



Human papillomavirus vaccination at age 9 or 10 years to increase coverage – a systematic review and narrative review of the literature

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Background

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- Since HPV vaccine was first licensed and recommended in 2006 for females, the wording of the routine age recommendation has remained the same
- While HPV vaccination coverage has increased since HPV vaccination was first recommended, uptake continues to be lower than other vaccines recommended in adolescence
- There have been many efforts to increase HPV vaccination in the United States
- In the past few years there has been increasing enthusiasm for HPV vaccine initiation at age 9 years to increase coverage

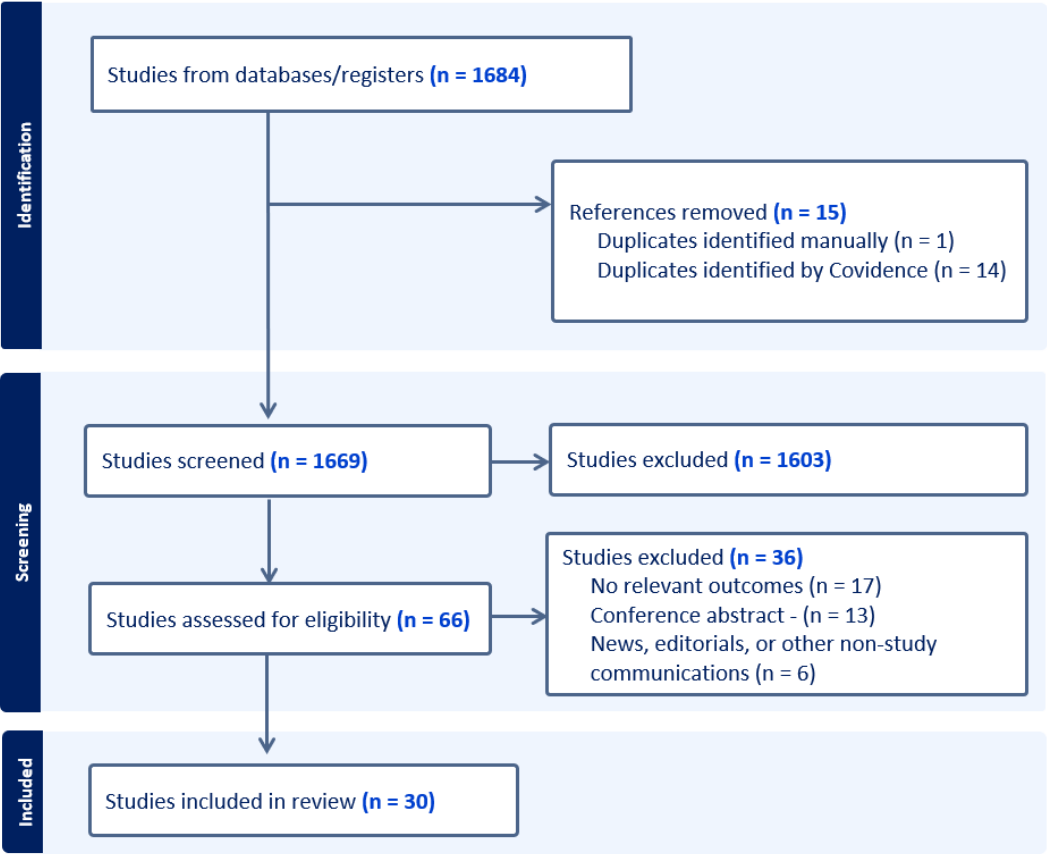
Objective

- Critically evaluate publications investigating HPV vaccination at age 9–10 years
 - Systematic review and narrative summary of literature
 - Describe methodologies used
 - Provide data summaries and interpretations

