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HPV immunization rates in student athletes depending on venue of pre-participation evaluation: a pilot study

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HPV immunization rates in student athletes depending on venue of pre-participation evaluation: a pilot study

Andrew Cunningham MD, Meaghan Rourke AT ATC, James Moeller MD, and Melissa Nayak MD
HPV Vaccine Background

Human Papilloma Virus (HPV) vaccine recommended by Advisory Committee on Immunization Practices (ACIP) for boys and girls age 9-26 years\(^{(1)}\)

- 2 dose series given 6-12 months apart
- If not completed by age 15, 3\(^{rd}\) dose required
- NOT required for school participation
- Low overall rates compared to required vaccines\(^{(2)}\)
  - 65.5% current on first dose of vaccine
  - 48.6% completed series
PPE Background

• Pre-Participation Physical Evaluation (PPE) required for high school sports participation in 49 of 50 states\(^{(3)}\)
  • Goal to maximize health of athletes and their safe participation in sports\(^{(5)}\)
• In Michigan, Michigan High School Athletic Association (MHSAA) requires yearly physical prior to participation\(^{(4)}\)
  • Completed by MD, DO, PA, NP
  • Primary care physician (PCP) is listed on form
• Commonly performed in office setting or mass participation group event “station based” approach
  • HF Sports Medicine routinely performs “physical nights” for affiliated high schools
PPE Location

Group/station-based Setting

Office setting

PCP or Partner

Urgent care
Research Question

Is there any difference in HPV vaccination rates depending on location of PPE, specifically those done at mass participation group event vs office?

Hypothesis: Athletes who had their exams performed in an office setting will have higher immunization rates than those who had their PPE done in a group setting at a mass participation event.
Study Design

• Retrospective cohort
• Single High School
• Reviewed MHSAA PPE forms for all athletes participating in Fall and Winter sports
  • Name, Date-of-birth, gender
  • Location of exam
    • Mass event, Office, Urgent Care
  • Examiner
    • PCP vs Other (includes unknown)
    • HPV immunization status (identified through Michigan Care Improvement Registry (MCIR) records)
      • 0, ≥1, Complete
• Statistics
  • Chi-squared tests with two sided alpha of 0.05
  • 80% power to detect a difference in vaccination rates of 15%
    • Estimated HPV rates of 60% in-office
    • Estimated sample size of 508: 406 in office, 102 in mass-event
Descriptive statistics

- 488 total athletes
  - Average age 15.6
  - 59% male, 41% female
- Venue
  - 64 (13%) group setting
  - 424 (87%) in office setting
    - 169 (35%) PCP
    - 147 (30%) UC
    - 108 (22%) “other”
- HPV Vaccination rates
  - 51% received ≥1 dose
  - 39% completed series

Table 1: Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Response</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean (SD)</td>
<td>15.6 (1.2)</td>
</tr>
<tr>
<td></td>
<td>Median (Q25, Q75)</td>
<td>15.0 (15, 16)</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>286 (58.6%)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>202 (41.4%)</td>
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<tr>
<td>HPV ≥1</td>
<td>Yes</td>
<td>250 (51.2%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>238 (48.8%)</td>
</tr>
<tr>
<td>HPV series complete</td>
<td>Yes</td>
<td>190 (38.9%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>298 (61.1%)</td>
</tr>
<tr>
<td>PPE Location</td>
<td>Group</td>
<td>64 (13.1%)</td>
</tr>
<tr>
<td></td>
<td>Office</td>
<td>424 (86.9%)</td>
</tr>
<tr>
<td>Physician</td>
<td>PCP</td>
<td>169 (34.6%)</td>
</tr>
<tr>
<td></td>
<td>Non PCP</td>
<td>272 (55.7%)</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>47 (9.6%)</td>
</tr>
<tr>
<td>Urgent care</td>
<td>Yes</td>
<td>147 (30.1%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>322 (66.0%)</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>19 (3.9%)</td>
</tr>
</tbody>
</table>
Results

HPV ≥1 vs 0

- No statistically significant difference
  - Gender
    - Male vs Female
  - Location
    - Office vs Group
    - Urgent care vs non-UC office
  - Provider
    - PCP vs Non-PCP

- Statistically significant difference
  - Urgent care vs all others
    - 44.2% vs 54.7% (p=0.036)
  - No difference when exclude group setting

