Technical Report: Respiratory Syncytial Virus (RSV)

Truveta Research

January 13, 2023

Intended Audience: This technical report is intended for scientific audiences.

About this report

This report contains current hospitalization trends associated with respiratory syncytial virus (RSV). We used a subset of Truveta data to identify laboratory-confirmed RSV infections in children and adults. Truveta was formed and governed by US health systems with a shared vision of saving lives with data. Truveta's 25 members provide 16% of patient care in the United States in more than 20,000 clinics and 700 hospitals. Updated data are provided daily to Truveta. The subset of Truveta data used in this study was provided on January 12, 2023 and included de-identified patient care data primary located across ten states (Iowa, Washington, California, North Carolina, Michigan, Alaska, Texas, Missouri, Oregon, and Illinois).

The figures below are intended to describe trends and comparisons of RSV-associated hospitalizations in different demographic groups and across seasons. For the purposes of this report, seasons are defined as the period from October through September of the following year. Given the unadjusted nature of the data, the rates do not account for undertesting and other variability that exists across patient groups, providers, and systems. For further limitations, see the section below.

Importance of this report

RSV is a leading cause of lower respiratory disease in infants, children, and older adults (Pastula et al., 2017; Shi et al., 2017). RSV can lead to hospitalization and death. Estimates indicate that RSV is associated with over 75,000 pediatric hospitalizations annually in the US (McLaughlin et al., 2022); however, representative and timely data to proactively monitor infections are scarce.

It is important for public health experts and clinical providers to understand the trends in RSV infection to inform decisions about public health, clinical care, and public policy. Connecting population- level trends with granular clinical information available in Truveta can be very useful to more deeply understand which cohorts are most impacted.

This report is intended to supplement the RSV surveillance data provided by the CDC (Centers for Disease Control and Prevention, 2022a). This report includes additional information about geographic regions and clinical detail that is not captured in other reports.

Data

RSV case definition

A case is defined by laboratory-confirmed RSV in a person who:

- 1. Was hospitalized in a Truveta-associated health system AND
- 2. Tested positive for RSV 14 days before or after the start of the hospitalization

For the purposes of this report RSV test positivity is defined as a positive value for any LOINC code listed in Table S1.

Data acquisition

Our study included hospitalized patients who tested positive for RSV within 14 days before or during the hospitalization from October 01, 2018 to December 31, 2022 in Truveta data.

RSV-associated hospitalizations have been grouped such that every hospitalization within 90 days of an RSV-associated hospitalization is considered to be the same infection and thus only counted once.

Analysis

Our study population consists of 11,102 RSV-associated hospitalizations. No patient had more than one hospitalization. To align with seasonality in RSV transmission, time periods include October 1st through September 30th of the following year. The demographics of patients are as follows:

