

Physicians' attitudes towards Human papillomavirus vaccination programme: a
systematic review

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Declaration

'The work is original and has not been submitted previously in support of any qualification or programme'.

Signature

Date

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Abstract

Background: Human papillomavirus (HPV) vaccine is a newly introduced vaccine against cervical cancer in adolescent girls. Uptake of the vaccine will be dependent on parental acceptability and physician recommendation.

Objective: To review physicians' attitudes towards HPV vaccine and identify factors that may influence their intent. Also, to determine if there is any difference in the views of different medical specialties with regards to HPV vaccination.

Search Strategy: Articles were obtained through computerised searches of CINAHL, Pubmed, Web of Knowledge, Cochrane Library and Science Direct, as well as manual searches in recognised scientific journal.

Selection criteria: Articles involving physicians' attitudes, knowledge and behaviour towards HPV vaccine published from 2007 onwards.

Data extraction: One reviewer independently assessed relevant studies, risk of bias and data extraction.

Main Results: Twenty nine studies were included in the final review. Twenty four studies used survey for data collection and five studies used interview. Majority of the studies revealed positive view of physicians towards HPV vaccine with high intent to provide vaccination. Barriers identified against HPV vaccination include the following: cost and reimbursement issue; providers concern about vaccine safety; parental concern over vaccine's safety and efficacy; age is considered too young for vaccination; issue that HPV vaccine could promote sexual activity, recommendation of HPV vaccine from organisations; communication related to sexuality; need for education and other factors like dosing, patient overload, boys should also be vaccinated and parental religious beliefs. No significant difference was noted between specialties with regards to their view about HPV vaccine.

Conclusion: Physicians' role is important in the promotion of HPV vaccine with their high intent and positive attitudes. In order for the HPV vaccination programme to succeed, vaccine should be made available and affordable especially to countries with high incidence of cervical cancer.

1. INTRODUCTION

Public Health is defined as the “science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organisations, public and private, communities and individuals” (Wanless, 2004, p.7)

The focus of public health activities is aimed at preventing problems from emerging or at least preventing their most serious consequences (Baggot, 2010). Three types of prevention have been established in public health, the primary, secondary and tertiary prevention. Yamell and Evans (2007), described primary prevention as preventing the onset of disease through immunisation against infectious disease or tropical disease; secondary prevention is involved in early detection of disease, slowing down or interrupting the natural progression of disease through screening for early tumours or raising symptom awareness and finally, tertiary prevention is preventing the major consequences of an established disease, for example, rehabilitation of patients with disability or long term management of chronic illness.

Vaccination was recognized as one of the ten great public health achievements for the 20th century (Centres for Disease Control and Prevention, Ten great public health achievements, 1999). Hence, with the emphasis of Public Health on the prevention of illness rather than treatment, this research paper will focus on the primary prevention of cervical cancer through immunisation with Human papillomavirus vaccine.

The link between Human papilloma virus (HPV) and cervical cancer was well documented biologically and epidemiologically (Franco, Rohan & Villa, 1999) and concluded by the International Agency for Research in Cancer (IARC) [Studies of Cancer in Human-IARC Monographs]. Human papillomavirus are double-stranded, nonenveloped DNA viruses in the family *Papillomaviridae*. HPV isolates are classified as “types” and assigned numbers signify their order of discovery (de Villiers, Fauquet, Broker, Bernard, Zur, 2004). HPV 16 and 18 were implicated as the causative agents in 70 percent of cases of cervical cancer globally. Together, HPVs 16, 18, 31, 33, 45, 52 and 58 account for about 90 percent of cases worldwide. While, HPV 6 and 11 are the two types with low oncogenic potential which causes 90 to 100 percent of external anogenital warts and nearly all cases of recurrent respiratory papillomatosis (World Health Organization HPV Vaccine Background Paper, 2008).

Furthermore, according to the World Health Organization (WHO: Human Papillomavirus Vaccine Background Paper, 2008), genital HPV infections are highly transmissible with penetrative and non-penetrative sexual contact. It is the most common viral infection of the genital tract. Incidence and prevalence increases with increasing sexual activity and most sexually active men and women will acquire the infection at some time in their lives. The use of condoms can reduce the transmission of HPV infection between partners, however, they are unlikely to provide complete protection against transmission of infection (Winer, Hughes, Feng et al., 2006).

Most HPV infections of the cervix are asymptomatic and transient, within two years, infection may clear and no longer be detectable by commonly used molecular methods. However, persistent HPV infection can lead to the development of precancerous lesions, cancer, notably cervical cancer. The WHO (Cervical cancer, Human papillomavirus and HPV vaccine key points for policy makers and health professionals, 2008) listed factors associated with persistence of HPV and development of cervical cancer as immune suppression, multiparity, early age at first delivery, long term use of hormonal contraceptives, cigarette smoking and infection with other sexually transmitted diseases. It would take a decade for an HPV infection to develop into a cervical cancer.

The World Health Organization states in its November 2010 Summary Report that cervical cancer is the second most common cancer in women worldwide. Cervicalcancer.org (2007), reported that a woman dies of cervical cancer every 2 minutes around the world. Recently, Global Cancer (GLOBOCAN 2008) factsheet showed cervical cancer as the third most common cancer in women and the seventh overall. More than 85 percent of the global burden occurs in developing countries where it accounts for 13 percent of all female cancer. Mortality incidence ratio is 52 percent in 2008, about 88 percent of deaths occur in developing countries. If current mortality trends continue, this proportion is expected to increase to 90 percent by 2020. Moreover, 60 percent of women with cervical cancer will die of their

disease in developing countries due to late detection (WHO: HPV vaccine Background Paper, 2008).

The U.S. Food and Drug Administration (FDA) in June 2006 approved the use of the first prophylactic quadrivalent HPV vaccine in 9 to 26 year old females. This vaccine contains virus-like particles (VLP) for HPV types 6, 11, 16 and 18 to prevent cervical precancers and cancers and anogenital warts in females as well as prevention of vulvar and vaginal precancers and cancers. This vaccine was also licensed for the prevention of anogenital warts in males in some countries. As of March 2008, this vaccine was licensed in more than 90 countries (Human papillomavirus vaccines: WHO position paper, 2009).

In April 2007, another prophylactic bivalent vaccine was first licensed in Australia, which contains virus-like particles of HPV types 16 and 18. This vaccine has been licensed for use in females for the prevention of cervical precancers and cancers as young as 10 years of age. Unlike the quadrivalent vaccine, recommendation for use in males has not been sought. By March 2008, the use of bivalent vaccine was licensed in 40 countries (Human papillomavirus vaccines: WHO position paper, 2009).

Both vaccines are generally well tolerated and have good safety profiles as concluded by the WHO's Global Advisory Committee on Vaccine Safety (June 2007). Likewise, both vaccines are indicated to be administered before first exposure to HPV infection, that is, before the onset of sexual activity or

sexual debut. Some countries recommend vaccinating “catch-up” populations of older females within the range of 13 to 26 year old, emphasizing the benefits offered to those who may not yet be infected.

Three doses are recommended and completed within 6 months. However, the Centre for Disease Control and Prevention in the USA reported that there is a high coverage among girls who received at least one of three necessary doses of an HPV vaccine (7 to 44 percent) but for girls who received three doses coverage was only 27 percents. At present, following completion of the primary series of vaccination, a booster dose is not recommended by the manufacturers.

In UK, routine nationwide vaccination programme for HPV vaccine was launched in September 2008, offered to girls in 12 to 13 years old in schools. According to the joint Department of Health and Health Protection Agency (HPA) annual report 2010, over 60 percent of all females completed the three-course of HPV vaccination during the first two years of the HPV programme.

In the United States, the 2010 overall coverage among girls 13 to 17 for 3 doses of HPV vaccine was 32 percent. In Canada, after the first year of the programme the national coverage varied with a range of 80 to 85 % reported in the Atlantic provinces and 51 % in Ontario. In Panama, the coverage was 67 % for 3 dose HPV vaccination in year 2010. For the first year of vaccination programme in Mexico in 2008, it had 81% coverage for 3 doses

of vaccines (Centres for Disease Control, 2010). Spain reported that during the first year of the HPV vaccination, three dose vaccination coverage was 77.3% for the targeted adolescent girls (Limia & Pachon, 2011).

Being a newly introduced programme for vaccination, uptake is vital for the programme to be effective. Success of HPV vaccines in reducing the incidence of cervical cancer will be dependent on its uptake. Jit, Choi and Edmunds (2008), estimated that for HPV vaccination programme to be effective, 80 % coverage should be achieved. A similar study suggested that to attain an indirect benefit to unvaccinated women who may experience a reduced risk to vaccine-preventable types or herd immunity, vaccine coverage should be between 50 to 70 percent (Boogards et al., 2011).

Acceptability of the target populations and their parents or guardians towards the vaccine is an important factor if high vaccination coverage should be achieved. As the vaccine is targeted at young adolescents, parental acceptance is of primary consideration. Parents' cited reasons for declining vaccination as lack of knowledge about HPV, age-related concerns and low perceived risk of infection. Nevertheless, motivating factors identified were desire to prevent illness, physician recommendation and high perceived risk of infection (Dempsey, Abraham, Dalton, Ruffin, 2009). Parents, particularly mothers were identified as single factors that heavily influence these young girls with regards to vaccination. It was further emphasized that "the gateway to the adoption of the vaccine is through the

parents” (Chollette, 2011). In addition, Ogilvie et al. (2008) particularly pointed out parental attitudes towards HPV vaccine as the strongest predictor of parental intention to vaccinate but health care professionals, particularly physician’s recommendation in favour of HPV vaccination was also emphasized. Those parents with vaccinated daughters had higher HPV vaccine knowledge and were likely to have received recommendation from their paediatrician (Gerend, Weibley & Bland, 2008).

Clearly, physicians are well situated in a position to be in contact point with the target populations. Hence, they have a key role in influencing parents and adolescent girls in increasing awareness to the HPV vaccination programme and intentions to accept vaccination.

In the United Kingdom, HPV vaccine delivery is school-based. Consequently, the school nurses are mostly responsible for delivering the HPV vaccine to 12 to 13 year old girls. A qualitative study was done in two Primary Care Trust (PCT) in the UK to assess the impact of HPV vaccine on school nurses’ role revealed that uptake between schools reflects the difficult relationships with the school nurse, primarily attributed to schools’ attitudes to health interventions, characteristics of the school, organizational problems and multiple school nurse roles and/or personal ability (Brabin, et al., 2011). Another qualitative study was conducted to explore school nurses’ experiences of delivering the UK vaccination programme in its first year through telephone interviews. Unlike the previous study, this study showed

that across UK, implementation of HPV vaccine in its first year exceeded school nurses expectations and success of the programme was ascribed to school nurses' commitment to the programme. Aside from the nurses', this study considered positive newsprint media reporting that accompanied HPV introduction as contributory factor to the success of the programme. However, both studies, agreed that HPV vaccination programme had vastly increased school nurses workload leading them to cut back on their core activities (Hilton, Hunt, Bedford, Peticrew, 2011).

