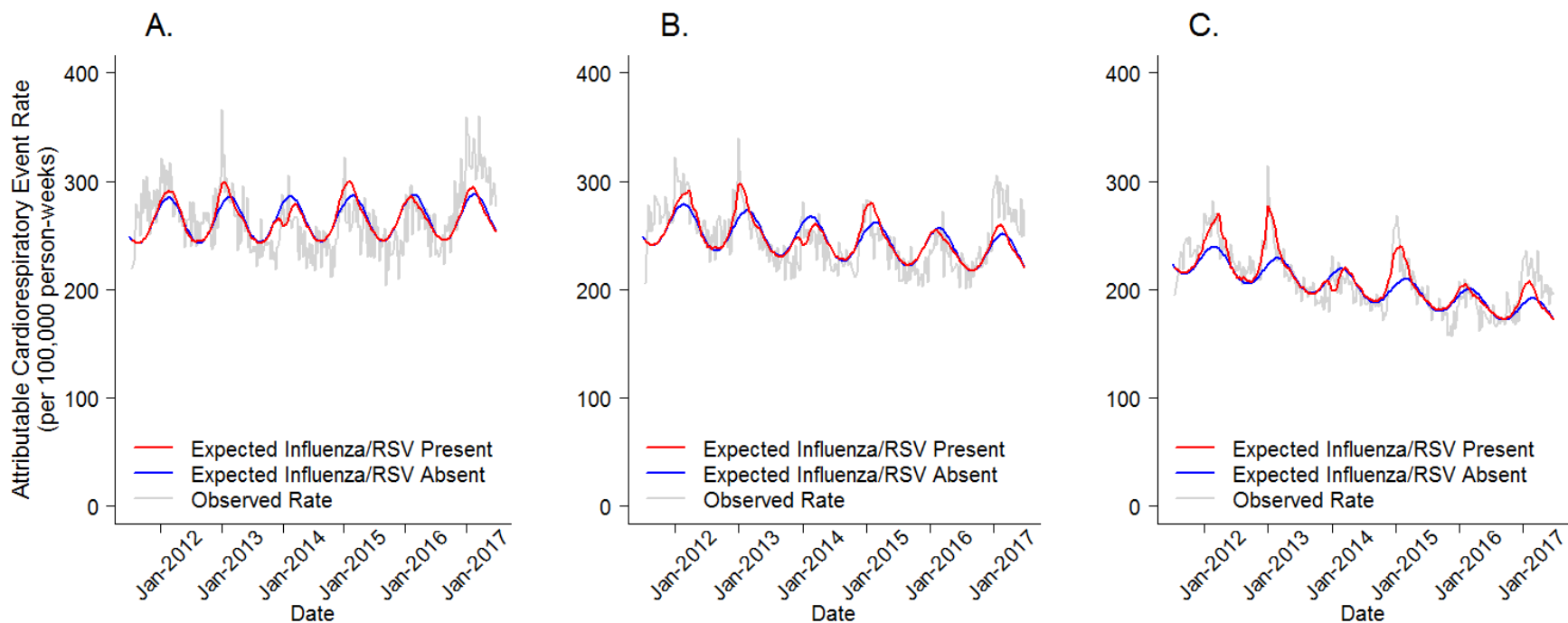
Weekly observed and model-estimated cardiorespiratory hospitalization rates among LTCF residents between 2011-2017. The following age groups are represented across the panels: A, ages 65-74; B, ages 75-84; and C, ages ≥85. The gray line represents the observed cardiorespiratory hospitalizations per 100,000 person-weeks during a given week. The red line represents the expected cardiorespiratory hospitalizations per 100,000 person-weeks when all influenza and RSV are present. The blue line represents the expected cardiorespiratory hospitalization per 100,000 person-weeks when the influenza and RSV terms are set to zero (i.e., circulating viruses are absent). The difference between the red and blue lines represents the influenza and RSV-attributable cardiorespiratory events. Weeks with the red line above the blue line represent positive attributable hospitalization estimates, weeks with the red line below the blue line represent negative attributable hospitalization estimates.