Selection criteria

- **Dates and location:** 2014–2024, United States
- **Population:**
 - Individuals ≥ 9 years of age who are eligible to receive HPV vaccination
 - Parents/caregivers of persons ≥ 9 years of age
 - Clinicians, providers, or other clinical staff who administer the HPV vaccine
- **Evaluation:**
 - HPV vaccination at ages 9–10 years
- **Outcomes:**
 - HPV vaccine initiation
 - HPV vaccine series completion
 - Acceptability among providers and caregivers of routine HPV vaccination at ages 9–10 years
 - Feasibility of routine HPV vaccination at ages 9–10 years where HPV vaccination is offered

PRISMA flow chart for study inclusion in systematic review



Study descriptions

Retrospective cohort/
observational coverage
studies

Quality
improvement/intervention
coverage projects

Provider/caregiver
behavior and perspectives

Study	Completion	Initiation	Provider perspectives/behavior	Caregiver perspectives
Kajtezovic 2023	X			
Saxena 2023	X			
St. Sauver 2016	X			
Goodman 2023	X			
Minihan 2023	X			
Hirth 2024	X			
Bednarczyk 2023	X			
Liu 2016	X			
Inguva 2020	X			
Kashani 2019	X			
Donahue 2015		X		
Perkins 2020	X	X		
Zorn 2022	X	X		
Goleman 2018		X		
Cox 2022	X	X		
O'Leary 2023	X	X		
Casey 2022	X	X		
Huang 2023	X	X		
Christensen 2023		X		
Strasel 2023		X		
Isher-Witt 2023		X		
Brodie 2018		X		
Bowden 2017		X		
Kong 2022			X	
Biancarelli 2020			X	
Vielot 2023			X	
Lake 2023			X	
Kahn 2023			X	
Kohler 2023				X
Aragones 2022				X

Retrospective cohort/observational studies (N=11)

	Study	Completion	Initiation	Provider perspectives /behavior	Caregiver perspectives
NIS-Teen	Goodman	X			
	Minihan	X			
	Bednarczyk	X			
	Hirth	X			
Marketscan	Kajtexovic	X			
	Saxena	X			
	Liu	X			
Other	St. Sauver	X			
	Inguva	X			
	Kashani	X			
	Donahue		X		

Summary: retrospective cohort/observational studies (N=11)

9 explored impact of initiation at age 9–10 vs. age ≥ 11 years on completion or up-to-date status of the vaccination series

- Many looked at series completion by age 13, but others evaluated up-to-date status at older ages or used an outcome defined by time to complete the series after receiving first dose
- All but one found higher on time completion of the HPV vaccination series when initiated at ages 9–10 years
- 1 also assessed impact of age at initiation on association between race/ethnicity and series completion; increased odds of series completion across all racial/ethnic groups when initiating at age 9–10 years compared to age 12 years

1 assessed association of initiation timing in relation to other routine adolescent vaccines on series completion

- HPV vaccine series completion higher if HPV vaccination initiated before Tdap or meningococcal

1 investigated predictors of initiation for children aged 9–13

- The same characteristics were associated with initiation, regardless of age at initiation

Interpretation: retrospective cohort/observational studies (N=11)

Higher vaccination series completion* when initiating at age 9–10 vs. 11–12, but study limitations preclude a cause-and-effect interpretation

A small percentage of vaccinated adolescents had initiated at age 9–10 in most studies (2–8%)

No information on reasons for initiation at age 9–10; may have been differences in those initiating at age 9–10 vs. 11–12

There may be differences between providers vaccinating at age 9–10 and those vaccinating at age 11–12

*Some studies evaluated completion, but not by age 13 years

Quality improvement/intervention (N=12)

Study	Completion	Initiation	Provider perspectives /behavior	Caregiver perspectives
Perkins	X	X		
Zorn	X	X		
Goleman		X		
Cox	X	X		
O'Leary	X	X		
Casey	X	X		
Huang	X	X		
Christensen		X		
Strasel		X		
Isher-Witt		X		
Brodie		X		
Bowden		X		

Summary: quality improvement/intervention studies (N=12)

