RSV Vaccine Effectiveness Declines After 12 Months in Older Adults

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Key Findings

- Vaccine effectiveness against RSV infection declined from 71% at 4 months post-vaccination to 40% by 19 months post-vaccination.
- RSV positivity during the 2024/2025 season was 3.9% among those never vaccinated, 1.1% among individuals who had the RSV vaccine in the past 6 months, 1.1% among those vaccinated 6 to 12 months prior, and 2.8% among those vaccinated 12 to 18 months prior.
- RSV-related emergency department (ED) visit and hospitalization rates were twice as high for patients vaccinated 12 to 18 months prior, compared to those vaccinated within the year prior. Those who have never received the RSV vaccine had ED visits three times more often than the recently vaccinated groups.

Respiratory syncytial virus (RSV) is a common and potentially severe respiratory pathogen in older adults. We previously found the vaccine to be effective at preventing infections, ED visits, and hospitalizations in the season it was administered.[1] However, limited data are available on longer-term protection, particularly beyond one year after vaccination.

To further understand RSV vaccine effectiveness in older adults, we studied 1,204,649 patients aged 60 and older who had an RSV lab test during the 2024/2025 RSV season. Patients were matched based on the month of their RSV lab test, age, and factors that indicate increased risk of complications from an RSV infection. Patients were grouped based on the time elapsed between RSV vaccination and RSV lab testing.

During the 2024/2025 RSV season, patients vaccinated two weeks to six months prior had a positive RSV infection rate of 1.1%, while those vaccinated more than a year prior had rates more than twice as high and those who have never received the RSV vaccine had rates nearly four times as high. Similar patterns were observed for ED visits and hospitalizations, as seen in Figure 1.