eFigure 5. Influenza-Attributable Events
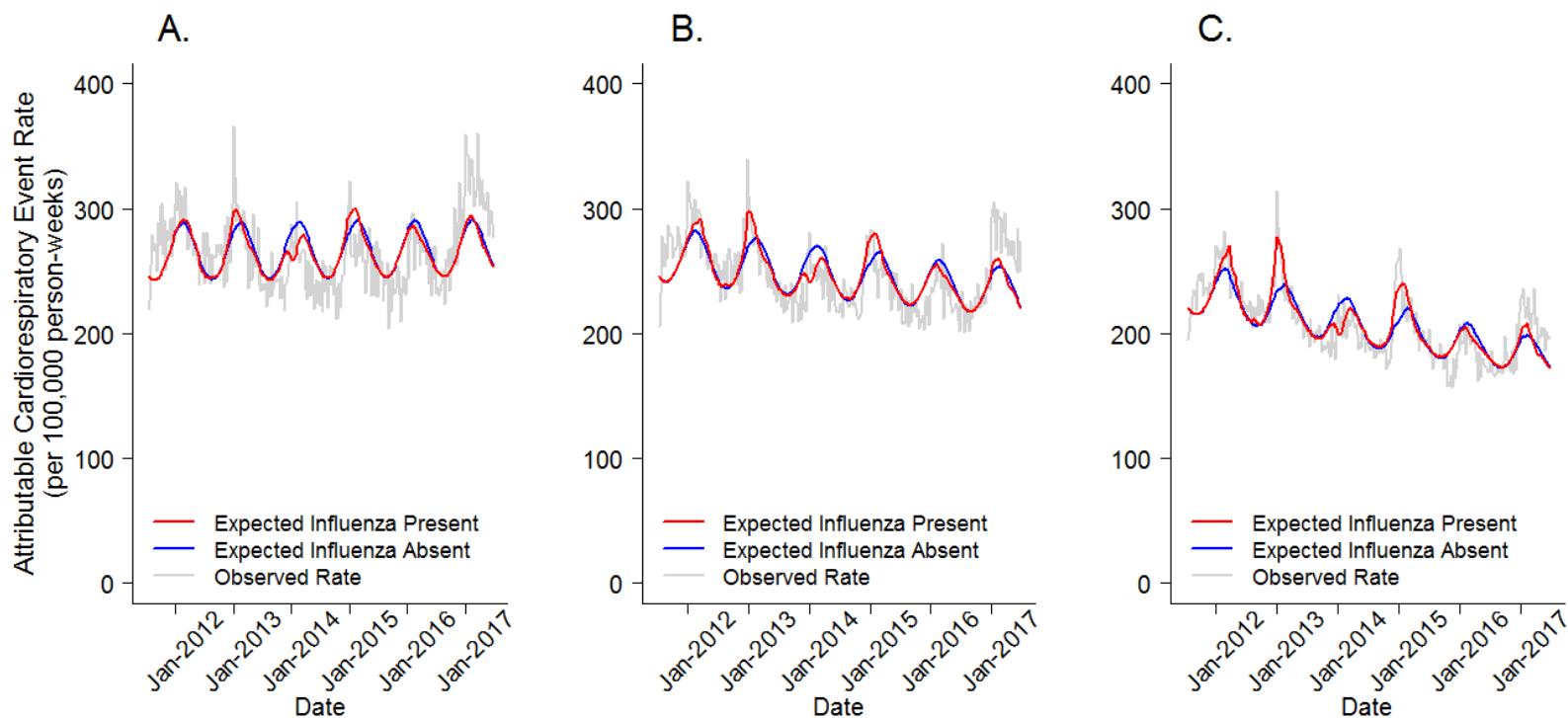
Weekly observed and model-estimated cardiorespiratory hospitalization rates among LTCF residents between 2011-2017. The following age groups are represented across the panels: A, ages 65-74; B, ages 75-84; and C, ages ≥85. The gray line represents the observed cardiorespiratory hospitalizations per 100,000 person-weeks during a given week. The red line represents the expected cardiorespiratory hospitalizations per 100,000 person-weeks when all influenza and RSV are present. The blue line represents the expected cardiorespiratory hospitalization per 100,000 person-weeks when the influenza terms are set to zero (i.e., circulating influenza is absent). The difference between the red and blue lines represents the influenza-attributable cardiorespiratory events. Weeks with the red line above the blue line represent positive attributable hospitalization estimates, weeks with the red line below the blue line represent negative attributable hospitalization estimates.

eFigure 6. RSV-Attributable Events

Weekly observed and model-estimated cardiorespiratory hospitalization rates among LTCF residents between 2011-2017. The following age groups are represented across the panels: A, ages 65-74; B, ages 75-84; and C, ages ≥85. The gray line represents the observed cardiorespiratory hospitalizations per 100,000 person-weeks during a given week. The red line represents the expected cardiorespiratory hospitalizations per 100,000 person-weeks when all influenza and RSV are present. The blue line differs represents the expected cardiorespiratory hospitalization per 100,000 person-weeks when the RSV term is set to zero. The difference between the red and blue lines represents RSV-attributable cardiorespiratory hospitalizations. Weeks with the red line above the blue line represent positive attributable hospitalization estimates, weeks with the red line below the blue line represent negative attributable hospitalization estimates.