2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	Overall
(N=2,589)	(N=2,671)	(N=986)	(N=1,916)	(N=2,940)	(N=11,102)
	-	-	-	-	_
606	556	354	461	715	2,692
(23.4%)	(20.8%)	(35.9%)	(24.1%)	(24.3%)	(24.2%)
197	237	125	159	257	975
(7.6%)	(8.9%)	(12.7%)	(8.3%)	(8.7%)	(8.8%)
192	204	132	186	289	1,003
(7.4%)	(7.6%)	(13.4%)	(9.7%)	(9.8%)	(9.0%)
195	153	78	151	330	907
(7.5%)	(5.7%)	(7.9%)	(7.9%)	(11.2%)	(8.2%)
43	48	14	49	118	272
(1.7%)	(1.8%)	(1.4%)	(2.6%)	(4.0%)	(2.5%)
125	135	56	169	199	684
(4.8%)	(5.1%)	(5.7%)	(8.8%)	(6.8%)	(6.2%)
282	292	74	196	246	1,090
(10.9%)	(10.9%)	(7.5%)	(10.2%)	(8.4%)	(9.8%)
949	1,046	153	545	786	3,479
(36.7%)	(39.2%)	(15.5%)	(28.4%)	(26.7%)	(31.3%)
1,330	1,410	501	938	1,486	5,665
(51.4%)	(52.8%)	(50.8%)	(49.0%)	(50.5%)	(51.0%)
1,225	1,234	480	962	1,434	5,335
(47.3%)	(46.2%)	(48.7%)	(50.2%)	(48.8%)	(48.1%)
34	27	5	16	20	102
(1.3%)	(1.0%)	(0.5%)	(0.8%)	(0.7%)	(0.9%)
1,835	1,817	635	1,285	1,822	7,394
(70.9%)	(68.0%)	(64.4%)	(67.1%)	(62.0%)	(66.6%)
239	268	134	143	236	1,020
(9.2%)	(10.0%)	(13.6%)	(7.5%)	(8.0%)	(9.2%)
71	71	15	49	99	305
(2.7%)	(2.7%)	(1.5%)	(2.6%)	(3.4%)	(2.7%)
28	30	8	26	24	116
(1.1%)	(1.1%)	(0.8%)	(1.4%)	(0.8%)	(1.0%)
. 22	20	7	24	50	123
(0.8%)	(0.7%)	(0.7%)	(1.3%)	(1.7%)	(1.1%)
	(N=2,589) 606 (23,4%) 197 (7.6%) 192 (7.4%) 195 (7.5%) 43 (1.7%) 125 (4.8%) 282 (10.9%) 282 (10.9%) 282 (10.9%) 1,225 (47.3%) 1,225 (47.3%) 1,225 (47.3%) 1,225 (47.3%) 1,225 (47.3%) 1,225 (47.3%) 1,225 (47.3%) 34 (1.3%) 1,835 (70.9%) 239 (9.2%) 71 (2.7%) 28 (1.1%) 28 (1.1%) 22	(N=2,589) (N=2,671) 606 556 (23.4%) 237 197 237 (7.6%) 204 (7.4%) 204 (7.4%) 153 (7.5%) 153 (7.5%) 153 (1.7%) 153 (1.7%) 135 (1.8%) 125 (1.8%) 151 282 292 (10.9%) 1046 (36.7%) 1,046 (36.7%) 1,241 (1.330) 1,410 (52.8%) 1,225 1,225 1,234 (47.3%) 246.2%) 34 27 (1.0%) 1,817 (68.0%) 239 239 268 (10.0%) 71 (2.7%) 71 (2.7%) 21 28 30 (1.1%) 21 22 20	(N=2,589) (N=2,671) (N=986) 606 556 354 (23,4%) (20,8%) (35,9%) 197 237 (12,7%) 192 204 132 (7,6%) (8,9%) (13,4%) 195 153 78 (7,5%) (5,7%) (7,9%) 43 48 14 (1,7%) (1,8%) (1,4%) 125 135 56 (4.8%) (1,09%) (7,5%) 282 292 74 (10,9%) (10,9%) (153) (36,7%) (39,2%) (155,9%) 1,330 1,410 501 (51,4%) (52,8%) (50,8%) 1,225 1,234 480 (47,3%) (46,2%) (48,7%) 34 27 5 (1,3%) (1,0%) (0,5%) 1,835 1,817 635 (70,9%) (1,0%) (13,6%) <t< td=""><td>$(N=2,589) (N=2,671) (N=986) (N=1,916)$ $(N=2,589) (N=2,671) (N=986) (N=1,916)$ $(12,34\%) (20.8\%) (22.8\%) (24.1\%)$ $197 237 125 159 \\ (7.6\%) (8.9\%) (12.7\%) (8.3\%)$ $192 204 132 186 \\ (7.4\%) (7.6\%) (13.4\%) (9.7\%)$ $195 153 78 151 \\ (7.5\%) (5.7\%) (7.9\%) (7.9\%)$ $195 153 56 169 \\ (4.8\%) (1.8\%) (1.4\%) (2.6\%)$ $125 135 56 169 \\ (4.8\%) (5.1\%) (5.7\%) (10.2\%)$ $282 292 74 196 \\ (10.9\%) (10.9\%) (7.5\%) (10.2\%)$ $282 292 74 196 \\ (10.9\%) (10.9\%) (7.5\%) (10.2\%)$ $1,330 1,410 501 938 \\ (51.4\%) (52.8\%) (50.8\%) (49.0\%)$ $1,225 1,234 480 962 \\ (47.3\%) (46.2\%) (50.8\%) (49.0\%)$ $1,225 1,234 480 962 \\ (47.3\%) (1.0\%) (0.5\%) (0.8\%)$ $1,835 1,817 635 (28.4\%)$ $1,835 1,817 635 (28.4\%)$ $1,835 1,817 635 (28.4\%)$ $1,835 