Nevertheless, for the purpose of this review, physicians' attitudes, largely, the primary care physicians, paediatricians and obstetricians attitudes toward HPV vaccine will be considered.

From a survey of verified U.S. physicians online in 2006, variables investigated as predictors of physicians' intention to vaccinate included perceived child risk for HPV, perceived benefits outweighing the risk of the vaccine, perceived severity of HPV, perceived effectiveness of the vaccine in preventing cervical cancer, perceived parental fears about the vaccine encouraging sexual activity, whether they would vaccinate their own child against HPV and physician specialty. Cost of the vaccine was also considered (Barnack, Reddy & Swain, 2009).

Availability of human papilloma vaccine has positioned the primary care physician to ensure its implementation and success (Carderelli & Carderelli, 2008). Recent findings about parental knowledge, attitudes and behaviours

revealed declining patterns in parental awareness, uptake and intent for HPV vaccination. Furthermore, there is a call for physicians to provide more information about the safety of the vaccine (Trim, Nagji, Elit and Roy, 2011), thus, making this review about physicians' attitude towards HPV vaccine more opportune. Therefore, whether physician could foster or hinder in the success of the HPV vaccination programme is an interesting matter to explore.

1.1 Background Literature

Prior to the approval of HPV vaccines, various studies were conducted to look at family physicians attitudes about HPV vaccination and to identify predictors of intent to recommend the vaccine (Riedesel, Rosenthal, Zimet, Bernstein, Huang, Lan & Kahn, 2005) and another study assessed

paediatricians intention to administer the HPV vaccine (Kahn, Zimet, Bernstein, Riedesel, Lan, Huang & Rosenthal, 2005). In both these studies done in the US family physicians and paediatricians demonstrated positive intent to recommend the vaccines.

A four-fold greater likelihood of vaccination when women received a strong recommendation from the physician shows the strength of the physician's recommendation and a significant role he or she played in the decision for vaccination (Rosenthal, Weiss, Zimet, Ma, Good & Vichnin, 2011).

Eighteen months post-licensure of HPV, vast majority of paediatricians and family physicians reported offering the vaccine (Daley et al., 2010), however, physicians' were not routinely providing HPV information to their female patients as found out when women were assessed regarding their perceptions of the education they received from their physicians regarding HPV infection, risk factors and prevention (Cermak, Cotrell & Murnan, 2010). It is a challenge to provide information to ensure that individuals understand the potential benefits of HPV vaccination which should ultimately determine the success of the immunization programme (Brown, Little & Leydon, 2010).

Research about physician's intent to vaccinate has been investigated in different settings. Hopkins, Wood, West and Darling (2009), conducted an online survey in the UK to three medical professional groups, which demonstrated that over 90% supported vaccination of girls as early as ages 11 to 13. In addition, doctors' self-rated knowledge of the HPV vaccine was

an important determinant of willingness to recommend vaccination. Likewise, the study showed that younger, more recently qualified doctors were less likely to be willing to recommend vaccination. In contrast, younger physicians were more likely to discuss about HPV infections, risks and prevention with women than older physicians (Cermak, Cottrell & Murnan, 2010). This survey could serve as a basis for improving doctors' confidence in recommending HPV vaccine by providing more information especially to junior doctors.

Driven by the low US uptake of 6 to 25 percent on the first year of vaccine introduction despite national recommendations for universal vaccination of adolescent girls 11 to 12 year-old girls, a state-wide survey about physicians' recommendation was done in Texas, U.S.A. that would help provide information on intervention to improve recommendation that would in turn improve uptake. The study revealed that half of the physicians' did not follow current recommendations for universal HPV vaccination. In addition, education and policy interventions were the factors related to vaccine recommendations (Kahn, et al., 2009).

Attitudes of Arkansas' primary care physicians towards the HPV vaccine was also surveyed in 2009. Results showed that significant barriers to HPV vaccine administration are cost and perceived low compliance to the dosing schedule. Furthermore, this study recommends vaccine funding for patients

and physicians which is a primary issue and steps should be taken to increase vaccine affordability (Tariq, Bhakta, Grimes & Stevens, 2009).

Physicians' have reiterated in several studies that cost or financial burden of immunization and safety of the vaccine were factors considered as barriers of HPV immunization (Jaspan, Dunton & Cook, 2008; Leddy, Anderson, Power, Gall, Gonik, & Schulkin, 2009).

Paediatricians' intent to recommend HPV and factors influencing their decisions were explored using a qualitative study in the USA. Primary factors driving paediatricians' decision about recommending HPV vaccines are: efficacy, safety and potential health impact of the vaccination, perceived benefits of HPV vaccination included prevention of HPV-related disease and the opportunity to educate adolescents. Anticipated parental belief (e.g. parental denial that their child would be at risk) and providers' belief like reluctance to discuss sexuality with preadolescents are the perceived barriers mentioned. High intent to recommend the vaccine was also one of the findings from this study. The main factors driving intention to recommend HPV vaccines included knowledge, personal and professional characteristics, office procedures, vaccine cost and reimbursement, parental factors and specific attitudes about HPV vaccines. (Kahn, Rosenthal, Tissot, Bernstein, Wetzel & Zimet, 2007)

To investigate issues surrounding HPV vaccine delivery in a multi-ethnic, multi-religious and multi-cultural society in Asia, a qualitative in-depth

interview study was conducted. Physicians rated success of HPV recommendations as very poor. Many expressed reluctance to offer the vaccine to preadolescents. The high cost of the vaccine was the most notable barrier. Being a new vaccine, parents of eligible target populations were concerned about its efficacy and side effects. This study recommends the need to strengthen the infrastructure necessary for HPV vaccine delivery and specifically target poor underserved women (Wong, 2011).

Numerous studies have proliferated to evaluate and assess healthcare providers' knowledge, attitudes, and experience with regards to the new HPV vaccination programme. In order to synthesize, and understand fully, issues surrounding these healthcare providers' attitudes and vaccine delivery, a systematic review will be carried out.

1.2 What is HPV vaccine?

Human papillomavirus vaccines are newly licensed vaccines against HPV infections. These vaccines are prophylactic and not intended to use as treatment in women with existing HPV infection or to treat HPV related

disease. According to Mc Neil (2006), four claimants were recognized as the inventors of HPV vaccine, the National Cancer Institute; Georgetown University in Washington, DC; Queensland University in Brisbane, Australia and University of Rochester in New York.

Currently, there are two available HPV vaccines marketed worldwide, the Quadrivalent HPV vaccine (HPV4; Gardasil, Merck & Co, Inc.) and the Bivalent HPV vaccine (HPV2; Cervarix, GlaxoSmithKline).

Quadrivalent HPV vaccine provides protection against two oncogenic types HPV 16 and 18 and two non-oncogenic types HPV 6 and 11 while the bivalent HPV vaccine protects against two oncogenic types, HPV 16 and 18. Both vaccines have high efficacy against HPV 16 and 18- related cervical precancer lesions while quadrivalent HPV vaccine has high efficacy against HPV 6 and HPV 11-related genital warts and HPV 16 and 18- related vaginal and vulvar precancer lesions (Centre for Disease Control, 2007).

The mechanism by which these vaccines induce protection have not been fully defined but seem to involved both cellular immunity and neutralizing immunoglobulin G antibodies (Stanley, Lowy & Fraser, 2006; Olsson, Villa, Costa, Petta, Andrade, Malm, et al., 2007)

Since both vaccines are composed of virus-like particles and are not live virus, they have good safety profiles and cannot cause a disease.

Advisory Committee on Immunization Practices (ACIP) recommends vaccination of females age 11 or 12 years with three doses of either quadrivalent or bivalent HPV vaccine. As early as 9 years of age, vaccination can be started. Given that HPV vaccines are most effective for females who are naive to vaccine-related HPV types, selection of the target population should be based on data on the age of initiation of sexual activity as suggested by WHO. Hence, the primary target population is likely girls within the age range of 9 or 10 years through 13 years (Conclusion: moderate quality of scientific evidence to support HPV vaccination of young adolescent girls to prevent cervical cancer later in life).

The administration schedules and dosing are similar for both vaccines. The route of administration is intramuscularly with the deltoid muscle as preferred site. Each dose is 0.5 ml, administered in a three-dose schedule. The second dose is administered 1 to 2 months after the first dose and the third dose is administered 6 months after the first dose (ACIP, 2010). In a situation where the HPV vaccine schedule is interrupted the vaccine series does not need to be restarted.

HPV vaccines are contraindicated in pregnant women and those who have experienced severe allergic reactions after previous vaccine dose or to a component of the vaccine. Lactating women could be administered the quadrivalent vaccine as safety data for bivalent vaccine are not yet available (Human papillomavirus vaccines: WHO position paper, 2009).

Furthermore, In countries where both vaccines are licensed, the choice between the two vaccines should be based on the assessment of a number of factors which includes the scale of the prevailing HPV problem (cervical cancer, other anogenital cancers or anogenital warts); the population for whom the vaccine has been approved (girls 9 or 10 through 13 years or older females, women, and/or males); delivery strategies, data on vaccine efficacy against HPV-related diseases and safety in subpopulations eligible for vaccination (Human papillomavirus vaccines: WHO position paper, 2009).

On October 2009, the Food and Drug Administration licensed quadrivalent HPV vaccine for use in males aged 9 through 26. Few days later, Advisory Committee on Immunization Practices (ACIP) provided guidance that quadrivalent HPV vaccine may be given to males aged 9 through 26 to reduce their likelihood of acquiring genital warts but does not recommend quadrivalent vaccine for routine use among males. Efficacy, immunogenicity, safety of quadrivalent HPV vaccine in males, epidemiology of HPV and burden of HPV associated diseases and cancers in males, cost effectiveness of male vaccinations and programmatic considerations were the issues reviewed by the Advisory Committee on Immunization Practice with regards to HPV vaccination in males. (CDC, MMWR, 2010)

Centres for Disease Control and Prevention listed HPV vaccine as the most expensive vaccine available (www.cdc.gov/vaccines/programs/vfc/cdc-vac-

price-list.htm), making its price to high income countries unaffordable for low to middle income countries. However, efforts are being made to provide vaccines especially in areas with disproportionate burden of cervical cancer.

1.3 Implementation of HPV vaccine

Along with the licensure of HPV vaccines by the Food and Drug Administration (FDA) on June 2006, the Advisory Committee on Immunization Practices (ACIP) provided recommendations on its use among females 9 to 26 years old in the United States. The World Health

Organization published a background paper about HPV that include key points and evidence most relevant to the World Health Organization Immunization Strategic Advisory group of Experts in 2008. Human Papillomavirus vaccines: WHO position paper was presented in 2009, providing more comprehensive information about the HPV vaccine particularly its recommendation as a new vaccine.

The introduction of HPV vaccine was supported with expansion of immunization programme beyond infancy and early childhood by WHO/UNICEF Global Immunization Vision and Strategy (GIVS); WHO's Vaccine Preventable Disease Categorization Project, which ranked cervical cancer as 1 of 10 "high-priority" diseases and guided Global Alliance for Vaccines and Immunisation GAVI's new investment strategy; WHO's Global Reproductive Health Strategy for the Prevention and Control of Sexually Transmitted Infections and Millennium Development Goals to combat disease characterized by socioeconomic inequity and to promote gender quality, empower women and improve maternal health (HPV vaccine, WHO, Background paper, 2008).

