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Literature Review of Sexual Risk Compensation Following Human Papillomavirus Immunization

Rebecca AG Christensen[1] **and Jane M Heffernan**[2,3*]

[1]*Department of Kinesiology and Health Science at York University, Canada*

[2]*Department of Mathematics and Statistics at York University, Canada*

[3]*Centre for Disease Modelling, York Institute for Health Research at York University, Canada*

[*]**Corresponding author:** Jane M Heffernan, York University, Department of Mathematics and Statistics, Ross Building, Rm N520, 4700 Keele Street, Toronto, Ontario, M3J 1P3, Canada, Tel: 87673937648; E-mail: jmheffer@yorku.ca

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Abstract

Objective: To examine existing literature on behavioural risk compensation/disinhibition following Human papillomavirus (HPV) immunization.

Methods: A systematic literature review was undertaken using the terms "behavioural risk compensation or disinhibition", "HPV vaccination or immunization", "in humans" on Google Scholar. A supplemental review was also undertaken to examine the themes "barriers and facilitators for HPV immunization" and "strategies to increase rates of vaccination", which were identified in the original search.

Results and Discussion: Structural barriers to vaccination such as cost, and personal barriers such as concern about the safety of the vaccination, were identified. Approximately half of the literature suggests that individuals have similar sexual health practices regardless of vaccination status. Some literature also suggests that women who are vaccinated for HPV are more likely to use a condom than their counterparts. Strategies to increase immunization uptake primarily focus on education or recommendation from primary health practitioners.

Conclusion: Barriers and facilitators for HPV vaccination appear consistent with other vaccines. Individuals who are vaccinated for HPV may be less likely to engage in high risk sexual behaviours. Further, education and support from primary health practitioners are key for increased vaccine uptake.

Keywords: HPV; Vaccination; Risk compensation; Behavioural disinhibition

Introduction

Currently there are two approved Human papillomavirus (HPV)[1] vaccines available in Canada: Cervarix and Gardasil. Cervarix, which is a multi-dose bivalent vaccine, protects against the two HPV serotypes, 16 and 18, that are responsible for 70% of all cervical cancers. Cervarix received approval in 2010 for use in females 10 to 25 years of age [1]. Gardasil is a multi-dose quadrivalent vaccine that protects against HPV serotypes[2] 6, 11, 16 and 18 [1]. In 2006, Gardasil was initially approved for use in Canada with females aged 9 to 26, which has since been expanded to for use in men of the same ages and then for women up to the age of 45 [1]. While both vaccines are available in Canada, Gardasil has been more heavily promoted by official sources due to its ability to protect against cervical cancer and genital warts. Currently, Gardasil is the vaccine used in all publicly funded immunization programs in Canada [1].

Gardasil has been proven to be safe, and 65-100% effective, in preventing new and reoccurring infections of HPV serotypes 16 and 18 in females 16 to 26 years old [2-4]. Gardasil was also added to Ontario's routine immunization registry in 2007, and a program was instituted to provide all three doses of the vaccination free of charge to girls in grade 8 [5]. In 2012, a catch-up program was instituted which allowed girls in grades 9-12 who had not received, or had missed a dose of the vaccination to get it free of charge at local Public Health units [5]. In February 2015, a new nonavalent vaccine (Gardasil 9) was approved for use in Canada; however, the National Advisory Committee on Immunization has yet to issue a statement [6].

Currently, immunization rates for HPV in Ontario are approximately 55 percent among eligible females [7]. Considering the extensive availability of the vaccine, it remains unclear as to why such a large percentage of the population has not been vaccinated. Thus, this report will begin by examining reasons why individuals have or have not elected to be vaccinated for HPV, if there is any change in behaviour following vaccination, and conclude with strategies for increasing rates of vaccination among vulnerable populations. While

[1] HPV is a sexually transmitted infection that has over 150 related viruses. HPV can cause genital warts in both men and women, and is responsible for all types of cervical cancer [32].