<table>
<thead>
<tr>
<th>Variable</th>
<th>Response</th>
<th>HPV ≥1</th>
<th>HPV=0</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean (SD)</td>
<td>15.6 (1.2)</td>
<td>15.5 (1.2)</td>
<td>0.235</td>
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<tr>
<td></td>
<td>Median (Q25, Q75)</td>
<td>15.5 (15, 17)</td>
<td>15 (15, 16)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Male (N=286)</td>
<td>153 (53.5%)</td>
<td>133 (46.5%)</td>
<td>0.270</td>
</tr>
<tr>
<td></td>
<td>Female (N=202)</td>
<td>97 (48.0%)</td>
<td>105 (52.0%)</td>
<td></td>
</tr>
<tr>
<td>PPE Location</td>
<td>Group (N=64)</td>
<td>32 (50.0%)</td>
<td>32 (50.0%)</td>
<td>0.833</td>
</tr>
<tr>
<td></td>
<td>Office (N=424)</td>
<td>218 (51.4%)</td>
<td>206 (48.6%)</td>
<td></td>
</tr>
<tr>
<td>PCP</td>
<td>PCP (N=169)</td>
<td>95 (56.2%)</td>
<td>74 (43.8%)</td>
<td>0.062</td>
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<tr>
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<td>Non-PCP (N=272)</td>
<td>128 (47.1%)</td>
<td>144 (52.9%)</td>
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</tr>
<tr>
<td>Urgent Care</td>
<td>Yes (N=147)</td>
<td>65 (44.2%)</td>
<td>82 (55.8%)</td>
<td>0.036</td>
</tr>
<tr>
<td></td>
<td>No (N=322)</td>
<td>176 (54.7%)</td>
<td>146 (45.3%)</td>
<td></td>
</tr>
<tr>
<td>Office Location</td>
<td>UC (N=147)</td>
<td>65 (44.2%)</td>
<td>82 (55.8%)</td>
<td>0.095</td>
</tr>
<tr>
<td></td>
<td>Non–UC (N=277)</td>
<td>153 (55.2%)</td>
<td>124 (44.8%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: HPV vaccine ≥1 vs 0
Results cont.

Series completion

- **No statistically significant difference**
  - Gender
  - Age
  - Group vs Office

- **Statistically significant**
  - PCP vs Non-PCP
    - 45.6% vs 33.8%, (p=0.014)
  - Urgent care vs non-UC office
    - 29.3% vs 44.8% (p=0.007)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Response</th>
<th>Vaccine Series Complete = Yes</th>
<th>HPV series Complete = No</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
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<td>Median (Q25, Q75)</td>
<td>15 (15, 16)</td>
<td>15 (15, 16)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Male (N=286)</td>
<td>116 (40.6%)</td>
<td>170 (59.4%)</td>
<td>0.381</td>
</tr>
<tr>
<td></td>
<td>Female (N=202)</td>
<td>74 (36.6%)</td>
<td>128 (63.4%)</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Group (N=64)</td>
<td>23 (35.9%)</td>
<td>41 (64.1%)</td>
<td>0.598</td>
</tr>
<tr>
<td></td>
<td>Office (N=424)</td>
<td>167 (39.4%)</td>
<td>257 (60.6%)</td>
<td></td>
</tr>
<tr>
<td>PCP</td>
<td>PCP (N=169)</td>
<td>77 (45.6%)</td>
<td>92 (54.4%)</td>
<td>0.014</td>
</tr>
<tr>
<td></td>
<td>Non-PCP (N=272)</td>
<td>92 (33.8%)</td>
<td>180 (66.2%)</td>
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</tr>
<tr>
<td>Urgent Care</td>
<td>Yes (N=147)</td>
<td>43 (29.3%)</td>
<td>104 (70.8%)</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>No (N=322)</td>
<td>139 (43.2%)</td>
<td>183 (56.8%)</td>
<td></td>
</tr>
<tr>
<td>Office Location</td>
<td>UC (N=147)</td>
<td>43 (29.3%)</td>
<td>104 (70.8%)</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>Non-UC,(N=277)</td>
<td>124 (44.8%)</td>
<td>153 (55.2%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: HPV vaccine series completion
Results Summary

- Low rates of HPV vaccine series initiation and completion compared to national data
- High proportion (30%) of athletes have PPE done at urgent care facilities
  - Urgent Care associated with Lowest vaccine series initiation/completion rates
- No statistically significant difference in HPV series initiation or completion between mass event and office based physicals.
- Highest vaccine series completion rates when PPE completed by PCP
Conclusions/Future Directions

- Overall low rates of HPV vaccination in student athletes
  - Is this true of student-athletes in general?
    - More schools/locations need to be studied
- Mass event PPE is a reasonable convenience with similar vaccination rates
- Providers should use PPE as an opportunity to vaccinate.
- Should mass participation group physicals offer vaccinations?

2. Walker TY et al. National, Regional, State, and selected Local Area vaccination coverage among adolescents aged 13-17 Years-United States, 2017. *Weekly / August 24, 2018 / 67(33);909–917 (67.3, 54.3)*