According to the WHO, decisions on the introduction of vaccine on each country must consider vaccine affordability and financing sources, the financial and operational impact on the delivery systems of immunizations, child and adolescent current immunization services and requirements to

develop new delivery systems for the primary target population. (HPV vaccine, WHO, Background paper, 2008)

Moreover, in recognition to the importance of cervical cancer and other HPV disease as global public health problems, the WHO recommends that routine HPV immunization should be included in the national immunization programmes.

It would be difficult to compare HPV vaccination programmes between countries because of the different vaccine delivery systems. Countries like UK, Australia and Canada have school based programmes for delivery of vaccines while the US has the paediatric and family medicine primary care provider clinic to administer the vaccines.

Regional consultations about cervical cancer and HPV vaccines by the WHO on 2008 pointed out, that to maximized vaccine delivery, a school based programmes would be promising. Kadis et al., (2011) suggested that most parents who support HPV vaccination for adolescents find school-based vaccination an acceptable option. Crosbie and Babin (2009) attributed high level of uptake in England for the first cohort of 12 to 13 year old girls who were offered HPV vaccine to the fact that the vaccine was offered in schools in the majority of Primary Care Trust.

1.4 Uptake of HPV vaccine?

Success in controlling cervical cancer would only be achieved if the vaccine have good uptake. At the same time, uptake of HPV vaccine is strongly influenced by its acceptability. Brewer and Fazekas (2007), listed factors that would increase HPV vaccine acceptability such as the effectiveness of the vaccine, the physician's recommendation and the risk of HPV infection.

The United States had reported an increase of coverage since it was introduced in 2006. Limia and Pachon (2011), cited that in the first year of HPV vaccination programme in Spain, 77.3 percent of target adolescents were given three doses of the vaccine. Furthermore, during the first year of the programme, other countries showed variable coverage for three doses in the respective target groups as follows: 44 percent in Belgium; 53.1 percent in Italy and 80.9 percent in the UK.

1.5 Burden of cervical cancer

GLOBOCAN reported that in 2008, there were 530,000 new cases of cervical cancer and 275,000 deaths. More than 85 percent of the global

burden occurs in developing countries. The high risked regions are Eastern and Western Africa; South Africa; South-Central Asia; South America and Middle Africa. Those with low rates regions are Western Asia; North America; Australia and New Zealand.

More than 260,000 cervical cancer deaths occurred in 2005, according to WHO, if this trend continues, by 2050 incidence of cervical cancer will rise to an estimated 1 million cases per year (WHO: HPV, Background Paper 2007).

Likewise, women over 40 years of age are the most commonly diagnosed with cervical cancer, an age when women maximize their familial, economic, social and educational contributions.

1.6 Why are physicians role important in the success of HPV vaccination programme?

For an immunization delivery system to be effective, it must address the needs of both the target populations and primary care practitioner (Orenstein & Rodewald, 2000). Physicians, aside from the nurses are frontline

personnel who could influence parents and adolescent girls in their intent for vaccination, provide information and offer advice. From the point of view of the physicians, suggested factors that would influence their decision in the delivery of adolescent immunization would be organizational recommendations, vaccine cost and reimbursement, disease characteristics as well as vaccine characteristics. (Humiston, et al., 2008).

Although the role of primary care physician is substantial for the campaign, implementation and delivery of the HPV vaccine, two particular specialties are particularly involved with HPV vaccine. First, the paediatricians, since these age group still covers the age catered by this specialties and secondly, the obstetricians-gynaecologist as this specialty are concerned about women's' reproductive health and diseases.

Adolescent is defined by the WHO as a person between 10 to 19 years old. Knowledge and clinical skills requires for the medical care of adolescents, rest mostly on the practice of paediatrics. Although, gynaecologist were seen as the most appropriate figure to provide information about HPV infection, there is still preference for the paediatricians as immunization provider, which could be explained by the observation that from birth, paediatricians has been around to provide health care to these age groups (Tozzi, Rava, Stat, Pandolfi, 2009).

Communicating about HPV vaccine to parents and adolescent girls which relates to sexually transmitted infection would posed a challenge. Parents

concern that by consenting to vaccination, adolescents will be predispose to risky sexual behaviour.

2.0 RATIONALE AND AIMS

Several studies relating to physicians' attitudes about HPV vaccination programme pre- licensure and post-licensure of the vaccine has conclusive findings and conflicting results. "The systematic review is now widely considered within policy and practice circles to be a good way of making the sometimes conflicting and complicated results of many different types of study accessible and more useable" (Bambra, 2011, p.14). Moreover, the same author gave the definition of systematic review in simple terms as "a method of locating, appraising and synthesising evidence". One reason why the systematic review is becoming more popular and established research in public health policy and practice is in its emphasis on 'evidence-based' decisions and interventions. Thus, the purpose of this review is to synthesize evidence generated from previous researches, to determine if they possess relevant information regarding the questions below:

1. What are physicians' attitudes towards HPV vaccination?
2. What are the factors that influence physicians' decisions in administering HPV vaccine?
3. Is there difference in the views of different medical specialties with regards to HPV vaccination?

This has been achieved through a systematic review of particular and relevant studies in accordance to a strict inclusion and exclusion criteria. As to date, no systematic review has been done about physicians' attitudes

towards HPV vaccination. The focus of this review is on studies done after the approval of first HPV vaccine on 2006.

3.0 METHODOLOGY

This section of the review will be used to explain the methods which were used in searching relevant articles used for analyses and evaluation as well as how the papers were searched for and selected. This will ensure that all studies have been selected for inclusion and quality assessed and those papers that did not qualify will not be included.

Prior to searching for related articles, subject librarian assistance was consulted for a comprehensive search strategy. With the research question as a guide for selecting keywords, a concept map was planned for searching articles. Adapted from the University of Illinois Concept Map, it is a guide that will help the researcher to brainstorm the topic and identify what concept or keywords to use for searching the information. Furthermore, it will also help to identify what is already known about the topic as well as provides an opportunity to think about the topic in new ways and identify gaps in knowledge. Thus, making the information search more effective and efficient. The modified concept map, provides, as well a checklist for resources to search for information and will help keep track on the databases listed. An example of a concept map is in appendices.

3.1 Search Strategy

The first step is to write the topic and encircle the keywords or key phrases. In this review, the keywords or key phrases encircled were “physician” and “Human papillomavirus vaccine” and “attitudes”. The next step is to write the key words that were encircled in boxes provided and list other terms that can be used to describe the keywords. To compile the keywords to search, the author’s own knowledge of the area of research, the medical subject headings (MeSH) on-line vocabulary and guidance from the subject librarian were utilised. The following text words for physician and HPV vaccine can be found in table 2.

Table 1 Keywords and synonyms

Physician	Human papilloma virus vaccine	Attitudes
Doctor*	HPV vaccine	views
Clinician*		knowledge
Obstetrician*		perceptions
Paediatrician*		
General practitioner*		
Family physician*		
Primary care staff*		

3.2 Search Methodology

The first and second step in performing journal search by using concept map as a guide had been performed. The final step is to list the resources planned to search for information. For this review, the resources/ databases listed were: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Pubmed, Web of Knowledge, Cochrane Library and Science Direct.

The above key words have been combined using Boolean logic (AND, OR, NOT) to create a set of results that should contain articles relating to the topic in question. The AND operator is used to ensure that all search terms must appear in the record as demonstrated below. The OR is used to accumulate similar terms and thus make the search larger. This will retrieve all records with physician, general practitioner, obstetrician, paediatrician, primary care staff, primary care personnel or all of these six were found.

In order to improve search results and make database searches more efficient, truncation and wildcard symbol (*) were also used. Truncation which is also called stemming is a technique that could help broaden searches by including various word endings

(www.memphis.edu/instructionalsvcs/pdfs/symbols.pdf).

For example in this search, by placing the symbol (*) at the end of the word physician, database will return results that include physician and physicians.

Therefore, the search terms would appear as:

“Human Papillomavirus vaccine” OR “HPV”

AND “Physician*” OR “General Practitioner*” OR “clinician*” OR

“Obstetrician*” OR “Paediatrician*” OR “Primary care staff”

AND “attitude*” OR “views” OR “perceptions”.

The operator NOT is used to exclude records from the search. For example in the search “Human papillomavirus vaccine” NOT “Human papillomavirus screening”, would retrieve all records which contained the term Human papillomavirus vaccine and not those which contained the term Human papillomavirus screening.

When searching database, the keywords were searched in all text of the journals not just in the title and abstract in order to retrieve more relevant articles. However when this refinement option was not available the search was extended to the entire document

3.3. Database search

The third step in searching for journals using the concept map is to list the resources planned to search for information. As mentioned, these databases include CINAHL, Pubmed, Web of Knowledge, Cochrane and Science Direct. These online databases were selected from subject resources for Public Health Research from the university intranet. Journals were searched in these five databases which will be described below to provide understanding why specific databases were chosen, followed by searches into specified journals.

CINAHL Plus with Full Text (www.ebscohost.com), the Cumulative Index to Nursing and Allied Health Literature is the most comprehensive resource for nursing and allied health literature. Providing more than 2.8 million records dating back to 1981; full text for more than 770 journals; full text for more than 275 books and monographs; full text coverage dating back to 1937 and indexing for more than 4600 journals. It also includes searchable cited reference on more than 1350 journals.

This database covers nursing, biomedicine, health sciences librarianship, alternative or complementary medicine, consumer health and 17 allied medicines.

Pubmed (www.ncbi.nlm.gov) is a major database for medical and bioscience literature. This database provides reference usually with abstracts and links

to the full text of some articles. It comprises more than 21 million citations for biomedical literature from MEDLINE, life science journal and online books. It is a free access internet version of MEDLINE, also including records from before 1966 (old MEDLINE), some very recent records and some of other life sciences journals.

MEDLINE is an electronic database produced by the United States National Library of Medicine (NLM). It indexes millions of articles in selected journals available through most medical libraries and can be accessed on the internet.

Web of Knowledge (www.wokinfo.com) contains Web of Science and MEDLINE. This database provides searchable index of science, social sciences and arts and humanities citations. It covers a broad subject area and covers 23,000 journals; 23 million patents; 148,000 conference proceeding; 40 million source items; 760 million cited reference; 9,000 websites; more than 250 product categories and 256 product categories.

The Cochrane Library (www.thecochranelibrary.com), is a collection of databases published on CD-ROM and the internet and updated quarterly, containing the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials, the Database of Abstracts of Reviews of Effects, the Cochrane Methodology Register, the Health Technology Assessment Database, NHS Economic Evaluation Database and Information about the Cochrane collaboration.

This data base is the source of evidence about the effects of health care. It also includes the full text of systematic reviews of clinical trials.

Science Direct (www.sciencedirect.com), is a leading full-text scientific database offering journal articles and book chapters from more than 2500 peer-reviewed journal and more than 11,000 books. There are more than 9.5 million articles and chapters. Over 1,500 full text science and medical journals could be accessed on this data base.