1,817 635 (28.5\%)$ $71 71 71 15 49 \\ (2.7\%) (2.7\%) (1.5\%) (2.6\%)$ $28 30 8 26 \\ (1.1\%) (1.1\%) (0.8\%) (1.4\%)$</td><td>(N=2,589)$(N=2,671)$$(N=986)$$(N=1,916)$$(N=2,940)$$606$ $(23,4%)$$556$ $(20.8%)$$35.9%$ $(24.1%)$$24.1%$ $(24.1%)$$(24.3%)$ $(24.3%)$$197$ $(7.6%)$$237$ $(8.9%)$$125$ $(12.7%)$$159$ $(8.3%)$$257$ $(8.7%)$$197$ $(7.6%)$$(23,9%)$ $(13.4%)$$(24,1%)$ $(9.7%)$$(24.3%)$ $(8.7%)$$192$ $(7.4%)$$204$ $(7.6%)$$132$ $(13.4%)$$186$ $(9.7%)$$195$ $(15.7%)$$153$ $(5.7%)$$78$ $(7.9%)$$151$ $(2.6%)$$43$ $(1.8%)$$48$ $(1.4%)$$14$ $(2.6%)$$112$ $(4.0%)$$125$ $(13.9%)$$135$ $(5.1%)$$56$ $(5.7%)$$169$ $(10.2%)$$282$ $(10.9%)$$292$ $(10.9%)$$74$ $(15.5%)$$199$ $(28.4%)$$1,330$ $(5.1%)$$1,410$ $(52.8%)$$501$ $(50.5%)$$938$ $(28.4%)$$1,330$ $(1.3%)$$1,410$ $(52.8%)$$501$ $(50.5%)$$938$ $(28.4%)$$1,225$ $(1.3%)$$1,234$ $(46.2%)$$480$ $(50.5%)$$962$ $(1.3%)$$1,335$ $(1.3%)$$1,817$ $(68.0%)$$635$ $(67.1%)$$1,825$ $(67.1%)$$1,835$ $(1.3%)$$1,817$ $(68.0%)$$635$ $(13.6%)$$1.285$ $(67.1%)$$1,335$ $(1.3%)$$1,817$ $(2.7%)$$635$ $(1.5%)$$1,285$ $(67.1%)$$1,335$ $(1.3%)$$1,817$ $(2.7%)$$635$ $(1.5%)$$1,285$ $(67.1%)$$1,335$ $(1.3%)$$1,$</td></t<>	$(N=2,589) (N=2,671) (N=986) (N=1,916)$ $(N=2,589) (N=2,671) (N=986) (N=1,916)$ $(12,34\%) (20.8\%) (22.8\%) (24.1\%)$ $197 237 125 159 \\ (7.6\%) (8.9\%) (12.7\%) (8.3\%)$ $192 204 132 186 \\ (7.4\%) (7.6\%) (13.4\%) (9.7\%)$ $195 153 78 151 \\ (7.5\%) (5.7\%) (7.9\%) (7.9\%)$ $195 153 56 169 \\ (4.8\%) (1.8\%) (1.4\%) (2.6\%)$ $125 135 56 169 \\ (4.8\%) (5.1\%) (5.7\%) (10.2\%)$ $282 292 74 196 \\ (10.9\%) (10.9\%) (7.5\%) (10.2\%)$ $282 292 74 196 \\ (10.9\%) (10.9\%) (7.5\%) (10.2\%)$ $1,330 1,410 501 938 \\ (51.4\%) (52.8\%) (50.8\%) (49.0\%)$ $1,225 1,234 480 962 \\ (47.3\%) (46.2\%) (50.8\%) (49.0\%)$ $1,225 1,234 480 962 \\ (47.3\%) (1.0\%) (0.5\%) (0.8\%)$ $1,835 1,817 635 (28.4\%)$ $1,835 1,817 635 (28.4\%)$ $1,835 1,817 635 (28.4\%)$ $1,835 1,817 635 (28.5\%)$ $71 71 71 15 49 \\ (2.7\%) (2.7\%) (1.5\%) (2.6\%)$ $28 30 8 26 \\ (1.1\%) (1.1\%) (0.8\%) (1.4\%)$	(N=2,589) $(N=2,671)$ $(N=986)$ $(N=1,916)$ $(N=2,940)$ 606 $(23,4%)$ 556 $(20.8%)$ $35.9%$ $(24.1%)$ $24.1%$ $(24.1%)$ $(24.3%)$ $(24.3%)$ 197 $(7.6%)$ 237 $(8.9%)$ 125 $(12.7%)$ 159 $(8.3%)$ 257 $(8.7%)$ 197 $(7.6%)$ $(23,9%)$ $(13.4%)$ $(24,1%)$ $(9.7%)$ $(24.3%)$ $(8.7%)$ 192 $(7.4%)$ 204 $(7.6%)$ 132 $(13.4%)$ 186 $(9.7%)$ 195 $(15.7%)$ 153 $(5.7%)$ 78 $(7.9%)$ 151 $(2.6%)$ 43 $(1.8%)$ 48 $(1.4%)$ 14 $(2.6%)$ 112 $(4.0%)$ 125 $(13.9%)$ 135 $(5.1%)$ 56 $(5.7%)$ 169 $(10.2%)$ 282 $(10.9%)$ 292 $(10.9%)$ 74 $(15.5%)$ 199 $(28.4%)$ $1,330$ $(5.1%)$ $1,410$ $(52.8%)$ 501 $(50.5%)$ 938 $(28.4%)$ $1,330$ $(1.3%)$ $1,410$ $(52.8%)$ 501 $(50.5%)$ 938 $(28.4%)$ $1,225$ $(1.3%)$ $1,234$ $(46.2%)$ 480 $(50.5%)$ 962 $(1.3%)$ $1,335$ $(1.3%)$ $1,817$ $(68.0%)$ 635 $(67.1%)$ $1,825$ $(67.1%)$ $1,835$ $(1.3%)$ $1,817$ $(68.0%)$ 635 $(13.6%)$ 1.285 $(67.1%)$ $1,335$ $(1.3%)$ $1,817$ $(2.7%)$ 635 $(1.5%)$ $1,285$ $(67.1%)$ $1,335$ $(1.3%)$ $1,817$ $(2.7%)$ 635 $(1.5%)$ $1,285$ $(67.1%)$ $1,335$ $(1.3%)$ $1,$