RSV Complication Rates by Time Since Vaccination

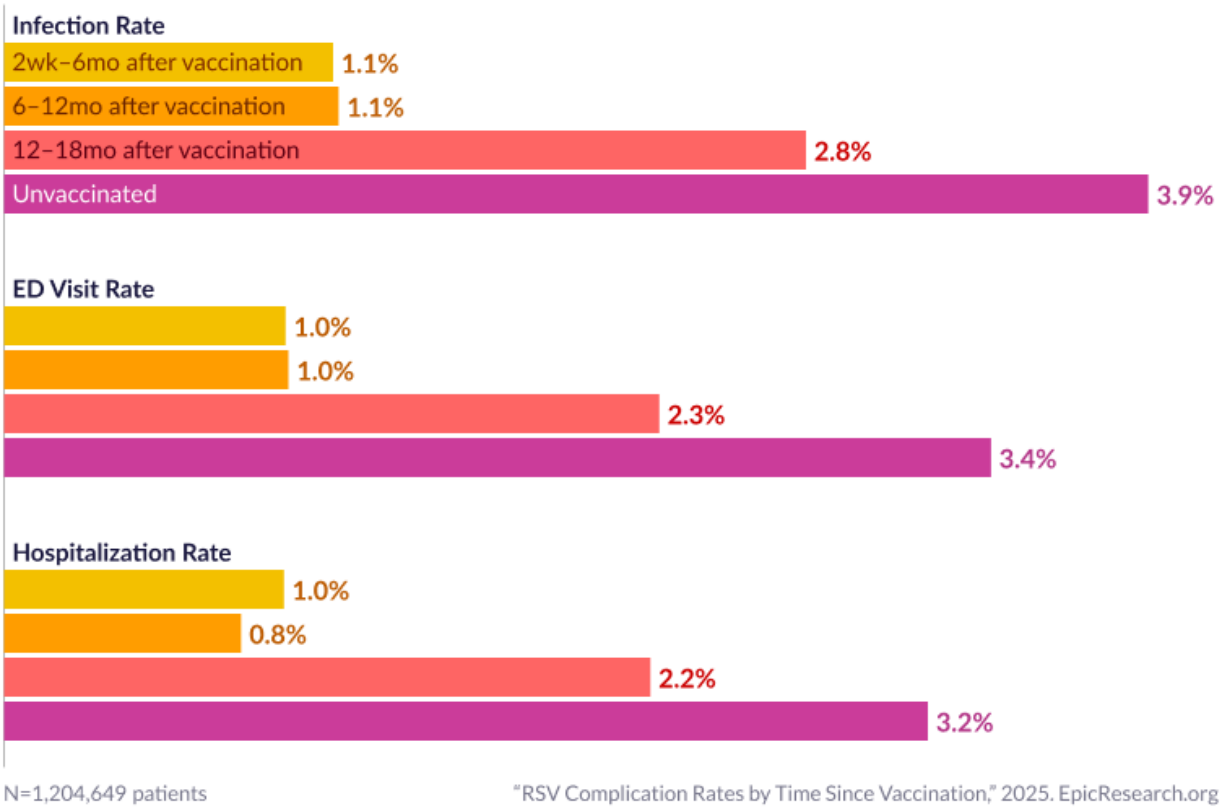

Figure 1. The rate of RSV infections, RSV-related ED visits, and RSV-related hospitalizations in the 2024/2025 RSV season by time since RSV vaccination.

Vaccine effectiveness (VE) declined steadily over time. For RSV infection, VE was 71% at 4 months, decreasing to 40% by month 19. Effectiveness against RSV-related ED visits followed a similar pattern, dropping from 71% in month 4 to 46% by month 19. Hospitalization protection declined from 73% to 44% over the same period.