3.4 Journal Articles

In order to recover other published articles that were not retrieved through database, journal articles that are specific to the topic investigated in this particular review such as physicians, HPV vaccines and views were searched through individual academic journals which are listed below:

- Vaccine
- The Lancet
- Journal of Adolescent Health
- International Journal of Gynaecology and Obstetrics
- Journal of Paediatric and Adolescent Gynaecology
- Ambulatory Paediatrics
- European Journal of Obstetrics and Gynaecology
- Clinical Journal of Oncology Nursing
- Journal of Women's Health

Supplemental searches were done for this particular review in order to collect more relevant articles, such as hand searching for journals, searching in websites and citation follow up. Unpublished articles were also sought by using the US ClinicalTrials.gov (<http://clinicaltrials.gov/ct2/info/about>) and the United Kingdom's National Research Register (NRR) Archive (<http://www.nihr.ac.uk/Pages/NRRArchive.aspx>).

3.5. Selection Criteria

The next phase of the selection process after selection of articles of particular interest has been identified is to refine search by utilising the limit strategies within the database and journal articles. This allows more filtering which only identifies articles of specific relevance and limits the article to review to a more manageable number. PUBMED database may sometimes allow free online access to the full text of the articles of interest. Most full text of the relevant articles were gained via the electronic resources catalogue of the University of Chester (<http://libcat.chester.ac.uk>). However, if full text of the articles could not be retrieved with these options, then interlibrary loan service was resorted to provide full text as abstracts are not acceptable for review.

Studies were deemed relevant and included for review if:

- Discussed attitudes, views and perceptions about HPV vaccines in female, adolescence age group.
- Sample population comprise of eligible physicians, paediatricians, obstetricians or primary care staff.
- Methodology is a survey.
- Articles must be written in English language.
- Articles must be original studies.
- Articles published in 2006 to the present, that is, after the approval of the vaccine.

Only articles that conform to all of the mentioned criteria were deemed eligible for review. Other articles that did conform to all the mentioned criteria were excluded from the review but if found to be relevant, were used to support analytic debate. To ensure that articles were not reviewed multiple times, duplications were carefully considered.

Search for this review was not limited to countries as the HPV programme has a worldwide implementation. However it was suggested that systematic review may sometimes benefit from spatial restrictions because in terms of implementation and transferability, country or cultural context may matter immensely (Egan, et al., 2009).

An initial pilot search exercise was carried out for this review. This would be beneficial for search strategy to produce an impression of where studies are

located, given that it is not necessary or productive for a systematic review to search everywhere as suggested by Bambra (2009).

Harden, et al (2003) states that “methods for systematic reviews are well developed for trials but not for non-experimental or qualitative research”. Thus, from the context of evidence based medicine, randomized controlled trial (RCT) is considered the greatest evidentiary value for assessing efficacy of interventions (Jarlais, Lyles, Crepas, 2004) However, Victoria et al., (2004) disputed this argument in view of the fact that evidence based public health will necessarily involved the use of research designs other than randomized controlled trials. They also argued that RCT may not be practical and ethical in evaluating many public health interventions.

People’s perspective and experience, sometime called “view” studies maybe difficult to locate as they could not be easily classified as qualitative or quantitative and often failed to meet the methodological reporting standards use in a newly developed assessment tools (Harden, et al. 2004).

Bryman (2008), described a survey research as a cross sectional design in relation to which data are collected mainly by self completion questionnaire or structured interview at a single point in time in order to collect data. It could provide a representative and quantitative picture of respondent issues, concerns and attitudes (Mills, Montori, Ross, Shea, Wilson & Guyatt, 2005).

In contrast, qualitative researches are those that usually emphasizes words rather than quantification in the collection and analysis of data (Bryman,

2008), therefore, provides insights into emotional and experiential phenomena to determine the perspective of those being studied (Giacomini & Cook, 2000).

4.0. Data Analysis

4.1 Data collection and Extraction

Articles selected for systematic review will differ in their aims and objectives, outcomes, analysis and overall conclusions, thus, each methodology will have different protocol. Therefore, to allow effective comparison between studies it is of vital importance that a universal, self explanatory method of data extraction and subsequent presentation is used (Black, 2007). The following data points were from the research studies included in the review:

1. Author, with priority on the first author
2. Date of publication
3. Date when study was conducted
4. Place where study was conducted
5. Type of participants
6. Number of participants
7. Method of data collection
8. Response rate
9. Outcome

Data extraction form was developed and pilot tested on two articles. Once remaining modifications were made to the extraction form, one reviewer (myself) extracted the data from included studies and records it. If there were inadequate data or information for a given outcome, that particular published

article was deemed inappropriate for analysis and was therefore excluded from the review.

4.2 Quality Criteria and Selection of bias

As studies included in this review varied in the methods they used, a checklist was adapted from Harden et al., 2004. Who authored a study that describes the methods developed for reviewing research on people's perspective and experience or "view" studies.

Table 2 demonstrates methods of data collection and analysis used as adapted from Harden et al (2004).

Twenty three of twenty nine studies included in the review use fixed response self-completion questionnaire, four studies utilised interview and 1 study each for study that employ fixed and open response self-completion questionnaire and another study make use of survey followed by interview.

Table 3 demonstrate method of analysis used in this review.

Majority (twenty three of twenty nine) of the studies in this review utilized descriptive and/or inferential statistics in the analysis of the data.

Table 2 Methods of Data collection and analysis used (n=29)

	Number
Fixed response self completion questionnaire	23
Fixed and open response self completion questionnaire	1
Open response self completion questionnaire	0
Interviews and/or focus groups	4
Combination of interview and questionnaire	1
Total	29

Table 3 Methods of Data Analysis (n=29)

	Number
Descriptive and/or inferential statistics	23
Qualitative data analysis	3
Combination	3
Total	29

Quality assessment of included studies.

There are numerous scales available for the assessment of bias and control of quality. The introduction of reporting guidelines like Consolidated Standards of Reporting Trials (CONSORT), Standards for Reporting Studies of Diagnostic Accuracy (STARD) and Strengthening the Reporting of Observational Studies in Epidemiology (STROBE), could be employed for trials and diagnostic study report presented more likely in a standard way. However, because of the limited timeframe to carry out this review and assess quality of studies incorporated in this review, a seven quality criteria adapted from Harden, et al (2004) were utilized. This quality assessment tool may need to be further developed. Nevertheless because it is simple, quick to use and could be acceptable to both qualitative and quantitative, it was deemed to be most appropriate for this investigation. Table 4 demonstrate the checklist and number of studies included in the review meeting each quality criterion.

Table four displays the number of studies meeting the seven criteria as reviewed by a single reviewer (myself). Only one study did not met the criteria of describing explicitly the aim and objective of the study conducted. Most of the studies met the seven criteria for quality assessment, thus, deemed to be of good quality.

Table 4. Number of studies included in the review meeting each quality criterion (n=29)

Criteria		Number
1.	An explicit theoretical framework and/or literature review	25
2.	Aims and objectives clearly stated	28
3.	A clear description of context	26
4.	A clear description of the sample and how it was recruited	24
5.	A clear description of methods used to collect analyze data	23
6.	Attempts made to establish the reliability or valid of data analysis	20
7.	Inclusion of sufficient original data to mediate between evidence and interpretation	28

5.0 Results

This section of the review will discuss results from literature search of five databases, results of assessment of quality of studies included. Furthermore, to present the result clearly, sections will be discussed based on the research questions and objectives of this review.

5.1 Literature search results

The search from the previously described databases and journal titles yield a potential 1,454 articles for review. Upon refinement, and limiting the search to incorporate only those applicable to the review, identifying those that met the inclusion criteria, as well as disregarding duplication, rejecting editorials, commentaries and reviews; excluding those with participants other than physicians and done prior to 2007, that before the vaccine approval, a total of 29 studies were deemed sufficient enough to be included in the review.

Other reasons for non-inclusion were: knowledge, attitudes or behaviour of physicians are not discussed; sample population is not comprised of physicians; articles are not about HPV vaccine, instead about HPV infection and screening; about HPV vaccination in males and not in English language.

The summaries of all 29 studies can be found in appendix 2.

Figure 1, demonstrate the overall results of the literature search

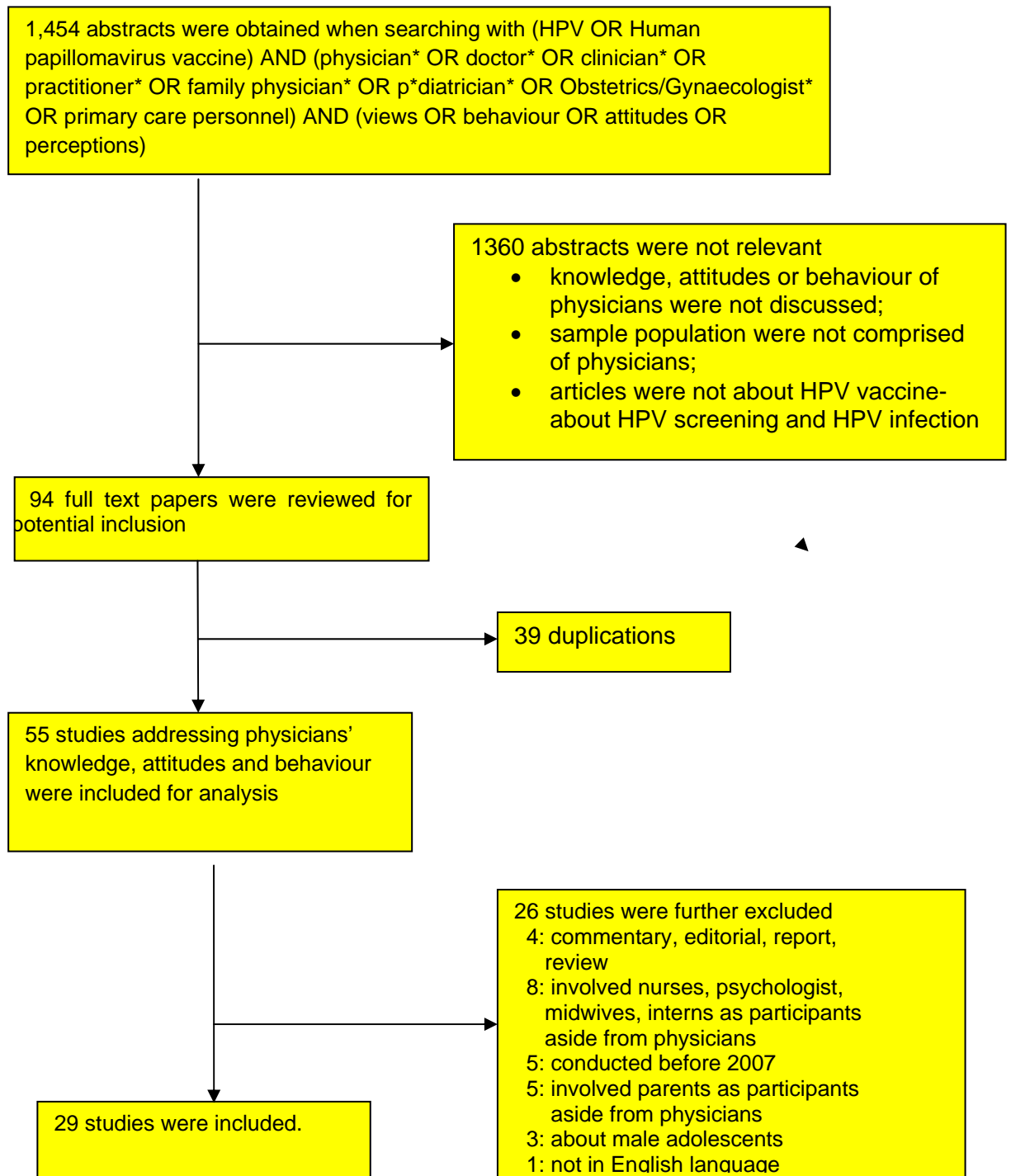


Figure 1. Flow chart for search and selection of studies for relevant articles included in the Systematic Review.