[2] Serotypes are distinct species or types of microorganisms like bacteria or viruses [33]. As they have differing surface structures they can cause different symptoms within the same bacteria. For example, HPV serotype 16 can cause cervical cancer while HPV serotype 6 can cause genital warts.

this report is focused on HPV, given the promising results from on-going vaccination trials for herpes simplex (HSV) and human immunodeficiency viruses (HIV), this review may also have future relevancy for other sexually transmitted infections (STIs).

Methods

A review was undertaken of the existing literature on behavioural risk compensation or disinhibition following HPV vaccination, from August 3rd to August 20, 2015. Google scholar was used as the search engine, with "behavioural risk compensation or disinhibition", "HPV vaccination or immunization", "in humans", entered as search parameters. This returned 129 icles. Abstracts from these articles were then reviewed to ensure they met inclusion criteria (i.e. using human participants, with a portion of which have received at least one dose of the HPV vaccine). The reference lists of these papers were then reviewed for additional articles relating to HPV vaccination that may have been missed during the initial search. This provided 2 new references for a total of 7 references. We identified "barriers and facilitators for HPV immunization", "behavioural changes following vaccination", and "strategies to increase immunization" as themes from the literature. A supplemental review was undertaken to further explore the themes of barriers and facilitators for HPV immunization, and strategies to increase immunization.

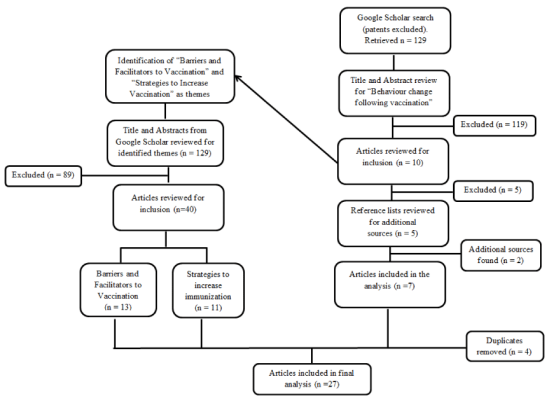

Figure 1: Article Inclusion Flow Chart.

Figure 1 contains a flow chart outline the inclusion and exclusion of articles while Table 1 (barriers and facilitators for HPV immunization), Table 2 (behavioural changes following vaccination), and Table 3 (strategies to increase immunization) summaries the articles by theme.

Author	Study Design	Sample Size (N)	Age	Sex	Country
Abdelmutti and Hoffman-Goetz [9]	Newspaper Content Analysis	15*	--	--	United States
Bednarczyk et al. [8]	Retrospective Cohort	1398	Adolescents	Female	United States
Brewer and Fazekas [11]	Systematic Review	28*	Adolescents, Young Adults, and Adults	Female	United States
Ferris et al. [15]	Cross-sectional	322	Adults	Female and Male	United States
A. Forster, Wardle, Stephenson and Waller [10]	Newspaper Content Analysis	92*	--	--	United Kingdom
Griffoen et al.	Cross-sectional	65	Adolescents and Adults	Female	United States
Guerry et al. [26]	Cross-sectional	509	Adults	Female and Male	United States
Kahn et al. [18]	Prospective cohort	99	Adolescents and Young Adults	Female	United States
Marlow, Forster, Wardle, and Waller [14]	Cross-sectional	692	Adolescents and Adults	Female	United Kingdom
Sauvageau, Duval, Lavoie and Ouakki [12]	Cross-sectional	471	Adolescents, Young Adults and Adults	Female	Canada
Schuler, Reiter, Smith, Brewer and Hill [16]	Cross-sectional	647	Adults	Female and Male	United States
Stretch et al.	Cross-sectional	651	Adults	Female and Male	United Kingdom
Thomas and Goldstone [19]	Cross-sectional	191	Adult	Male	United Kingdom

*=Sample size refers to number of articles/studies not participants
--=Information not provided
Adolescents=11 to 19 years of age
Young Adults=20 to 26 years of age

Table 1: Barriers and Facilitators to Vaccination Articles.