Vaccine Effectiveness by Time Since Vaccinated

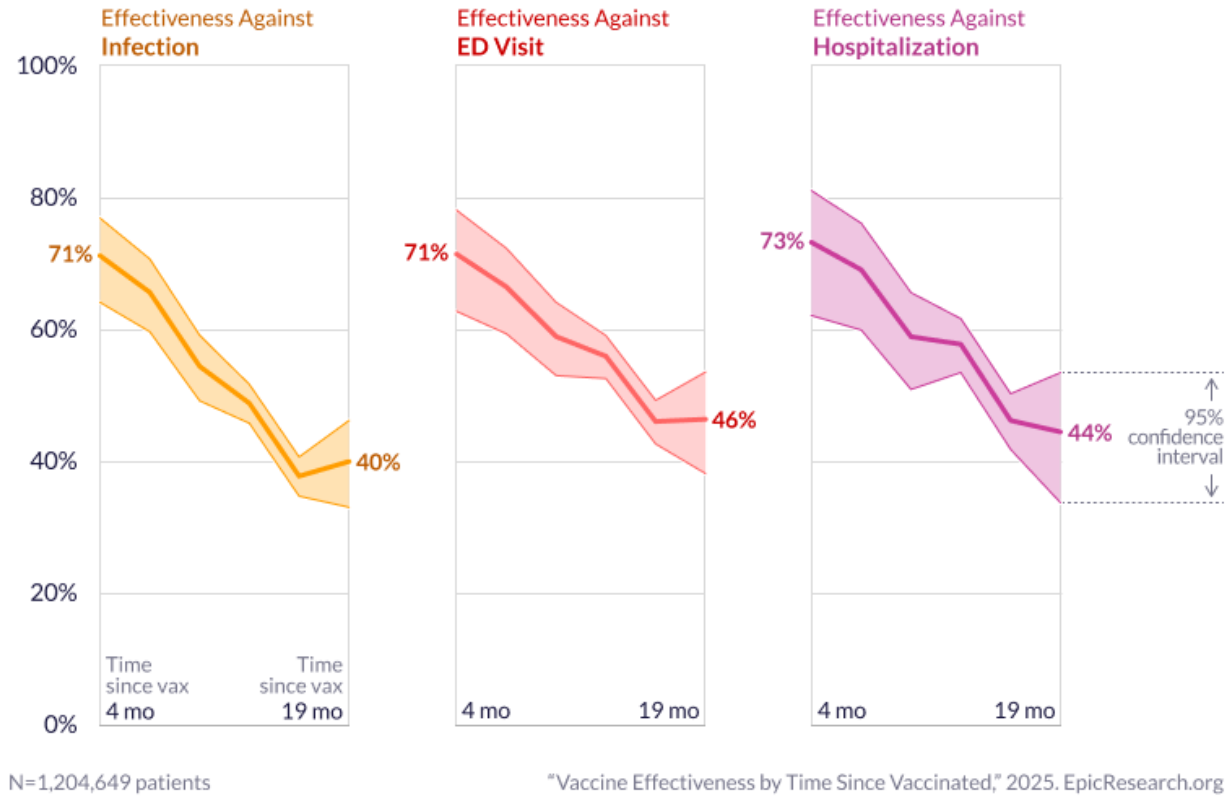

Figure 2. Vaccine effectiveness against RSV infection, RSV-related ED visit, or an RSV-related hospitalization by months since the patient received their RSV vaccine.

These findings suggest that while protection against severe outcomes persists into the next season, it is significantly reduced compared to the initial vaccination season.

These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 300 million patient records from 1,700 hospitals and more than 40,000 clinics from all 50 U.S. states, Lebanon, and Saudi Arabia. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Brian Olson.

References

1. Bartelt K, Deckert J, Gracianette M, Barkley E. RSV Vaccine Can Prevent More Than 70% of RSV Infections, ED Visits, and Admissions Among Older Adults. Epic Research. https://epicresearch.org/articles/rsv-vaccine-can-prevent-more-than-70-of-rsv-infections-ed-visits-and-admissions-among-older-adults. Accessed on June 30, 2025.

Data Definitions

Term	Definition
Study period	10/1/2024 to 4/30/2025
Study population	Inclusion: • Patients aged 60+ o For those aged 60 to 74, they must have an **increased risk** of RSV • Have an **RSV lab** during the study period • Have a vaccine query in the study period Exclusion: • **RSV infection** in two years before **RSV lab** in study period • Patients who received the **RSV vaccine** within two weeks of their **RSV lab** • **RSV vaccination** during the RSV season
Exposures	Patients who never received an **RSV vaccination** prior to **RSV lab** Patients grouped by months since their RSV vaccination prior to their **RSV lab** • 2 weeks to <6 months ago • 6 months to <12 months ago • 12 months to <18 months ago • >18 months ago
RSV vaccine	An immunization with CVX code 303, 304, 305, 306, 307, 314, 315, or 326
Outcomes	RSV infection (positivity) ED visit with **RSV** Hospitalization with **RSV**
RSV lab	A lab with LOINC code 14129-1, 17520-8, 55100-2, 88527-7, 91782-3, 91785-6, 101425-7, 77022-2, 88595-4, 91795-5, 101426-5, 77023-0, 88597-0, 91794-8, 101298-8, 76088-4, 76089-2, 82176-9, 85479-4, 91133-9, 92131-2, 92957-0, 30075-6, 101982-7, 41456-5, 80597-8, 88204-3, 80598-6, 88202-7, 30076-4, 40987-0, 88528-5, 60271-4, 40988-8, 31949-1, 31950-9, 32040-8, 33045-6, 50329-2, 5874-3, 5875-0, 5876-8, 5877-6, 68966-1, 72885-7, 77389-5, 77390-3, or 88909-7 • A result of "Positive," "Detected," or "Present" indicated a positive result • An abnormal flag also was also treated as a positive result unless the result text was "Negative" or "Not detected" • Patients who do not meet any of the above criteria were considered negative If a patient has more than one in the study period, take positive lab if any
Confounders	History of conditions that cause **increased risk** Age: 60-64, 65-69, 70-74, 75-79, 80-84, 85+ **RUCA** score **Social Vulnerability Index** score Census region: MW, NE, S, W Received more than one **RSV vaccine** ever: y/n History of smoking • Look at the most recent result. If it was "never," look back further to see if there's any indication of smoking on any other records. If so, group as "former." Legal sex: male or female **Race and ethnicity**
Increased risk	CAR-T cell therapy: A procedure with CPT code 0540T CVD: ICD-10-CM code I20*-I28* or I30*-I51*