5.2 Characteristics of included articles

As previously stated only papers done after HPV vaccine approval in 2007 were included in the review. Majority of the studies included were published in year 2009 (n=6) and 2010 (n= 9). In accordance with the inclusion criteria all studies reviewed were in English language. Likewise, majority of the studies were conducted in 2006 (n=8) and 2008 (n=7). From the 29 studies included for review, 24 studies used survey method for data collection (mailed self- administered questionnaire, n= 15; online self-administered questionnaire, n=7; through fax, n=2) while the remaining 4 studies utilized in-depth interview method to collect data with 1 study that utilized both methods.

Regarding population characteristics, majority of the study was conducted in the USA (n=21) and Australia (n=2) with the remaining studies from each countries: Canada, Italy, UK, France, India and Malaysia.

A greater part of the study was conducted across mixed of populations (general/family, obstetrician/gynaecology and paediatricians) with 14 out of 29 studies followed by studies with paediatricians (n=9) as participants and obstetrics/gynaecology with 3 studies.

Response rate was reported by seven out of 29 studies to be low in their limitations of study (Kahn, 2009; Wong, 2009; Tariq, 2009; Askelson, 2010;

Brotherton, 2010; Ko, 2010 and Schnatz, 2010). Response rate was calculated as the number of surveys returned divided by the number of the surveys that were sent and not returned as undeliverable (Roberto, Krieger, Katz, Goei & Jain, 2011). This may result to non-response bias. However, Grooves (2006) argued that low response rate do not necessarily indicate a non-response bias. Compared to the general population, non-response bias might not be as critical, which could be accounted to the uniformity of knowledge, attitudes and behaviour in particular group of physicians (Kellerman & Herold 2001)

Monetary incentive, imbursement or compensation was identified in eight out of 29 studies included in the review (Tissot, 2007; Kahn, 2007; Weiss, 2010; Brotherton, 2010; Lutringer-Magnin, 2011; Vadaparampil, 2011; Young, 2011 and Zimet, 2011).

On line survey was used in five studies as a method of data collection. Kellerman and Herold (2001), found that surveys completed on the web among physicians have a tendency to incur a greater non-response bias compared to surveys conducted in other modes. This finding was contradictory to the result of the study that no response bias exist when web and mail was compared. Furthermore, this bias was only present toward specialist in the web group (Beebe, Locke, Barnes, Davern & Anderson, 2007).

Characteristics of included studies can be referred to in Table 5.

Table 5. Demonstrate the basic characteristics of included studies within systematic review

(Arranged according to publication year)

First author	Publication Date	Year Survey Distributed	Place Where Study Completed	Participants and Number of Participants	Response Rate	Method of Data Collection
Tissot	2007	2005	USA	Paediatrician (n=31)	Represent 72% of initially contacted	In depth semi-structured interview
Kahn	2007	2005	USA	Paediatrician (n=31)	72% of initially contacted	One on one interview
Esposito	2007	2006	Italy	Paediatrician (n=311)	77.8%	Self-administered questionnaire
Duval	2007	2006	Canada	Paediatrician (n=461) Obstetrician (n=395) Family physician (n=408)	51%	Self-administered questionnaire
Feemster	2008	2006, December to 2007 February	USA	Paediatrician (n=101)	59%	On line questionnaire
Ishibashi	2008a	2006	USA	Paediatricians (n=373)	50%	On line survey

First author	Publication Date	Year Survey Distributed	Place Where Study Completed	Participants and Number of Participants	Response rate	Method of Data Collection
Ishibashi	2008b	2006	USA	Paediatricians (n=373)	50%	On line survey
Keating	2008	2007	USA	Paediatrician(n=22)) OB/GYN (n=26) Family/Gen practitioner n=65) Internist (n=30)	74%	Interview
Jaspan	2008	2006	USA	Obstetrician (n=9)	Not stated	Questionnaire
Wong, L	2009	2008	Malaysia	General physicians (n=176)	29.5%	Questionnaire (mailed)
Hopkins	2009	2007	UK	General Practice(n=62) Paediatrics(n=103), Obstetrics/Gynaecology (n=57)	23 %	On-line survey
Leddy	2009	2007	USA	OB/GYN (n=3896)	28.03%	Survey

First author	Publication Date	Year Survey Distributed	Place Where Study Completed	Participants and Number of Participants	Response Rate	Method of Data Collection
Kahn	2009b	2008	USA	Family Med (n=384) Paediatrics (n=298) OBGYN (n=289) Internal med (n=148) Other (n=4)	Not stated	On line survey
Tariq	2009	Not stated	USA	Family physicians (n=821) Internal Medicine (n=222) Paediatrician (n=190)	20.4%	Questionnaire
Huey	2009	2006	USA	Primary care practitioner(n=55)	85%	Survey
Askelson	2010	2007	USA	General physicians (n=207)	24.6%	Survey
Weiss	2010	2008	USA	Family physicians (n=499) Paediatrician (n=595)	44.7%	Survey
Tan	2010	2009	Australia	Gynaecologist(n=731)	49.0%	Survey

First author	Publication Date	Year Survey Distributed	Place Where Study Completed	Participants and Number of Participants	Response Rate	Method of Data Collection
Krupp	2010	2008	India	OB/GYN (n=6) Paediatrics (n=9) Family or general practice (n=5)	Not recorded	In depth interview
Brotherton	2010	2008	Australia	General practitioner (n=298)	32%	Survey
Wong	2010	2006-2007	USA	General practitioner/Family practitioner (n= 421), OB/GYN (n=333), Internal Medicine(n=310)	67.5%	Survey
Ko	2010	2007	USA	Internal Medicine(n=212), Paediatrician (n=122), OBGYN (n=90)	28.9%	Online survey
Schnatz	2010	2008	USA	Paediatrician (n=345)	32,5%	Survey (mail)
Daley	2010	2008	USA	Paediatrician (n=429) Family physician (n=419)	Paediatrician (81%) Family physician (79 %)	Online survey and mail based on participant preference
Lutringer-Magnin	2011	2007 to 2008	France	Paediatrician (n=279)	93%	Self-administered questionnaire and interview

First author	Publication Date	Year Survey Distributed	Place Where Study Completed	Participants and Number of Participants	Response Rate	Method of Data Collection
Roberto	2011	Not recorded	USA	Paediatrician(n=406)	34.7%	Survey
Vadaparampil	2011	2009	USA	Family physician (n=500), Paediatrician (n=287), Obstetrician & Gynaecology (n=226)	Not recorded	Survey
Young	2011	2007	USA	Family practitioners (n=169); Obstetrician & Gynaecologist (n=216)	48.7%	Survey
Zimet	2011	2008	USA	Family/General physician (n=113); OB/GYN (n=158)	34.0%	Survey through fax

Studies included in the review posed a variety of objective, design and method of data collection and analysis. In order to simplify analysis, outcomes were classified whether focus was given or attitudes, described in this review as physicians' intention or recommendation to provide the HPV vaccine. Studies that identified and listed barriers were grouped as to what barrier and factor to provide framework for analysis.

Table 6 demonstrates the included studies for the review with its objective, focus and identification of the barriers for vaccination.

Table 6. Included studies in the review by its objective, focus and barrier of vaccination discussed

First author	Publication Date	Year survey distributed	Place where study completed	Participants and number of participants	Method of data collection	Objective of the study	Knowledge focus	Attitude focus	Barriers
Tissot	2007	2005	USA	Paediatrician (n=31)	In depth semi-structured interview	Examine paediatricians views about key issues related to HPV vaccine delivery and identify their strategy for effective vaccine delivery	No	Yes	Yes
Kahn	2007a	2005	USA	Paediatrician (n=31)	One on one interview	Describe the range of paediatricians' attitudes about HPV and explore factors influencing their intention to recommend HPV	No	No	Yes
Esposito	2007	2006	Italy	Paediatrician (n=311)	Self-administered, anonymous questionnaire	Evaluate knowledge and attitudes regarding HPV and its prevention	Yes	Yes	Yes
Duval	2007	2006	Canada	Paediatrician (n=461) Obstetrician (N=395) Family physician (n=408)	Self-administered questionnaire	Assess knowledge, attitudes and beliefs about HPV infection and prevention as well as factors associated with willingness to prescribe HPV vaccine	No	Yes	Yes
Ishibashi	2008a	2006	USA	Paediatricians (n=373)	On line survey	Examine whether paediatrician would recommend the vaccine, obstacles they encountered and characteristic with not recommending to eligible patients	No	Yes	Yes

First author	Publication Date	Year survey distributed	Place where study completed	Participants and number of participants	Method of data collection	Objective of the study	Knowledge focus	Attitude focus	Barriers
Ishibashi	2008b	2006	USA	Paediatrician (n=373)	On line survey	Determine paediatricians attitudes about HPV and to compare their attitudes with those expressed by the general public	No	Yes	No
Keating	2008	2007	USA	Paediatrician (n=22) Obstetrician/gynaecologist (n=26) Family/ Gen practitioner (n=65) Internist (n=30)	Interview	Provide an overview of potential barriers to provision of HPV vaccine and empirical data on the concerns of medical practices that may inhibit vaccine provision	No	Yes	Yes
Jaspan	2008	2006	USA	Obstetrician (n=9)	Questionnaire	Determine the percentage of patients vaccinated per individual provider and to document attitudes and reasons for the acceptance of the vaccine	No	Yes	Yes
Wong	2009	2008	Malaysia	General physicians	Questionnaire (mailed)	Determine physicians' experiences in providing HPV vaccination	No	Yes	Yes
Hopkins	2009	2007	UK	General practice (n=62) Paediatrician (n=103) Obstetrics and gynaecology (n=57)	On line survey	Investigate the willingness of clinicians to recommend HPV vaccine and to determine factors affects their willingness	No	Yes	Yes

