Vaccine 31S (2013) G58–G64

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Review

Prospects and Challenges in the Introduction of Human Papillomavirus Vaccines in the Extended Middle East and North Africa Region

Aisha O. Jumaan[a], Soha Ghanem[b], Jalaa Taher[c], Mhammed Braikat[d], Salah Al Awaidy[e], Ghassan S. Dbaibo[b,*]

[a] Independent Consultant, Seattle, USA
[b] Department of Pediatrics and Adolescent Medicine and the Center for Infectious Diseases Research, American University of Beirut, Beirut, Lebanon
[c] Department of Non-Communicable Diseases, Public Health & Policies Division, Ministry of Health, Abu Dhabi, United Arab Emirates
[d] Expanded Program on Immunization, Ministry of Health, Rabat, Morocco
[e] Department of Communicable Disease Surveillance and Control, Ministry of Health, Muscat, Oman

ARTICLE INFO

Article history:
Received 26 March 2012
Received in revised form 25 June 2012
Accepted 26 June 2012

Key words:
Extended Middle East and North Africa
Adolescent
vaccination
HPV
Cervical cancer

ABSTRACT

The development of effective and safe human papillomavirus (HPV) vaccines provides a great opportunity to prevent a devastating disease, cervical cancer, and a host of other related diseases. However, the introduction of these vaccines has been slow in the Extended Middle East and North Africa (EMENA) region. Only one country has introduced the vaccine and few countries plan HPV vaccine introduction in the coming 5 years. Several factors influence the slow uptake in the region, including financial constraints, weak infrastructure for adolescent vaccine delivery, competition with high priority vaccines, and lack of reliable data on the burden of HPV disease. Other barriers include cultural and religious sensitivities, as the vaccines are offered to prevent a sexually transmitted disease in young girls. Recommendations to enhance HPV vaccine introduction in EMENA countries include establishing a regional joint vaccine procurement program, enhancing the adolescent vaccination platform, documenting the burden of cervical cancer, strengthening local National Immunization Technical Advisory Groups and designing Information, Education and Communication material that address cultural concerns.

This article forms part of a regional report entitled *"Comprehensive Control of HPV Infections and Related Diseases in the Extended Middle East and North Africa Region"* Vaccine Volume 31, Supplement 6, 2013. Updates of the progress in the field are presented in a separate monograph entitled *"Comprehensive Control of HPV Infections and Related Diseases"* Vaccine Volume 30, Supplement 5, 2012.

1. Introduction

In 2006 and 2007, two human papillomavirus (HPV) vaccines, Gardasil® (Merck & Co., Whitehouse Station, NJ, USA) and Cervarix® (GlaxoSmithKline Biologicals, Rixensart, Belgium) were approved in the United States of America and Europe, respectively, and have since been licensed in more than 100 countries worldwide, including the Extended Middle East and North Africa (EMENA) Region [1]. Fourteen EMENA countries, Morocco, Turkey, Egypt, Pakistan, Tunisia, Lebanon, Kuwait, Saudi Arabia, United Arab Emirates (UAE), Bahrain, Oman, Qatar, Syria, and Jordan, have licensed at least one of the HPV vaccines [1]. Both vaccines protect against HPV16 and 18, the most common HPV types that cause cervical cancer. Published studies have documented high efficacy of over 92% against precancerous lesions among women with no prior infection with HPV vaccine types [2–4]. In 2009, the World Health Organization (WHO) recommended HPV vaccination for countries where cervical cancer is a public health priority and where the introduction of the vaccine is feasible and financially sustainable. WHO also recommended that girls aged 9–13 years be the primary target group for HPV vaccination before sexual debut [5]. Both vaccines were prequalified by WHO for purchase by United Nations agencies for national immunization programs in developing countries. Decisions for HPV vaccine introduction and successful implementations in EMENA will be affected by many factors, including the immunization program infrastructure and performance, especially adolescent vaccination, the countries' priorities for new vaccines introduction, and resources.

2. Immunization programs in the Extended Middle East and North Africa Region

All national immunization programs in EMENA countries (Morocco, Tunisia, Libya, Algeria, Egypt, Lebanon, Syria, Jordan,

* Corresponding author. Tel.: +961 1374374, ext 5752; fax: +961 1370781.
E-mail address: gdbaibo@aub.edu.lb (G.S. Dbaibo).

0264-410X/$ – see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.vaccine.2012.06.097

Table 1
Additional vaccines included in EMENA countries as of January, 2012.