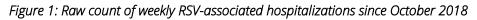
Table 1: Demographics

	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	Overall
	(N=2,589)	(N=2,671)	(N=986)	(N=1,916)	(N=2,940)	(N=11,102)
Other Race	219	252	81	185	298	1,035
	(8.5%)	(9.4%)	(8.2%)	(9.7%)	(10.1%)	(9.3%)
Unknown	175	213	106	204	411	1,109
	(6.8%)	(8.0%)	(10.8%)	(10.6%)	(14.0%)	(10.0%)
Ethnicity						
Hispanic or Latino	254	269	102	246	413	1,284
	(9.8%)	(10.1%)	(10.3%)	(12.8%)	(14.0%)	(11.6%)
Not Hispanic or Latino	1,692	1,690	700	1,307	1,921	7,310
	(65.4%)	(63.3%)	(71.0%)	(68.2%)	(65.3%)	(65.8%)
Unknown	643	712	184	363	606	2,508
	(24.8%)	(26.7%)	(18.7%)	(18.9%)	(20.6%)	(22.6%)

In our population, 5,665 (51.0%) are female, while 5,335 (48.1%) are male. Since October 01, 2018, patients less than five years old makeup the largest age group in RSV-associated hospitalizations (5,577 (50.2%)). The second largest age group with RSV-associated hospitalizations are patients in the 65+ age group (3,479 (31.3%)). When only looking at the current RSV season (2022/2023), 1,591 (54.1%) are less than five years old, and 786 (26.7%) are 65+.

Time series analysis

Figure 1 illustrates the count of RSV-associated hospitalizations in a given week.

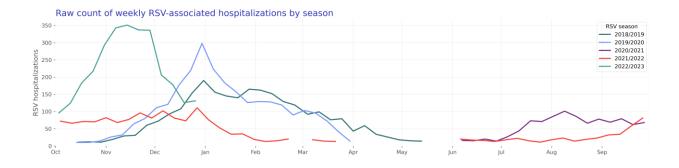




Season over season

Figure 2 overlays RSV seasons, starting in October 01, 2018.

Figure 2: Raw count of weekly RSV-associated hospitalizations by season



Infants and children (age 0-4)

Estimates of the hospitalization rate of infants and children (defined as individuals less than five years of age) with RSV are higher than other age groups (Centers for Disease Control and Prevention, 2022b). In Table 2, we report counts for demographic factors of this high-risk population. In the future, we plan to include high-risk comorbid states, such as congenital heart disease, chronic lung disease, preterm birth, asthma, and cystic fibrosis (Committee on Infectious Diseases and Bronchiolitis Guidelines Committee et al., 2014).