First author	Publication Date	Year survey distributed	Place where study completed	Participants and number of participants	Method of data collection	Objective of the study	Knowledge focus	Attitude focus	Barriers
Leddy	2009	2007	USA	Obstetrician and gynaecology (n=3896)	Survey	Examine obstetricians and gynaecologists' practices, opinions and knowledge regarding HPV vaccine	Yes	Yes	Yes
Kahn	2009b	2008	USA	Family medicine (n=384) Paediatrics (n=298) Obstetrics and gynaecology (n=289) Internal Medicine (n=147) Other (N=4)	On line survey	Examine physicians' recommendations for the quadrivalent HPV in 11-12 year old girls, intention to recommend HPV vaccines to 11-12 year old boys and attitudes about mandated HPV vaccination for 11-12 year old girls	No	Yes	Yes
Tariq	2009	Not stated	USA	Family physicians (n=821) Internal Medicine (n=222) Paediatrician (n=190)	Questionnaire	Assess attitudes about the HPV vaccine; to expose barriers that physician encounter when prescribing or administering the HPV vaccine	No	Yes	Yes

First author	Publication Date	Year survey distributed	Place where study completed	Participants and number of participants	Method of data collection	Objective of the study	Knowledge focus	Attitude focus	Barriers
Huey	2009	2006 to 2007	USA	Family Medicine/ Paediatrician/ Obstetrician and Gynaecology (n=55)	Survey through fax	Assessed attitudes and practices related to HPV vaccination	No	Yes	Yes
Askelson	2010	2007	USA	General physicians (n=207)	Survey	Assess factors related to physicians' intention to vaccinate patients against HPV	No	Yes	Yes
Weiss	2010	2008	USA	Family physicians (n=499) Paediatrician (n=595)	Survey	Assess physicians' attitudes and perceptions regarding potential HPV vaccination of males	Yes	Yes	No
Tan	2010	2009	Australia	Gynaecologist	Survey	Established the attitudes of gynaecologist to HPV vaccination when advising women in various age groups	No	Yes	No
Krupp	2010	2008	India	Obstetrics & gynaecology (n=6) Paediatrics (n=9) Family or general practice (n=5)	In depth interview	Investigate physician intention-to-recommend the HPV vaccine to parents of adolescent girls	No	Yes	Yes

First author	Publication Date	Year survey distributed	Place where study completed	Participants and number of participants	Method of data collection	Objective of the study	Knowledge focus	Attitude focus	Barriers
Brotherton	2010	2008	Australia	General practitioner (n=298)	Survey	Investigate general practitioners' experiences of delivering the HPV vaccine to women aged 18 to 26	No	No	Yes
Wong	2010	2006-2007	USA	General practitioner/Family practitioner (n= 421), Obstetrics and gynaecology (n=333), Internal Medicine (n=310)	Survey	Evaluate physician intentions regarding HPV vaccine's impact on future screening.	No	No	No
Ko	2010	2007	USA	Internal Medicine (n=212), Paediatrician (n=122), Obstetrics & gynaecology (n=90)	On line survey	Compare physician practices, attitudes and barriers toward human papillomavirus (HPV) vaccination	Yes	Yes	Yes
Schnatz	2010	2008	USA	Paediatrician (n=345)	Survey (mail)	Investigate practitioner acceptability of the recommendation to offer the human papillomavirus (HPV) vaccine to adolescent women	Yes	Yes	Yes

First author	Publication Date	Year survey distributed	Place where study completed	Participants and number of participants	Method of data collection	Objective of the study	Knowledge focus	Attitude focus	Barriers
Daley	2010	2008	USA	Paediatrician (n=429), Family physicians (N=419)	Survey (online and through mail based on participants preference)	Assess HPV vaccination practices, perceived barriers to vaccination and factors associated with whether physicians strongly recommend HPV vaccine to 11 to 12 year old	No	Yes	Yes
Lutringer-Magnin	2011	2007 to 2008	France	Paediatrician (n=279)	Self-administered questionnaire and interview	Examine the perception, attitudes and practices of GPs in relation to HPV	No	Yes	Yes
Roberto	2011		USA	Paediatrician	Survey	Examines the ability of theory of reasoned action and theory of planned behaviour to predict whether or not paediatricians encourage parents to get their adolescent daughters vaccinated against HPV	No	Yes	No
Vadaparampil	2011	2009	USA	Family physician (n=500), Paediatrician (n=287), Obstetrician & Gynaecology (n=226)	Survey	Determine the prevalence of physician recommendation of HPV vaccination in early ages (11-12), middle (13-17) and late adolescent (18-26); identify factors associated with recommendation in early adolescents	No	Yes	Yes

First author	Publication Date	Year survey distributed	Place where study completed	Participants and number of participants	Method of data collection	Objective of the study	Knowledge focus	Attitude focus	Barriers
Young	2011	2007	USA	Family practitioners (n=169); Obstetrician & Gynaecologist (n=216)	Survey	Evaluate use of the HPV vaccine, attitudes and barriers among gynaecologist and family practitioners between the 2 specialties	No	Yes	Yes
Zimet	2011	2008	USA	Family/General physician (n=113); Obstetrics/gynaecology(n=158)	Survey through fax	To determine whether physicians consider the patient's relationship status or HPV/Pap testing history when deciding whether to recommend the HPV vaccine to women ages 19-26.	No	Yes	No

.3. Question one. “What are the physicians’ attitudes towards HPV vaccination?”

Twenty five studies were found to have reported physicians’ attitudes in their findings. Attitudes by physician were linked on their intent to vaccinate their patients against HPV vaccine and their recommendation for their patients to vaccinate against HPV. Kahn (2007) and Askelson (2010) described physicians’ attitude as positive. Esposito (2007) illustrate in his study of Italian physicians that majority intent to recommend the vaccine to female adolescent and more likely to males. This finding was also reported by Kahn (2009), Roberto (2011), Lutringer-Magnin (2011), Tariq (2009) as well as Weiss (2010). Kahn(2009) rationalized that physicians may be more willing to recommend the HPV vaccine to boys now than in the past because more data are available about the efficacy and safety of HPV vaccine in girls and clinicians maybe more aware of HPV related disease in men. Physicians from Canada professed higher intent to recommend the HPV vaccine if it publicly funded (88 percent) and only would not likely (84 percent) if patients have to pay for the vaccine.

Studies involving obstetrics and gynaecology as participants (Tan, 2010 & Jaspán 2008) also show strong support for HPV vaccine although gynaecologist from the latter mentioned study do not see themselves in the traditional role as vaccinators..

Physicians from less developed countries like India (Krupp, 2010), expressed positive attitude toward HPV vaccination in general, although majority believed

that few of their patients would react positively to a vaccine recommendation. Practicing OB/GYN suggested that recommending immunization was not appropriate in their work setting, which could likely be a factor of constrain in the promotion of HPV vaccination. In addition, a physician pointed out patient load was perceived as an obstacle in promoting the vaccine.

Another study from less developed multi ethnic country, Malaysia, Wong (2009), view HPV vaccine as great promise in cervical cancer prevention. However, cultural sensitivity is an issue of consideration by Malay Muslim physicians when recommending HPV vaccine. Physicians agreed that better acceptance would benefit the target population if HPV vaccine is recommended for cervical cancer than sexually transmitted disease.

Six authors described knowledge of physician regarding HPV in their studies (Esposito, 2007; Feemster, 2008; Hopkins, 2009; Leddy, 2009; Brotherton, 2010 and Schnatz, 2010). Majority of these studies exemplify physicians' knowledge about HPV vaccine. However, Esposito (2007), demonstrate in his study about Italian physicians' knowledge to be poor concerning HPV disease, and its prevention. Although, majority would still recommend HPV vaccination.

Hopkins (2009), pointed out findings in his study of UK physicians' that self-rated knowledge of the HPV vaccine was an important determinant of willingness to recommend vaccination.

Question 2. What are the factors that influence physicians' decision in administering HPV vaccine?

This section of the review will focus on the factors identified from the studies considered as barriers to their intent to vaccinate their patients against HPV infection.

Of the 29 studies included in the review, 23 made some mentioning of barriers in physicians' intent to vaccinate their patients for HPV vaccine. The following patterns regarding barriers for intention to provide vaccine will be discussed.

1. Cost of the vaccine and/or problem with reimbursement

Cost of the vaccine or problem with reimbursement was identified in 13 of 29 studies (Kahn,2007; Ishibashi, 2008a; Keating, 2008; Jaspan, 2008; Wong, 2009; Leddy, 2009; Kahn, 2009; Tariq, 2009; Huey, 2009; Krupp, 2010; Ko, 2010; Daley, 2010 and Young, 2011).

Physicians delivering HPV vaccine through clinic based considered cost of the vaccine as the most important factor preventing them from providing vaccine to their patients. High cost of the vaccine and inadequate reimbursement were consistent concern of most physicians.

Wong (2009), in her study in a developing country like Malaysia, found out that physician viewed high cost of the vaccine as a great challenge. With no public source of funding for HPV vaccine and the burden cause by the three doses vaccine to an average Malaysian household income, cost of the vaccine would remain to be an important contributing factor that limits its use.

This same finding was also identified by Krupp (2010) as a perceived barrier in his study conducted in India.

Leddy (2009), described results from her study, that many physicians agreed, cost is a reason for patient refusal and a deterrent from mandating the vaccine.

Tariq (2009) pointed out affordability of vaccine to a significant barrier in his studies, identifying the cost of the vaccine as more expensive than most vaccine.

2. Providers concern about vaccine's safety and efficacy.

Three of the twenty nine studies discussed about provider's issues of concern regarding safety and efficacy of the vaccine, which may result to be a barrier in vaccine promotion. These studies were authored by the following: Kahn (2007), Ishibashi (2008a), and Jaspan (2008).

Kahn (2007) found out in his study that physicians were concerned that HPV immunization could have an adverse effect. Beliefs about efficacy by the physicians is related to immunogenicity, primarily about the decline of protection by the time adolescents become sexually active and non-compliance with three doses could lead to suboptimal immune response.

Concerns towards safety by patients were considered as a provider's barrier to the acceptance of the vaccine (Jaspan, 2008).

3. Parental concern over vaccine's safety and efficacy.

Parental barrier over vaccine's safety and efficacy was reported in their studies by Kahn (2009), Feemster (2008), Wong (2009), Ko (2010), Lutringer-Magnin (2011) and Schnatz (2010).

Schnatz (2010), discussed findings about unknown long term effect of the vaccine and the belief that their child is not yet sexually active were the reasons provided to their physicians by parents of adolescent girls who chose not to have their children vaccinated with HPV.

Ko (2010) reported that the most frequently encountered barrier for vaccination by the paediatricians are parental fear for the vaccine's adverse effects.

4. The age of the adolescent is considered too young for vaccination.

Wong (2010), Huey (2009), Vadaparampil (2011) and Kahn (2009), particularly mentioned age of the target populations to be too young for vaccination.

Vadaparampil found out that most physicians would not recommend HPV vaccine to the younger age group of 11 to 12 years old.

5. The issue that HPV vaccine could promote sexual activity.

Huey (2009) and Krupp (2010) reported from the result of their studies that issues about HPV vaccination could promote risky sexual behaviour was

considered as a barrier for providing the vaccine particularly on the parental perspective.

Ishibashi (2008a) described providers' concern about vaccines' impact on adolescents' sexual activity.

HPV vaccine may encourage sexual activity was recorded by Ko (2010) and Wong (2009) on their studies.