eTable 2. Stability Analysis—Influenza and RSV-Attributable Cardiorespiratory Hospitalizations Estimated Using Final Negative Binomial Model

Age	Attributable events,[a] n (95% CI)	Person-years, n	Attributable event rate (per 100,000 person-years), n (95% CI)
65-74	30 (-296-356)	783,660	4 (-38-45)
75-84	1,001 (451-1,552)	1,640,294	61 (28-95)
85+	6,692 (6,044-7,341)	2,655,918	252 (228-276)
Total	7,723 (6,198-9,249)	5,079,872	152 (122-182)

Note- [a]Estimates for each age stratum were rounded to nearest whole number, and so may not precisely add up to the total row. **Abbreviations:** confidence interval, CI.

eTable 3. Average Cost and LOS of Attributable Cardiorespiratory Hospitalizations Estimated Using Final Negative Binomial Model

Age	N attributable	Average cost,[1] mean (SE)	Attributable cost, $ (95% CI)	Average LOS,[1] mean (SE)	Attributable LOS, days (95% CI)
Influenza and RSV					
65-74	741	9,783 (7,655)	7,251,327 (4,062,650-10,440,003)	5.6 (4.9)	4,143 (2,321-5,965)
75-84	2,345	8,571 (6,167)	20,098,795 (15,380,740-24,816,850)	5.4 (4.6)	12,652 (9,682-15,621)
85+	7,852	8,113 (5,150)	63,705,272 (58,441,926-68,968,617)	5.1 (4.1)	39,894 (36,598-43,191)
Total	10,939	8,738 (6,274)	91,055,393 (77,885,316-104,225,470)	5.3 (4.6)	56,689 (48,601-64,776)
Influenza Only					
65-74	453	9,783 (7,655)	4,431,938 (1,945,479-6,918,397)	5.6 (4.9)	2,532 (1,112-3,953)
75-84	1,825	8,571 (6,167)	15,645,472 (11,958,346-19,332,598)	5.4 (4.6)	9,848 (7,527-12,169)
85+	4,604	8,113 (5,150)	37,353,161 (33,177,550-41,528,772)	5.1 (4.1)	23,392 (20,777-26,007)
Total	6,883	8,738 (6,274)	57,430,571 (47,081,375-67,779,766)	5.3 (4.6)	35,772 (29,416-42,129)
RSV Only					
65-74	500	9,783 (7,655)	4,896,187 (1,872,117-7,920,257)	5.6 (4.9)	2,797 (1,070-4,525)
75-84	871	8,571 (6,167)	7,467,596 (2,959,214-11,975,978)	5.4 (4.6)	4,701 (1,863-7,539)
85+	4,824	8,113 (5,150)	39,139,322 (34,068,639-44,210,006)	5.1 (4.1)	24,510 (21,335-27,686)
Total	6,196	8,738 (6,274)	51,503,105 (38,899,971-64,106,240)	5.3 (4.6)	32,008 (24,267-39,749)

Note- [1]Average cost and LOS calculated using the middle 99% of the distribution for cost and LOS of cardiorespiratory hospitalizations for each age stratum. Cost estimates represent 2017 inflation-adjusted costs. **Abbreviations:** confidence interval, CI; standard error, SE; length of stay, LOS.

eTable 4. Stability Analysis—Average Cost and Length of Stay for Influenza and RSV-Attributable Cardiorespiratory Hospitalizations

Age	Attributable events, n (95% CI)	Average cost[1], mean (SE)	Attributable cost, $ (95% CI)	Average LOS[1], mean (SE)	Attributable LOS, days (95% CI)
65-74	30 (-296-356)	9,783 (7,655)	293,490 (-2,895,768-3,482,748)	5.6 (4.9)	168 (-1,658-2,044)
75-84	1,001 (451-1,552)	8,571 (6,167)	8,579,571 (3,865,521-13,302,192	5.4 (4.6)	5,405 (2,435-8,381)
85+	6,692 (6,044-7,341)	8,113 (5,150)	54,292,196 (49,034,972-59,557,533)	5.1 (4.1)	34,129 (30,824-37,439)
Total	7,723 (6,198-9,249)	8,738 (6,274)	63,165,257 (50,004,725-76,342,473)	5.3 (4.6)	39,703 (31,602-47,864)

Note- [1]Average cost and LOS calculated using the middle 99% of the distribution for cost and LOS of cardiorespiratory hospitalizations for each age stratum. Cost estimates represent 2017 inflation-adjusted costs. **Abbreviations:** confidence interval, CI; length of stay, LOS.