	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	Overall
	(N=1,190)	(N=1,150)	(N=689)	(N=957)	(N=1,591)	(N=5,577)
Age Group		-	-	-		
0 - <6 months	606	556	354	461	715	2,692
	(50.9%)	(48.3%)	(51.4%)	(48.2%)	(44.9%)	(48.3%)
6 - <12 months	197	237	125	159	257	975
	(16.6%)	(20.6%)	(18.1%)	(16.6%)	(16.2%)	(17.5%)
1 - <2 years	192	204	132	186	289	1,003
	(16.1%)	(17.7%)	(19.2%)	(19.4%)	(18.2%)	(18.0%)
2 - 4 years	195 (16.4%)	153 (13.3%)	78 (11.3%)	151 (15.8%)	330 (20.7%)	907 (16.3%)
Sex						
Female	533	525	315	403	706	2,482
	(44.8%)	(45.7%)	(45.7%)	(42.1%)	(44.4%)	(44.5%)
Male	647	616	374	548	880	3,065
	(54.4%)	(53.6%)	(54.3%)	(57.3%)	(55.3%)	(55.0%)
Unknown	10	9	0	6	5	30
	(0.8%)	(0.8%)	(0%)	(0.6%)	(0.3%)	(0.5%)

Race

	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	Overall
	(N=1,190)	(N=1,150)	(N=689)	(N=957)	(N=1,591)	(N=5,577)
White	710 (59.7%)	627 (54.5%)	424 (61.5%)	- 566 (59.1%)	869 (54.6%)	3,196 (57.3%)
Black or African American	127	140	90	79	115	551
	(10.7%)	(12.2%)	(13.1%)	(8.3%)	(7.2%)	(9.9%)
Asian	43	37	7	18	47	152
	(3.6%)	(3.2%)	(1.0%)	(1.9%)	(3.0%)	(2.7%)
American Indian or Alaska Native	15	19	5	13	15	67
	(1.3%)	(1.7%)	(0.7%)	(1.4%)	(0.9%)	(1.2%)
Native Hawaiian or Other Pacific	18	13	6	15	34	86
Islander	(1.5%)	(1.1%)	(0.9%)	(1.6%)	(2.1%)	(1.5%)
Other Race	167	171	68	113	193	712
	(14.0%)	(14.9%)	(9.9%)	(11.8%)	(12.1%)	(12.8%)
Unknown	110	143	89	153	318	813
	(9.2%)	(12.4%)	(12.9%)	(16.0%)	(20.0%)	(14.6%)
Ethnicity						
Hispanic or Latino	210	208	87	146	283	934
	(17.6%)	(18.1%)	(12.6%)	(15.3%)	(17.8%)	(16.7%)
Not Hispanic or Latino	739	695	484	637	936	3,491
	(62.1%)	(60.4%)	(70.2%)	(66.6%)	(58.8%)	(62.6%)
Unknown	241	247	118	174	372	1,152
	(20.3%)	(21.5%)	(17.1%)	(18.2%)	(23.4%)	(20.7%)

Time series analysis

The count of RSV-associated hospitalization for infants and children under five is shown in Figure 3. Figure 4 shows seasonality trends in the count of infants and children with RSV-associated hospitalizations. A rate of weekly RSV-associated hospitalizations compared to all hospitalizations was also calculated. Patients were included in this calculation on the first day of their hospitalization. If their stay was greater than one day, they were not counted in subsequent dates. Seasonal trends in this rate are shown in Figure 5.

Figure 3: Raw count of weekly RSV-associated hospitalizations since October 2018 for infants and children under five



Figure 4: Raw count of weekly RSV-associated hospitalizations by season for infants and children under five

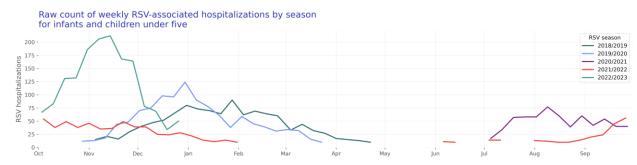
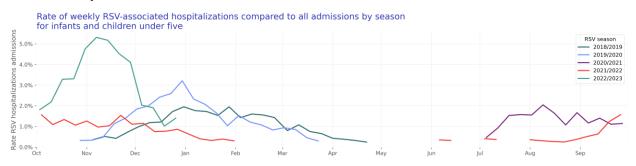


Figure 5: Rate of weekly RSV-associated hospitalizations compared to all admissions by season for infants and children under five



Older adults (age 65 and over)

RSV is also a major source of infection and hospitalizations in older adults (defined here as patients >=65 years of age). Incidence of RSV in older adults has been estimated between 3-10% annually (Boyce et al., 2000).

There are comorbidities that are associated with increased hospitalization risk for older adults, such as congestive heart failure and chronic lung disease (Lee et al., 2013). Further, asthma, COPD, and congestive heart failure can exacerbate RSV infections. Here we report counts for a selection of high-risk medical conditions congestive heart failure, immunocompromised (immunocompromising conditions), chronic lung diseases, chronic obstructive pulmonary disease, and asthma. In the future, we plan to include other high-risk groups.