Country	Hepatitis B	Hib	MCV2	PCV	Rota
Afghanistan	x	x	x		
Algeria	x	x	x		
Bahrain	x	x	x	x	x
Egypt			x		
Iran	x	x	x		
Iraq	x	x	x	x	x
Jordan	x	x	x		
Kuwait	x	x	x	x	
Lebanon	x	x	x	x	
Libya	x	x	x		
Morocco	x	x	x	x	x
Oman	x	x	x	x	
Pakistan	x	x	x	x	
Qatar	x	x	x	x	x
Saudi Arabia	x	x	x	x	
Syria	x	x	x		
Tunisia	x		x		
Turkey	x	x	x	x	
United Arab Emirates	x	x	x	x	
West Bank and Gaza	x	x	x	x	
Yemen	x	x	x	x	

Hib: *Haemophilus influenzae* type B vaccine; MCV2: two doses of measles containing vaccine; PCV: pneumococcal conjugate vaccine; Rota: rotavirus vaccine.

the West Bank and Gaza, Iraq, Turkey, Iran, Pakistan, Afghanistan, Bahrain, Oman, Saudi Arabia, Qatar, UAE, Kuwait, and Yemen) provide vaccines against six vaccine preventable diseases, including childhood tuberculosis (except Lebanon), diphtheria, pertussis, tetanus (DPT), polio and measles. Most countries also provide vaccination against maternal and neonatal tetanus by immunizing pregnant women and women of childbearing age. The use of other vaccines varies by country (Table 1). Adding HPV vaccine to the current national immunization programs will provide an opportunity for cervical cancer prevention [6,7].

2.1. Current status of vaccination programs

Vaccination coverage with the third dose of DPT vaccines among infants is the main indicator of immunization programs' performance and is used as a benchmark to qualify for GAVI Alliance support. The target for the Eastern Mediterranean Region of WHO (EMR) is to achieve at least 90% DPT3 coverage in all countries by 2010 [8]. Using this indicator, the immunization programs in EMENA countries have been successful in achieving an average coverage over 91% of DPT3 in 2010 (Fig. 1) [9–12]. However, a recent document by EMR (2010) identified several challenges that would hamper their ability to scale up immunization services; these included inadequate structure and management at both the central and peripheral levels; financial constraints due to a low level of financial allocations by governments and the cost of adding new vaccines; limited resources to address continuing challenges such as efforts for polio eradication and measles elimination, and inadequate systems for vaccine purchase and vaccine safety monitoring [13].

2.2. Adolescent vaccination

Most EMENA countries have adopted adolescent vaccination and many utilize schools to administer the vaccines [9,14] (Table 2). In 2006, EMR recommended that countries establish an adolescent vaccination visit at 11–12 years of age to provide catch-up or booster vaccines [15]. These included three doses of tetanus and diphtheria toxoids (Td) over 6–12 months, one dose of pertussis, one dose of rubella, two doses of measles and mumps, and one dose of hepatitis B. When it comes to the logistics of vaccine administration, the closest vaccines to the HPV target group are diphtheria and Tetanus Toxoid (dT) or Tetanus Toxoid (TT) vaccines, which are recommended by the EMR for girls aged 12 years; booster doses are recommended starting at age 15 every 10 years for pregnant women and women of childbearing age. However, for the second and subsequent tetanus toxoid (TT2) doses, most MENA countries that reported data revealed low vaccine coverage in 2010 ranging from 17% in Yemen to 85% in Jordan (Fig. 2) [16].

2.3. Competing priority vaccines

Despite the high burden of respiratory and diarrheal diseases in EMENA countries and the availability of new vaccines, pneumococcal conjugate vaccine (PCV) and rotavirus vaccines, the introduction of these vaccines into national immunization programs for middle-income EMENA countries has been challenging due to financial constraints. The EMR estimates that 88% of infants are in countries that have not introduced either vaccine [13]. Only high-income countries, such as those belonging to the Gulf Cooperation Council (GCC), and low-income countries, that get support from GAVI, are able to introduce new vaccines. PCV has only been introduced