Author	Study Design	Sample Size (N)	Age	Sex	Country
Bednarczyk et al. [8]	Retrospective Cohort	1398	Adolescents	Female	United States
Cummings et al. [20]	Case Control	225	Adolescents	Female	United States
Forster et al. [10]	Prospective Cohort	407	Adolescents	Female	United Kingdom
Jena, Goldman, and Seabury [23]	Case Control	208,111	Adolescents	Female	United States
Liddon et al. [21]	Retrospective Cohort	1243	Adolescents and Young Adults	Female	United States
Rysavy et al. [22]	Cross-sectional	203	Adolescents and Young Adults	Female	United States
Thomas and Goldstone [19]	Cross-sectional	191	Adult	Male	United Kingdom

Adolescents=11 to 19 years of age
Young Adults=20 to 26 years of age
Adults=>26 years of age

Table 2: Behaviour Change Following Vaccination Articles.

Author	Study Design	Sample Size (N)	Age	Sex	Country
Alexander et al. [30]	Cross-sectional	42	Adolescents and Adults	Female and Male	United States
Askelson et al. [30]	Cross-sectional	217	Adults	Female	United States
Brabin et al. [29]	Cross-sectional	553	Adolescents	Female	United Kingdom
Brewer and Fazekas [11]	Systematic Review	28*	Adolescents, Young Adults, and Adults	Female	United States
Griffoen et al.	Cross-sectional	65	Adolescents and Adults	Female	United States
Guerry et al. [26]	Cross-sectional	509	Adults	Female and Male	United States
Krawczyk et al. [24]	Cross-sectional	447	Adolescents, Young Adults, and Adults	Female	Canada
McRee, Gottlieb, et al.	Cross-sectional	900	Adults	Female	United States
McRee, Reiter and Brewer [28]	Cross-sectional	888	Adults	Female and Male	United States
Zimet, Rosberger, Fisher, Perez, and Stupiansky [27]	Literature Review	--	--	--	--
Zimet, Weiss, Rosenthal, Good and Vichnin [25]	Cross-sectional	185	Adolescents and Young Adults	Female	United States

*=Sample size refers to number of articles/studies not participants
--=Information not provided
Adolescents=11 to 19 years of age
Young Adults=20 to 26 years of age
Adults=>26 years of age

Table 3: Strategies to Increase Vaccination Articles.

Results and Discussion

Barriers and facilitators for HPV immunization

Research conducted on barriers and facilitators for HPV vaccination has primarily focused on mothers and a subpopulation of fathers, given the recommended young age of 11 to 12 years for HPV vaccination. Parents report structural barriers to immunization such as cost, and the multi-dose nature of the vaccine, as well as personal barriers such as concerns about how safe the vaccine is [8]. Additionally, various news reports throughout North America [9] and the United Kingdom [10] have suggested that girls may adopt risky sexual behaviours following vaccination. Concern for this risk compensation[3] has been reported by 6-30% of parents surveyed in a variety of studies [11-16].

Research has been conducted on adolescent females that have reported no intention to change behaviours following vaccination [8], however, they do perceive themselves at a decreased risk for HPV as well as other STIs [17,18].

While research conducted on HPV has primarily focused on women being vaccinated, there has been a surge of research focusing on potential barriers and facilitators for men being vaccinated, given the potential health benefits of the vaccination for them. Overall, research showed that the reasons men would not, or did not get vaccinated for HPV were rather similar to women. Men reported the high cost associated with vaccination, as well a lack of adequate information regarding safety and effectiveness of the vaccine [19]. There was no concern about sexual risk compensation or disinhibition among men; however, this may be due to the fact that parents were not the respondents for these studies.