	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	Overall
	(N=949)	(N=1,046)	(N=153)	(N=545)	(N=786)	(N=3,479)
Age Group	-	-	-	-	-	
65 - 74 years	347	362	65	211	286	1,271
	(36.6%)	(34.6%)	(42.5%)	(38.7%)	(36.4%)	(36.5%)
75 - 85 years	325	395	55	195	290	1,260
	(34.2%)	(37.8%)	(35.9%)	(35.8%)	(36.9%)	(36.2%)
85+ years	277	289	33	139	210	948
	(29.2%)	(27.6%)	(21.6%)	(25.5%)	(26.7%)	(27.2%)
Sex						
Female	562	626	97	318	452	2,055
	(59.2%)	(59.8%)	(63.4%)	(58.3%)	(57.5%)	(59.1%)
Male	376	408	55	223	326	1,388
	(39.6%)	(39.0%)	(35.9%)	(40.9%)	(41.5%)	(39.9%)
Unknown	11	12	1	4	8	36
	(1.2%)	(1.1%)	(0.7%)	(0.7%)	(1.0%)	(1.0%)
Race						
White	805	860	131	437	615	2,848
	(84.8%)	(82.2%)	(85.6%)	(80.2%)	(78.2%)	(81.9%)
Black or African American	55	57	9	21	44	186
	(5.8%)	(5.4%)	(5.9%)	(3.9%)	(5.6%)	(5.3%)
Asian	20	25	3	20	26	94
	(2.1%)	(2.4%)	(2.0%)	(3.7%)	(3.3%)	(2.7%)
	4	2	0	5	2	13
American Indian or Alaska Native	(0.4%)	(0.2%)	(0%)	(0.9%)	(0.3%)	(0.4%)
Native Hawaiian or Other Pacific	2	4	0	2	4	12
slander	(0.2%)	(0.4%)	(0%)	(0.4%)	(0.5%)	(0.3%)
Other Race	31	52	3	34	53	173
	(3.3%)	(5.0%)	(2.0%)	(6.2%)	(6.7%)	(5.0%)
	32	46	7	26	42	153
Unknown	(3.4%)	(4.4%)	(4.6%)	(4.8%)	(5.3%)	(4.4%)
Ethnicity						
Hispanic or Latino	23	22	6	34	46	131
	(2.4%)	(2.1%)	(3.9%)	(6.2%)	(5.9%)	(3.8%)
Not Hispanic or Latino	627	652	111	380	607	2,377
	(66.1%)	(62.3%)	(72.5%)	(69.7%)	(77.2%)	(68.3%)
Unknown	299	372	36	131	133	971
	(31.5%)	(35.6%)	(23.5%)	(24.0%)	(16.9%)	(27.9%)
Congestive Heart Failure	266	322	29	153	247	1,017
	(28.0%)	(30.8%)	(19.0%)	(28.1%)	(31.4%)	(29.2%)

Table 3: Table 1 for Older Adults (65 years of age and older)

	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	Overall
	(N=949)	(N=1,046)	(N=153)	(N=545)	(N=786)	(N=3,479)
Immunocompromised		90 (8.6%)	13 (8.5%)	50 (9.2%)	85 (10.8%)	327 (9.4%)
Chronic Lung Disease	169	177	24	87	127	584
	(17.8%)	(16.9%)	(15.7%)	(16.0%)	(16.2%)	(16.8%)
Obstructive Pulmonary Disease	363	372	59	195	290	1,279
	(38.3%)	(35.6%)	(38.6%)	(35.8%)	(36.9%)	(36.8%)
Asthma	159	166	18	100	149	592
	(16.8%)	(15.9%)	(11.8%)	(18.3%)	(19.0%)	(17.0%)

Time series analysis

The count of RSV-associated hospitalization for adults 65 and over is shown in Figure 6. Figure 7 shows seasonality trends for the population of adults 65 and older. Similar to the analysis completed for infants and children, a rate of weekly RSV-associated hospitalizations compared to all hospitalizations was also calculated. Patients were only included once, independent of their length of stay. Seasonal trends in this rate are shown in Figure 8.