All 12 studies evaluated initiation:

- Interventions were multipronged, with one component focused on initiation at ages 9–10 years
- All studies observed an increase in initiation for all ages at initiation (9–10 years and ≥ 11 years), or at a clinic population level
 - Magnitude of increases varied across age groups
 - Increases were not sustained in all studies
 - Initiation rates at 9–10 years still lower than initiation at ≥ 11 years

6 Studies evaluated initiation and completion:

- Increases in completion rates observed in the majority of studies

Quality improvement/intervention (N=12)

N=6 Focus on initiation only

Author	EMR change	Provider/ staff training	Patient education	QI team/ data feedback	Clinic incentives	Standing orders	Patient reminders
Goleman	X		X	X	X		
Isher-Witt		X		X		X	X
Strasel		X					X
Christensen	X*						
Brodie		X		X			
Bowden	X	X	X	X			

*Analysis attempted to measure association with change in electronic medical record (EMR) only, but there may have been other undocumented concurrent events that influenced HPV initiations that were not incorporated into the model

Quality improvement/intervention (N=12)

N=6 Focus on both initiation and completion

Author	EMR change	Provider /staff training	Patient education	QI team/ data feedback	Clinic incentives	Standing orders	Patient reminders
Perkins		X	X	X		X	X
Casey		X	X	X		X	X
Zorn	X	X	X				
Cox	X	X	X	X	X	X	X
Huang	X	X		X		X	
O'Leary	X					X	

Interpretation: quality improvement/intervention studies (N=12)

In the majority of QI/Intervention studies, there were increases in initiation and completion; however:

- Due to multi-pronged interventions, it is unclear if the component focused on initiation at ages 9–10 was responsible for any of the increase in coverage
- Within the QI/Intervention studies, vaccination at age 9 was feasible, but not necessarily better than at ages 11–12

Provider/caregiver perspectives and behavior studies

	Study	Completion	Initiation	Provider perspectives/ behavior	Caregiver perspectives
Interviews: Providers	Vielot			X	
	Biancarelli			X	
Surveys: Providers	Kong			X	
	Lake			X	
	Kahn			X	
Interview/ Survey: Caregivers	Kohler				X
	Aragones				X

Summary: provider/caregiver behavior and perspective studies (N=7)

2 Clinician Interviews:

- 1 intervention study: providers reported a positive experience with recommending vaccination at age 9–10
- 1 qualitative study: providers had mixed opinions

3 Clinician Surveys:

- 1 survey: among not currently recommending at age 9, family medicine physicians were more willing to recommend the vaccine at ages 9–10
- 1 survey: strong recommendation differed by age group and specialty
- 1 survey: recommendation framing mattered when initiating at ages 9–10
- Perceived benefits of vaccination varied by initiation age

2 Caregiver Studies:

- Few caregivers reported receiving information or recommendations to vaccinate children before age 11
- Most reported willingness to vaccinate at ages 9–10

Interpretation: provider/caregiver behavior and perspective studies (N=7)

In limited settings, and mostly small studies, vaccination at ages 9–10 years was acceptable by caregivers and providers

Overall summary

- **We conducted a systematic review evaluating HPV vaccination at ages 9–10 years**
- **Data from 30 studies published 2014–2024 were summarized in a narrative review**
- **3 general types of studies**
 - Within retrospective cohort studies, HPV vaccine initiation at ages 9–10 years was associated with higher completion by age 13; this was a small proportion of initiators in all studies
 - There could have been meaningful differences between children initiating at ages 9–10 vs 11–12 or providers vaccinating at ages 9–10 vs those vaccinating at the routine age
 - Within QI/ intervention studies findings show vaccination at age 9 was feasible, but not necessarily better
 - Due to the multifaceted approaches; contribution of the recommendation for initiation at age 9–10 years on increases in coverage is unclear
 - Vaccination at ages 9–10 years may be acceptable to caregivers and providers

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For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



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