	Chronic liver disease: ICD-10-CM code K70.3*-K70.4*, K71.3*-K71.5*, K71.7*, K72.1, K73*, or K76.1 Chronic lung disease: ICD-10-CM code J41*-J45*, J84*, E84*, J60, J67.8, J69.8, or J82.83 Diabetes: ICD-10-CM code E08*-E13* ESRD: ICD-10-CM code N18.5 or N18.6 Immunocompromised: ICD-10-CM code C81*-C89*, C90*-C96*, Z94.0-Z94.4, Z94.83, D83*, D82.0, D82.1, or B20 **Immunocompromising medications** Muscular dystrophy: ICD-10-CM code G71.0* Sickle cell disease: ICD-10-CM code D57.0*-D57.2* or D57.4*-D57.9* Spinal muscular atrophy: ICD-10-CM code G12* Stroke: ICD-10-CM code I60*-I63* or I65*-I69* Transplant: A transplant episode for a kidney or liver
Immunocompromising medications	A prescription for one of the following medications identified by RxNorm code: melphalan (6718), mesna (44), fludarabine (24698), irinotecan (51499), sorafenib (495881), sulfasalazine (9524), selinexor (2178390), thiotepa (10473), sipuleucel-t (997261), etoposide phos (24614), hydroxychloroquine (5521), idecabtagene vicleucel (2536430), streptozocin (10114), brentuximab vedotin (1147320), fluorouracil (4492), idarubicin (5650), doxorubicin hydrochloride liposome (466523), vedolizumab (1538097), Belimumab (1092437), anakinra (72435), basiliximab (196102), inotuzumab ozogamicin (1942950), mycophenolate mofetil (68149), fingolimod (1012892), clofarabine (44151), pazopanib (714438), vinorelbine (39541), gemtuzumab (1294580), ocrelizumab (1876366), aldesleukin (70223), emapalumab-lzsg (2104603), mitomycin (632), teniposide (10362), busulfan (1828), bexarotene (233272), gemcitabine (12574), benralizumab (1989100), etanercept (214555), pemetrexed (68446), mechlorethamine (6674), topotecan (57308), azathioprine (1256), cytarabine (lipo, 968804), nilotinib (662281), mycophenolate acid (265323), prednisolone (8638), venetoclax (174556), dasatinib (475342), paclitaxel (56946), muromonab-cd3 (42405), procarbazine (8702), gefitinib (328134), tretinoin (10753), interferon alfa-n3 (612937), etoposide (4179), cabazitaxel (996051), dexamethasone (3264), osimertinib (1721560), methotrexate (6851), carboplatin (40048), glatiramer acetate (84375), ixabepilone (337523), canakinumab (853491), interferon beta-1a (75917), defibrotide (1311089), carfilzomib (1302966), arsenic trioxide (18330), bleomycin sulfate (1621), natalizumab (354770), decitabine (15657), pralatrexate (662019), certolizumab pegol (709271), tisagenlecleucel (1986438), thioguanine (10485), mercaptopurine (103), uracil mustard (10996), dexrazoxane (42736), rilonacept (763450), eribulin mesylate (1045452), bevacizumab (253337), sunitinib (357977), mitoxantrone (7005), azacytidine (1251), ofatumumab (712566), mitotane (7004), lapatinib (480167), pimecrolimus (321952), obinutuzumab (974779), vincristine sulfate (11203), oxaliplatin (32592), cladribine (44157), budesonide (19831), carmustine (2105), tacrolimus (42316), everolimus (141704), mesalamine (52582), temozolomide (37776), cisplatin (2555), dacarbazine (3098), altretamine (5296), amifostine (4126), efalizumab (356988), ciltacabtagene autoleucel (2594775), docetaxel (72962), panitumumab (263034), interferon alfa-2a (5879), alefacept (299635), doxorubicin (3639), vincristine (11202), denileukin diftitox (214470), ifosfamide (5657), bortezomib (358258), Granulocyte - colony stimulating factor (G-CSF,0) (1440046), thiopurine (10485), cyclosporine (3008), cetuximab (318341), lenalidomide (342368), guselkumab