Figure 6: Raw count of weekly RSV-associated hospitalizations since October 2018 for adults 65 years or older



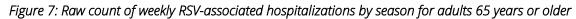
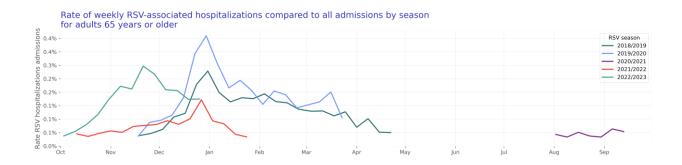




Figure 8: Rate of weekly RSV-associated hospitalizations compared to all admissions by season for adults 65 years or older



Trends in surveillance

Data from November and December 2022 indicate that overall counts of RSVassociated hospitalizations peaked at a higher level and earlier in this season than during the 2019/2020 season. The 2019/2020 season was chosen as a comparison as the season occurred before the COVID-19 pandemic. RSV-associated hospitalization counts remained low throughout the beginning of the COVID pandemic both for the overall population and for the specific age groups investigated.

The most recent complete data suggest RSV-associated hospitalization counts have decreased substantially since they peaked in November 2022. This trend is seen in both age groups of interest. Infants and children made up a larger proportion of the overall population with RSV-associated hospitalized this RSV season (2022/2023) compared to pre-COVID era trends (2019/2020), and this difference is most pronounced in the 2–4-year-old age group. Older adults made up a smaller proportion of the RSV-associated hospitalized population this season when compared to prior seasons.

Limitations

- All data are preliminary and may change as additional data are obtained. These findings are consistent with data pulled January 12, 2023.
- These are raw counts and post-stratification methods have not been conducted. Therefore, data may not be representative of the U.S. population.
- Patients hospitalized with RSV who were not tested for RSV or were tested later in their medical care (when laboratory tests results would have returned a negative result) would be missed in this analysis.
- The unknowns in this report either indicate the value was not included in the individual's electronic health record or that it was excluded from the data to protect an individual's identity as a part of Truveta's commitment to privacy (Truveta, 2022).

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References

Boyce, T. G., Mellen, B. G., Mitchel, E. F., Wright, P. F., & Griffin, M. R. (2000). Rates of hospitalization for respiratory syncytial virus infection among children in Medicaid. The Journal of Pediatrics, 137(6), 865–870. *https://doi.org/10.1067/mpd.2000.110531*

Centers for Disease Control and Prevention. (2022a, October 25). RSV-NET Interactive Dashboard Print. *https://www.cdc.gov/rsv/research/rsv-net/dashboard.html*

Centers for Disease Control and Prevention. (2022b, October 28). RSV in Infants and Young Children. *https://www.cdc.gov/rsv/high-risk/infants-young-children.html*

Committee on Infectious Diseases and Bronchiolitis Guidelines Committee, Brady, M. T., Byington, C. L., Davies, H. D., Edwards, K. M., Jackson, M. A., Maldonado, Y. A., Murray, D. L., Orenstein, W. A., Rathore, M. H., Sawyer, M. H., Schutze, G. E., Willoughby, R. E., Zaoutis, T. E., Ralston, S. L., Lieberthal, A. S., Meissner, H. C., Alverson, B. K., Baley, J. E., ... Hernández-Cancio, S. (2014). Updated Guidance for Palivizumab Prophylaxis Among Infants and Young Children at Increased Risk of Hospitalization for Respiratory Syncytial Virus Infection. Pediatrics, 134(2), e620–e638. https://doi.org/10.1542/peds.2014-1666

Lee, N., Lui, G. C. Y., Wong, K. T., Li, T. C. M., Tse, E. C. M., Chan, J. Y. C., Yu, J., Wong, S. S. M., Choi, K. W., Wong, R. Y. K., Ngai, K. L. K., Hui, D. S. C., & Chan, P. K. S. (2013). High Morbidity and Mortality in Adults Hospitalized for Respiratory Syncytial Virus Infections. Clinical Infectious Diseases, 57(8), 1069–1077. *https://doi.org/10.1093/cid/cit471*

McLaughlin, J. M., Khan, F., Schmitt, H.-J., Agosti, Y., Jodar, L., Simões, E. A. F., & Swerdlow, D. L. (2022). Respiratory Syncytial Virus–Associated Hospitalization Rates among US Infants: A Systematic Review and Meta-Analysis. The Journal of Infectious Diseases, 225(6), 1100–1111. *https://doi.org/10.1093/infdis/jiaa752*

Pastula, S. T., Hackett, J., Coalson, J., Jiang, X., Villafana, T., Ambrose, C., & Fryzek, J. (2017). Hospitalizations for Respiratory Syncytial Virus Among Adults in the United States, 1997–2012. Open Forum Infectious Diseases, 4(1), ofw270. https://doi.org/10.1093/ofid/ofw270