Behaviours following vaccination

Our literature review identified only seven studies to date the focus on behaviour change following vaccination. The small number of studies may be a result of the fact that the HPV vaccine has only been available for a short period of time. Six of the studies were conducted in the United States [8,20-23] and the United Kingdom [17] on females 11 to 24 years old. Study findings have been relatively consistent across all studies, with three reporting no difference in sexual behaviours, such as number of sexual partners and condom use [17,22,23], while the three other studies found no difference in the majority of sexual behaviours except that females who had been vaccinated had slightly increased rates of condom use [8,20,21]. These results were also consistent with the one study conducted on men, which showed there was no difference in frequency of anal sex, condom use, or sexual activity based on whether they had or had not received the HPV vaccine [19].

Overall, the consensus among existing literature appears to be that receiving the HPV vaccine does not contribute to increased risky sexual behaviour. Indeed, it appears as though being vaccinated may result in a greater likelihood of safe sex practices compared to same aged counterparts who had not been vaccinated.

[3] Sexual risk compensation or disinhibition refers to individuals changing behaviours in response to vaccination, resulting in initiating in sex at a younger age, or adopting riskier sexual behaviours such as not using condoms.

Strategies to increase rates of vaccination

Consistent results across a variety of studies with both males and females have found that a lack of adequate information and education appear to be the primary barrier to HPV vaccine uptake. Physicians have been shown to be one of the most important determining factors in whether individuals accept vaccination [11,24-27] or not [21,25]. Therefore, HPV vaccine educational literature provision through medical offices may increase uptake in HPV immunization [19,27].

The manner of presentation of the risks of the HPV vaccine to children and their parents may also play an important role in determining whether or not vaccination will occur [27]. Therefore, physicians and other important role models, such as teachers, may want to focus on the risk associated with not getting vaccinated for HPV rather than how safe the vaccine is [27].

A percentage of parents also report concerns about sexual risk compensation or disinhibition following vaccination [11-16], which may make them less likely to have their child (ren) immunized for HPV. While research appears to contradict this concern, this research is not necessarily easily accessible for parents who are deciding if they should or should not have their child vaccinated. Further, research suggests that having accurate material accessible online for parents may improve vaccination uptake, given that parents are already accessing most of their medical resources online [28]. Therefore, providing quality information to parents may alleviate some of their concerns and aid in decision-making.

Lastly, openly discussing HPV vaccination may provide adolescents with an opportunity to actively participate in their health care practices [29,30] and an opportunity to discuss sexual health topics that build positive sexual health values [31]. This may be why research has shown that females who have received the HPV vaccination are more likely to participate in safe sexual practices compared to those who have not.

There is a limitation that warrants mentioning. This review used only one search engine to conduct the literature review which may have impacted the amount of articles retrieved. However, as Google Scholar aggregates articles from other search engines this is unlikely to have an impact on the overall findings presented.

Conclusion

Cost and sexual risk compensation are likely to be reported as reasons for not vaccinating adolescents against HPV, which is consistent with other vaccines. However, due to the public funding of Gardasil immunization for Ontario, and the findings of this review which suggest that that sexual disinhibition following vaccination does not occur, these are likely not the main reasons for poor immunization uptake. What may play a greater role is the lack of education and knowledge dissemination surrounding vaccination programs, as well as a lack of understanding of the benefits for safe sexual behaviour following HPV vaccination. Thus, recommendations from primary health care professional appear to be a key determining factor in vaccination. Further, providing a positive venue for parents and adolescents to speak openly about sex, and for adolescents to take responsibility for their health, are additional benefits from this program beyond the foundational proposition of decreased rates of HPV infection. This research also provides promise for the extended health benefits that may be seen following approval for HSV or HIV vaccinations in human, as well as provides strategies that might be employed to ensure the successful uptake of these new vaccinations on a population level.

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Disclosure

None

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