

HPV-related Recurrent Respiratory Papillomatosis: Preventive and Therapeutic Interventions from a Public Health Perspective

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Abstract

Objective: Recurrent respiratory papillomatosis (RRP) is a chronic HPV-related respiratory disease that causes persistent morbidity, vocal dysfunction, heavy economic costs, and psychological burdens across all age groups. This review aimed to summarize updated RRP prevention and management strategies, and evaluate the public health value of modern multimodal interventions to support population-level disease control and burden reduction. **Study Design:** A comprehensive overview. **Data Sources:** PubMed, Scopus, and Web of Science. **Methods:** Literature published between 1995 and 2026 was systematically searched focusing on RRP epidemiology, disease burden, interventions, and HPV vaccination. Eligible original studies, reviews, and guidelines were included, while non-clinical and non-English studies were excluded. Given evident literature heterogeneity, narrative synthesis was adopted, and evidence quality was assessed via the GRADE system. **Results:** Overall, 95 full-text articles were included from 128 screened abstracts. Universal HPV vaccination has substantially reduced the incidence of juvenile-onset RRP, serving as a key population preventive measure. Optimized physical interventions minimize iatrogenic injury and improve patients' quality of life. Novel adjuvant approaches, including bevacizumab, immune checkpoint inhibitors, and DNA immunotherapy, effectively prolong surgical intervals and control recurrent lesions. As a vital public health strategy, HPV vaccination significantly reduces long-term surgical frequency and medical consumption. RRP still imposes a massive global healthcare burden, with annual U.S. costs exceeding \$100 million. **Conclusion:** RRP management has evolved into a public health-oriented multimodal model integrating prevention and individualized treatment. HPV vaccination is the most cost-effective population-level intervention. Combined therapies effectively reduce disease recurrence and socioeconomic burdens. Future research should focus on therapeutic vaccines and biomarkers to advance standardized global RRP prevention and control systems.

Keywords

Recurrent Respiratory Papillomatosis, HPV Vaccination, Multimodal Intervention, Disease Burden, Public Health Prevention