Shi, T., McAllister, D. A., O'Brien, K. L., Simoes, E. A. F., Madhi, S. A., Gessner, B. D., Polack, F. P., Balsells, E., Acacio, S., Aguayo, C., Alassani, I., Ali, A., Antonio, M., Awasthi, S., Awori, J. O., Azziz-Baumgartner, E., Baggett, H. C., Baillie, V. L., Balmaseda, A., ... Nair, H. (2017). Global, regional, and national disease burden estimates of acute lower respiratory infections due to respiratory syncytial virus in young children in 2015: A systematic review and modelling study. The Lancet, 390(10098), 946–958. https://doi.org/10.1016/S0140-6736(17)30938-8

Truveta. (2022). Truveta's Approach to Patient Privacy. *https://resources.truveta.com/patient-privacy*

Supplementary material

Table S1: LOINC codes for RSV lab test

Code System	Concept Code	Concept Name
LOINC	5874-3	Respiratory syncytial virus Ag [Presence] in Throat by Immunoassay
LOINC	5875-0	Respiratory syncytial virus Ag [Presence] in Throat by Immunofluorescence
LOINC	5876-8	Respiratory syncytial virus Ag [Presence] in Specimen by Immunoassay
LOINC	5877-6	Respiratory syncytial virus Ag [Presence] in Specimen by Immunofluorescence
LOINC	30075-6	Respiratory syncytial virus A RNA [Presence] in Specimen by NAA with probe detection
LOINC	30076-4	Respiratory syncytial virus B RNA [Presence] in Specimen by NAA with probe detection
LOINC	31949-1	Respiratory syncytial virus Ag [Presence] in Throat
LOINC	31950-9	Respiratory syncytial virus Ag [Presence] in Specimen
LOINC	32040-8	Respiratory syncytial virus Ag [Presence] in Nose by Immunofluorescence
LOINC	33045-6	Respiratory syncytial virus Ag [Presence] in Nose
LOINC	40988-8	Respiratory syncytial virus RNA [Presence] in Specimen by NAA with probe detection
LOINC	50329-2	Respiratory syncytial virus Ag [Presence] in Tissue by Immune stain
LOINC	60271-4	Respiratory syncytial virus RNA [Presence] in Isolate by NAA with probe detection
LOINC	68966-1	Respiratory syncytial virus Ag [Presence] in Nasopharynx by Immunoassay
LOINC	72885-7	Respiratory syncytial virus Ag [Presence] in Nasopharynx by Rapid immunoassay
LOINC	76088-4	Respiratory syncytial virus RNA [Presence] in Bronchoalveolar lavage by NAA with probe detection
LOINC	76089-2	Respiratory syncytial virus RNA [Presence] in Nasopharynx by NAA with probe detection
LOINC	77022-2	Respiratory syncytial virus A RNA [Presence] in Nasopharynx by NAA with probe detection
LOINC	77023-0	Respiratory syncytial virus B RNA [Presence] in Nasopharynx by NAA with probe detection
LOINC	77389-5	Respiratory syncytial virus Ag [Presence] in Bronchoalveolar lavage by Immunofluorescence
LOINC	77390-3	Respiratory syncytial virus Ag [Presence] in Nasopharynx by Immunofluorescence
LOINC	80597-8	Respiratory syncytial virus A 5' UTR RNA [Presence] in Nasopharynx by NAA with probe detection
LOINC	80598-6	Respiratory syncytial virus B F gene [Presence] in Nasopharynx by NAA with probe detection
LOINC	82176-9	Respiratory syncytial virus RNA [Presence] in Nasopharynx by NAA with non-probe detection
LOINC	85479-4	Respiratory syncytial virus RNA [Presence] in Upper respiratory specimen by NAA with probe detection

Code System	Concept Code	Concept Name
LOINC	88595-4	Respiratory syncytial virus A RNA [Presence] in Lower respiratory specimen by NAA with probe detection
LOINC	88597-0	Respiratory syncytial virus B RNA [Presence] in Lower respiratory specimen by NAA with probe detection
LOINC	88909-7	Respiratory syncytial virus Ag [Presence] in Lower respiratory specimen by Immunofluorescence
LOINC	91133-9	Respiratory syncytial virus RNA [Presence] in Lower respiratory specimen by NAA with probe detection
LOINC	91794-8	Respiratory syncytial virus B RNA [Presence] in Upper respiratory specimen by NAA with probe detection
LOINC	91795-5	Respiratory syncytial virus A RNA [Presence] in Upper respiratory specimen by NAA with probe detection
LOINC	92131-2	Respiratory syncytial virus RNA [Presence] in Respiratory specimen by NAA with probe detection
LOINC	92957-0	Respiratory syncytial virus RNA [Presence] in Lower respiratory specimen by NAA with non- probe detection

Table S1: LOINC Codes for RSV lab test

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