However, Tariq (2009) discussed in his study that physicians did not believe HPV vaccine increased patients' sexual activity.

6. Recommendation of HPV vaccine from organization.

Two studies showed findings that providers are more inclined to provide vaccination if it is recommended by influential organisation Tissot (2007) and Askelson (2010). The latter discussed that intent for vaccination usually follows organisation recommendation and its importance of recommendation is highly considered by the providers.

7. Communication related to sexuality.

Esposito (2007) reported that paediatricians' propensity not to talk about question related to sexuality with their patient's parents could represent a barrier for vaccination. Likewise, Daley (2010) emphasized the necessity of discussing sexuality before recommending the HPV vaccine.

8. Need for education.

Esposito (2007), Krupp (2010), Brotherton (2010) and Wong (2010) discussed in their studies that education about HPV vaccine should be highlighted to the providers in order to promote vaccination.

9. Other factors

Other factors considered in the review were: sex, that men should also be vaccinated for HPV by Tariq et al., (2009); the latter likewise discussed dosing of the HPV vaccine could posed a barrier for vaccination; another factor considered by Krupp et al., (2010) to be a barrier in HPV vaccination is workplace constraints and load of patients in their clinic and Tissot et al., (2007) discussed parental religious beliefs could affect vaccine acceptability.

Question no. 3. Is there difference in the views of different medical specialties with regards to HPV vaccination?

This section of the review focus on the different views and attitudes of three medical specialties involved in the included studies.

As the participants of the studies in the review are influence by their demographic and practice patterns between specialties it is deemed inappropriate to compare individual views of each specialty. However, for the purpose of this review, those studies with comparison between specialties and maybe relevant to the review will be discussed.

Although, 14 studies of 29 included in this review covered mixed participants across specialties, comparison will be incongruous as often result and conclusion derived from the study are frequently generalized or conclusion cannot be drawn. Participants are described at the methodology but in the result it is always collectively presented.

Four studies that discussed comparison of medical specialty views regarding HPV vaccine were:

- Young (2011), compared gynaecologist and family physician in the rates of providing HPV vaccine in their clinics in which found he found no significant deference between the two specialties.
- Daley (2010), who reported that vast majority of paediatricians and family physicians are offering the vaccine to their patients although fewer physicians for both specialties, strongly recommended the vaccine for 11 to 12 year old patients than for older.
- Vadaparampil (2011), who surveyed family physicians, paediatricians and Obstetrics & Gynaecology and found that paediatricians are more likely to recommend the HPV vaccine
- Ko (2010), identified different barriers between specialties. For internist and obstetrician and gynaecology, the greatest barrier is reimbursement concern while paediatricians reported adverse effects of the vaccine.

6.0 DISCUSSION

This section of the review summarises the major findings from the papers included in the review, describes the limitations of the included studies details, the strengths and weaknesses of review methods, discusses the results in the context of other knowledge, implications for current practice and suggestions for future work.

The systematic review was carried out to assess physicians' attitudes towards HPV vaccine and to identify factors that influence their intent in providing HPV vaccine to the target group, the adolescent girls. Another objective of this review is to understand differences in views about HPV vaccine by the different medical specialties involved in delivering the HPV vaccine. The searches revealed that the majority of the studies demonstrate physicians' positive attitudes towards HPV vaccine. Most physicians showed support and intent to provide the vaccine to the adolescent girls. This strong support and recommendation was based on perceived susceptibility of the target population and likelihood of benefit. However, as this review explored more of the factors that inhibit them to provide the HPV vaccine and identified in this review as 'barriers' for intention, the focus of the discussion will be on these factors. The cost of the vaccine and problems with reimbursement is the most important factor identified in majority of the studies. Other factors were: providers concern about vaccine safety and efficacy; parental concern over vaccine safety and efficacy; age of adolescents is considered too young for this particular vaccination; the issue that HPV vaccine could promote sexual activity; recommendation of HPV vaccine from organisations; communication related to sexuality; the need for education regarding HPV vaccine and other factors such as sex, a recommendation that boys should also be given the HPV vaccine, a three series vaccine could pose a problem with compliance, workplace and patients load in the clinic as well as cultural and religious beliefs were listed.

In terms of the difference in the views of different medical specialties particularly general/family physician, paediatrician and obstetrics/gynaecology with regards to HPV vaccination, formulating comparison can be ambiguous as these specialties are influence by their demographic or practice patterns. However, four studies that described comparison between specialties revealed no significant difference between

gynaecologist and family physician with regards to the rates of providing the vaccine during clinic visits (Young, et al., 2011); fewer paediatricians and family physicians recommend the vaccine to 11 to 12 year old than to older girls (Daley, et al. 2010); a survey among family physicians, obstetrics/gynaecology and paediatricians revealed that the latter would more likely recommend the HPV vaccine (Vadaparampil et al., 2011) and Ko et al.(2010) discussed different barrier for each specialty.

The review is limited by demographic background. Majority of the studies, 21 of 29 studies included were conducted in the USA thus, results cannot always be generalised. With its characteristic health system and clinic based delivery of the vaccine, it will be apparent that cost of the vaccine and reimbursement will be the key barrier in vaccination. Thus, raising doubts whether this factor will also come out as a primary factor in other countries with different health system and vaccine delivery. Interestingly, cost is not only identified in developed countries as developing country like Malaysia also reported cost as the primary barrier for vaccination.

The strength of this review is that it includes studies conducted recently; nine studies in 2010 and five studies in 2011 were published respectively. Thus, reflecting, attitudes of physicians after approval and implementation of the vaccine. Furthermore, adherence to guidelines was also recognized. For example, review of studies showed that most physicians are not recommending the vaccine to younger age group of adolescents, with the perception that the recommended age which is 11 to 12 year old is too young or too low for vaccination.

The weakness of the systematic review is not utilising a standard tool to reduce bias. The studies included in this review are a mix of qualitative and quantitative study, hence to limit and assessed quality of the studies, a checklist was developed and adapted from a study that also aimed to review people's perspective and experiences or called the "view" studies (Harden, et al., 2003). This checklist was deemed appropriate to use as it is extensive but simplified and time saving to a review with a limited timeframe.

Another weakness of the review is the use of sole researcher. Higgins (2008) and Petticrew (2001), emphasized the importance of two reviewers in systematic review to

select and critically appraise studies independently as well as to check data extraction. This is important in terms of methodological rigour and prevention of bias but also beneficial in terms of sharing the workload and ensuring that there is a support throughout the review process (Bambra, 2009).

Attitudes of physicians before the approval of the HPV vaccine in 2006 (Riedesel, Rosenthal, Zimet, Bernstein, Huang & Lan, 2005; Kahn, Zimet, Bernstein, Riedesel, Lan & Huang, 2005 and Raley, Fellowwill, Zimet & Ault, 2004) revealed willingness to recommend the vaccine and the attitudes of physicians from this review revealed similar findings. Survey question during pre-licensure time were still hypothetical as vaccines are not yet available, however, it is interesting to know that providers intention did not vary in time and with the availability of the vaccine.

A recent review done with parents to assess their knowledge, attitudes and behaviours towards HPV vaccination for their children from 2001 to 2011, revealed that the key barrier for HPV vaccination among parents is the safety concern of the newly approved vaccine. In contrast, in this review, it was found out that the cost of the vaccine and issue of reimbursement was considered the primary barrier for vaccination among parents.

Likewise, age as barrier for acceptability of HPV vaccine (Dempsey, Abraham, Dalton, Ruffin, 2009) as previously mentioned is consistent with the current finding in this review that most physician would not recommend the vaccine to younger age group (Wong, 2009; Huey et al., 2009; Vadaparampil, et al., 2011& Kahn et al., 2009).

Furthermore, as the physician's role is highly acknowledged in the recommendation and delivery of the vaccine, particularly the paediatrician (Ziv, Boulet & Slap, 1999 & Rand, Shone, Albertin, 2007) that play a particularly important role in HPV vaccine delivery to 11 to 12 year old adolescent girls, more effort should be exerted to reached out this age group and diminished missed opportunities of immunisation.

In terms of future implications of policy, in order to promote and preserve the health of the population, with the only vaccine available to prevent cervical cancer in the future, availability of the vaccine at lower cost should be supported as well as providing HPV

vaccine through a school-based approach. If it should be a national program, then it should be accessible to most people. Education would be beneficial to a new vaccine for its promotion not only to the physicians but to the public as well. In addition, campaign against belief that the vaccine would promote high risk sexual activity should be encouraged.

As compliance is another drawback for a three dose vaccine, future studies should focus on the efficacy of limited number of doses which could offer adequate protection.

7.0 CONCLUSION

Physicians' attitude towards HPV vaccine is consistently positive before licensure and post licensure of the vaccine. Hence, their role is still important in the implementation and improving uptake of HPV vaccine. Barriers should be overcome to increase vaccine acceptability.

Numerous studies had been done regarding HPV vaccine, however to my knowledge and upon extensive data base search, no systematic review exploring physicians' attitudes toward HPV vaccine had been done to date. Researcher in the future could make a comprehensive research on the acceptability of HPV on each country, to compare, contrast and evaluate its success or failure, considering that the vaccine has been instigated for five years. Hence, policy and guidelines could be further improved, implementation could be enhanced, and uptake will be maximized.

It is with optimism that by recognizing barriers to HPV vaccination, public health impact could be created; therefore, appropriate action could be developed and accomplished.

For a public health programme to succeed, it should meet the needs of its target beneficiaries.

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List of References

- Barnack, J.L., Reddy, D.M. & Swain, C. (2009). Predictors of parents' willingness to vaccinate for Human papillomavirus and physicians' intention to recommend the vaccine. *Women's Health Issues, 20*(1), 28-34.
- Boogards, J., Coupe, V., Xiridou, M., Meijer, C., Wallinga, J., Berkhof, J. (2011). Long term impact of human papillomavirus vaccination on Infection rates, cervical abnormalities and cancer incidence. *Epidemiology, 22*(4), 505-515.
- Brewer, N. & Fazekas, K. (2007). Predictors of HPV vaccine acceptability: a theory informed systematic reviews. *Preventive Medicine, 45*(2-3), 107-114.
- Canderelli, R. & Canderelli, K.M. (2008). Recommendations for primary care physicians to improve HPV vaccination rates during clinical encounters. *Osteopath Medicine Primary Care, 23* (2), 10.
- Charlotte, V. (2011). Use and acceptance of HPV vaccine still in progress. National Cancer Institute Cancer Bulletin, 8(9) Retrieved October 5, 2011 from <http://www.cancer.gov/ncicancerbulletin/050311/page6>
- Centres for Disease Control and Prevention Morbidity and Mortality Weekly Report (MMWR)[October 14, 2011], 60 (40), 1382-1384

Cervical Cancer Incidence and Mortality Worldwide in 2008 Summary Global Cancer

(GLOBOCAN 2008) factsheet Retrieved October 14, 2011 from

<http://globocan.iarc.fr/factsheets/cancers/cervix.asp>

Cervical Cancer Statistics. April 2, 2007. Retrieved October 14, 2011 from

<http://www.cervicalcancer.org/statistics.html> Human Papillomavirus (HPV) vaccine, WHO, Geneva (2008), Background paper.