	(1928588), abatacept (614391), belatacept (1112973), asparaginase (1156), daclizumab (190353), brexucabtagene autoleucel (2387277), triamcinolone (10759), ipilimumab (1094833), cyclophosphamide (3002), adalimumab (327361), dactinomycin (3100), capecitabine (194000), romidepsin (87750), rituximab (121191), peginterferon alfa-2a (120608), vinblastine (11198), plicamycin (6995), golimumab (819300), thalidomide (10432), daunorubicin citrate liposome (221087), denosumab (939449), yttrium 90 ibritumomab tiuxetan (262323), thiopurine (1256), lomustine (6466), Granulocyte - colony stimulating factor (G-CSF,0) (70167), vorinostat (194337), aurothioglucose (4980), imatinib (282388), hydroxydaunorubicin hydrochloride (doxorubicin hydrochloride,0) (142433), interferon alfa-2b (5880), ixazomib (1723735), mepolizumab (1720597), gold sodium thiomalate (4981), ustekinumab (847083), palifermin (196319), levamisole (6371), ibritumomab (262323), epirubicin (3995), interferon alfacon-1 (59744), palivizumab (194279), pegademase bovine (59768), auranofin (1227), bendamustine hydrochloride (1114693), indium In-111 ibritumomab tiuxetan (262323), interferon beta-1b (72257), chlorambucil (2346), floxuridine (4488), infliximab (191831), porfimer (333848), Methylprednisolone (6902), betamethasone (1514), peginterferon alfa-2b (253453), sirolimus (35302), Granulocyte - colony stimulating factor (G-CSF,0) (68442), trastuzumab (224905), estramustine phos sodium (4090), temsirolimus (657797), erlotinib (337525), pertuzumab (1298944), eculizumab (591781), tositumomab and iodine (234449), amsacrine (739), axicabtagene ciloleucel (1987398), daunorubicin (3109), methylprednisolone sod succinate (203189), adriamycin (42512), tocilizumab (612865), leflunomide (27169), lisocabtagene maraleucel (2479136), prednisone (8640), cytarabine (conv,0) (3041), alemtuzumab (117055), blinatumomab (1597258), pentostatin (8011), nelarabine (274771), thiopurine (103), pegaspargase (34132)
Model specifications	Logistic regression Match on age group, month of test, and **increased risk**

Table 1: RSV Complication Rates by Time Since Vaccination

Infection Rate	
2wk–6mo after vaccination	1.13%
6–12mo after vaccination	1.15%
12–18mo after vaccination	2.76%
Unvaccinated	3.93%
ED Visit Rate	
2wk–6mo after vaccination	0.97%
6–12mo after vaccination	0.98%
12–18mo after vaccination	2.25%
Unvaccinated	3.39%
Hospitalization Rate	
2wk–6mo after vaccination	0.96%
6–12mo after vaccination	0.82%
12–18mo after vaccination	2.22%
Unvaccinated	3.18%

Table 2: Vaccine Effectiveness by Time Since Vaccinated

		Month 4	**Month 7**	**Month 10**	**Month 13**	**Month 16**	**Month 19**
RSV infections	**VE Rate**	71%	65.62%	54.40%	48.79%	37.73%	40%
	Lower CI – 95%	64.10%	59.66%	49.16%	45.75%	34.69%	33.02%
	Upper CI – 95%	76.89%	70.70%	59.10%	51.66%	40.64%	46.17%
RSV ED Visits	**VE Rate**	71%	66.44%	58.91%	55.93%	46.03%	46%
	Lower CI – 95%	62.73%	59.33%	52.99%	52.55%	42.62%	38.12%
	Upper CI – 95%	78.09%	72.30%	64.09%	59.07%	49.24%	53.52%
RSV Hospitalizations	**VE Rate**	73%	69.03%	58.88%	57.75%	46.17%	44%
	Lower CI – 95%	62.10%	59.89%	50.89%	53.46%	41.77%	33.71%
	Upper CI – 95%	81.06%	76.10%	65.57%	61.64%	50.24%	53.43%