Retrieved October 5, 2011 from:

<http://www.sciencedirect.com/science/article/pii/S1045105609000700>

Crosbie, E.J. & Brabin, L. (2009). Cervical cancer: problem solved? Vaccinating girls against Human papillomavirus. *British Journal of Obstetrics and Gynaecology*, 117, 137-142.

De Villiers., E., Fauquet, C., Broker, T., Bernard, H., Zur, H. (2004). Classification of papillomaviruses. *Virology*, 324, 17-27.

Gerend, MA., Weibley, E., & Bland, H. (2008). Parental response to human papilloma virus vaccine availability: uptake and intentions. *Journal of Adolescent Health*, 45(5), 528-531 doi: 10.1016/j.jadohealth.2009.02.006

Health Protection Agency. (2011, January 28). HPV vaccine coverage maintained in second year of human papilloma (HPV) immunization programme. *Report News*

Archives, 5 (4) Retrieved November 2, 2011 from:

<http://www.hpa.org.uk/hpr/archives/2011/news0411.htm>

Higgins, J. & Green, S. (2008). *Cochrane handbook for systematic reviews of intervention*.

Cambridge: Wiley Blackwell.

Hopkins, TG., Wood, NJ., West RM., Darling, JC. (2009). UK health professionals' attitudes and knowledge regarding Human papilloma Virus (HPV) vaccination: a West Yorkshire study. *Journal of Paediatric and Child Health*, 45 (11), 652-5.

Human Papillomavirus vaccines: WHO position paper (2009). Retrieved October 5, 2011

from: <http://www.sciencedirect.com/science/article/pii/S1045105609000700>

Human Papillomavirus (HPV) vaccine, WHO, Geneva (2008), Background paper.

Retrieved October 5, 2011 from:

Humiston, S., Albertin, C., Schaffer, S., Rand, C., Shone, L., Stokley, S., Szilagyi, R.

2009). *Patient Education and Counselling*, 75, 121-127

International Agency for Research (IARC) Summary and Evaluations. (1995). Human papillomaviruses. Retrieved from:

<http://inchem.org/documents/iarc/vol64/hpv.html>

- Jaspan, D., Dunton, C., Cook, T. (2008). Acceptance of human papillomavirus vaccine by gynaecologist in an urban setting. *Journal of Lower Genital Tract*, 12(2), 118-121.
- Jit, M., Choi, YH., & Edmunds, WJ. (2008). Economic evaluation of human papillomavirus vaccination in the United Kingdom. *British Medical Journal*. 337(a769) doi:10.1136/bmj.a769
<http://www.cancer.gov/ncicancerbulletin/050311/page6>
- Kadis, J., McRee, AL., Gottlieb, S., Lee, M., Reiter, P., Dittus, P., Brewer, N. (2011). Mothers' support for voluntary provision of HPV vaccine in school. *Vaccine*, 29, 2542-2547 doi:10.1016/j.vaccine.2011.01.067.
- Kahn, J., Cooper, P., Vadaparampil, B., Pence, B., Weinberg, A., LoCoco, S. & Rosenthal, S. (2009). Human papillomavirus vaccine recommendations and agreement with mandated human papillomavirus vaccination for 11 to 12 year-old-girls: a statewide survey of Texas physicians. *Cancer Epidemiological Biomarkers Prevention*, 18(8), 2325-2332.
- Kahn, JA. Rosenthal, SL., Tissot, AM., Bernstein, DL. Wetzel, C. & Zimet, GD. (2007). Factors influencing paediatricians' intention to recommend human papillomavirus vaccines. *Ambulatory Paediatrics*, 7(5), 367-373

- Kahn, J., Zimet, G., Bernstein, D., Riedesel, J., Lan, D., Huang, B. & Rosenthal, S. (2005). Paediatricians' intention to administer human papillomavirus vaccine: the role of practice characteristics, knowledge and attitudes. *Journal of Adolescent Health*, 37(6), 502-10.
- Leddy M., Anderson, B., Power, M., Gall, S., Gonik, B., Schulkin, J. (2009). Changes in and current status of obstetrician-gynaecologists' knowledge, attitudes and practice regarding immunization. *Obstetrics Gynaecology Surveillance*, 64 (12) 823-9.
- Limia, A. and Pachon, I., (2011). Coverage of Human Papillomavirus vaccination during the first year of its introduction in Spain. Retrieved October 16, 2011 from <http://eurosurveillance.org/ViewArticle.aspx?ArticleId=19873>
- Ogilvie, G., Remple, V., Pharm, FM., Mc Neil, S., Naus, M., Pielak, K. ...Patrick, D. (2007). Parental intentions to have daughters receive the human papillomavirus vaccine. *Canadian Medical Association Journal*. 177(12), 1506-1512.
- Studies of Cancers in Human-International Agency for Research in Cancer Monograph
Retrieved October 6, 2011 from:
<http://monographs.iarc.fr/ENG/Monographs/vol90/mono-7.pdf>
- Riedesel, J., Rosenthal, S., Zimet, G., Bernstein, D., Huang, B., Lan, D. & Kahn, J. (2005). *Journal of Paediatric and Adolescent Gynaecology*, 18, 391-398.

Rosenthal, SL., Weiss, TW., Zimet, GD., Ma, L., Good, MB. & Vichnin, MD. (2011).

Predictors of HPV uptake among women age 19-26: importance of physicians' recommendation. *Vaccine*, 29 (5), 890-895.

Tariq, S., Bhakta, S., Grimes, A., Stevens, A. (2009). Attitudes of Arkansas' primary care

physicians towards the HPV vaccine. *Journal of Arkansas Medical Society*, 106(5), 113-7

Tozzi, A., Rava, L., Stat, D., Pandolfi, E., Marino, M., Ugazio, A. (2009). Attitudes

towards HPV vaccination of Italian mothers of adolescent girls and potential role of health care professionals in the immunization program. *Vaccine*, 27, 2525-2529.

Trim, K., Nagji, N., Elit, L. & Roy, K. (2011). Parental knowledge, attitudes and

behaviours towards Human papillomavirus vaccination for their children: a systematic review from 2001 to 2011. *Obstetrics and Gynaecology International*, 2012. doi: 10. 1155/2012/921236.

U.S. Food and Drug Administration Approved Products: Gardasil. U.S. Food and Drug

Administration. Retrieved September 5, 2011 from:

<http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/UCM09402>

U.S. Food and Drug Administration Approved Products: Cervarix. U.S. Food and drug

administration. Retrieved September 5, 2011 from

<http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm186957.htm>

WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre).

Human Papillomavirus and Related Cancer in the World. Summary Report 2010.

Retrieved October 12, 2010 from: www.who.int/hpvcentre

Wong, LP. (2011).Physicians' experience with HPV vaccine delivery: evidence from

developing country with multiethnic populations. *Vaccine*. 27 (10), 1622-1627.

World Health Organization Southeast Asia Regional Office, Child and Adolescent Care.

Retrieved October 14, 2011 from:

[http://www.searowho.int/en/Section 13/Section1245_4980.htm](http://www.searowho.int/en/Section%2013/Section1245_4980.htm).

World Health Organization. Global Advisory Committee on Vaccine Safety (June 2007).

Safety of Papillomavirus vaccine. *Weekly Epidemiological Record*, 82, 252-9.

World Health Organization. HPV Immunization. Conclusion: moderate quality of

scientific evidence to support HPV vaccination of young adolescent girls to

prevent cervical cancer later in life. Retrieved October 5, 2011 from:

http://www.who.int/immunization/HPV_Grad_Adol_girls.pdf

Stretch, R., Mc Cann, R., Roberts, S., Elton, P., Baxter, D. & Brabin, L. (2009). A qualitative study to assess school nurses' views on vaccinating 12-13 year old school girls against human papillomavirus without parental consent. *BMC Public Health*, 9 (254), doi: 10.1186/147124589254

Centre for Disease Control 2007

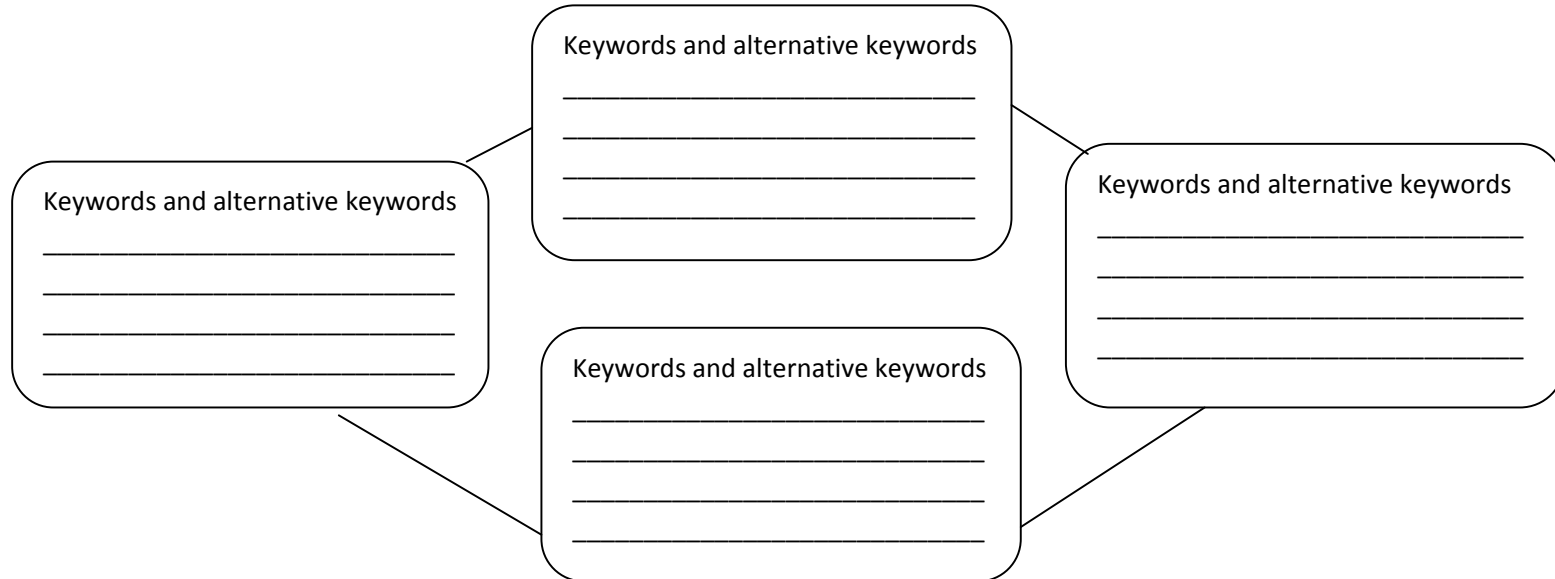
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APPENDICES

Figure 1. CONCEPT MAP

Plan Your Search

1. Write your topic on the box below and circle the keywords or key phrases.

2. In the boxes below write the keywords you circled and list other terms that can be used to describe this keyword.



3. List the resources you planned to search for this information.