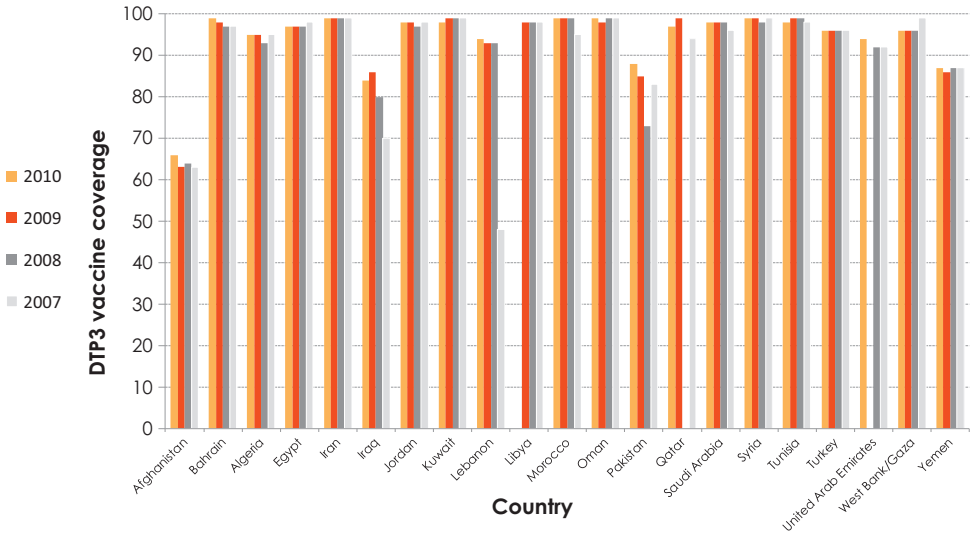

Figure 1. DPT3 vaccine coverage in EMENA countries by year, 2007-2010 [9–12]. DPT3: Diphtheria, Tetanus and Pertussis vaccine.

Table 2
EMENA countries with an adolescent vaccine schedule as of September, 2011.

Country	Td	TT	MMR	Other
Afghanistan		WCBA		
Algeria	11-13 and 16-18 years			
Bahrain	>12 years			
Egypt	10			
Iran	Repeated very 10 years			
Iraq	>6-7 years	WCBA & PW		
Jordan	16 years			
Kuwait	10 and 18 years	Pregnant and high risk groups	12 years	
Lebanon	10-12 years			
Libya	15 years	15 years		
Morocco				Rubella 12-24 years
Oman	12, 17 years	PW		Rubella 15-49 years
Pakistan		PW		
Qatar	13-16 years			
Saudi Arabia	≥7 years			
Syria	12 years			
Tunisia	7, 12 and 18 years	WCBA		Rubella, 12 years
Turkey	14 years			
UAE	15-16 years			Rubella, 15-16 years
West Bank and Gaza	15 years	WCBA		
Yemen		WCBA		

MMR: measles, mumps, rubella; PW: pregnant women; Td: tetanus and diphtheria toxoids; TT: tetanus toxoid; WCBA: women of childbearing age.

in Yemen with GAVI support and in Morocco, a middle-income country, as well as the six GCC countries. Rotavirus vaccine has only been introduced in Morocco, and two GCC countries, Bahrain, and Qatar. Therefore, these vaccines are identified by WHO and UNICEF as priority vaccines for introduction to Expanded Programs on Immunization (EPI) [13].

2.4. Resources

EMENA countries are very diverse economically, ranging from three GAVI eligible countries to six high-income GCC; the majority are middle-income and, therefore, struggle with finding resources for the introduction of new vaccines [13]. GCC countries have implemented successful immunization programs due to high political commitment, and allocation of resources to establish and sustain EPI programs and infrastructures. Moreover, the presence in each country of a strong National Immunization Technical Advisory Group (NITAG) and the establishment in 1978 of the Gulf Procurement Program (GPP), a joint vaccine procurement system, has facilitated the introduction of new vaccines. Vaccines are administered through public and private institutions free of charge leading to increased immunization coverage from 10% in 1981 to over 95% in 1995, and 99% in 2010 [S. Al Awaidy, Oman MOH, personal communication, May 2012].

3. HPV vaccine introduction in the Extended Middle East and North Africa Countries

HPV vaccines are relatively expensive compared to other available vaccines and although global funding for vaccines has increased through support from GAVI, only three countries in EMENA qualify for GAVI support (Pakistan, Afghanistan, and Yemen). Therefore, the major factors impacting HPV vaccine introduction in the remaining EMENA countries include financial constraints in most countries, strained immunization programs, making it difficult to add vaccines for adolescent girls, lack of data documenting disease burden, impairing appropriate policy decision making, and lack of political will.

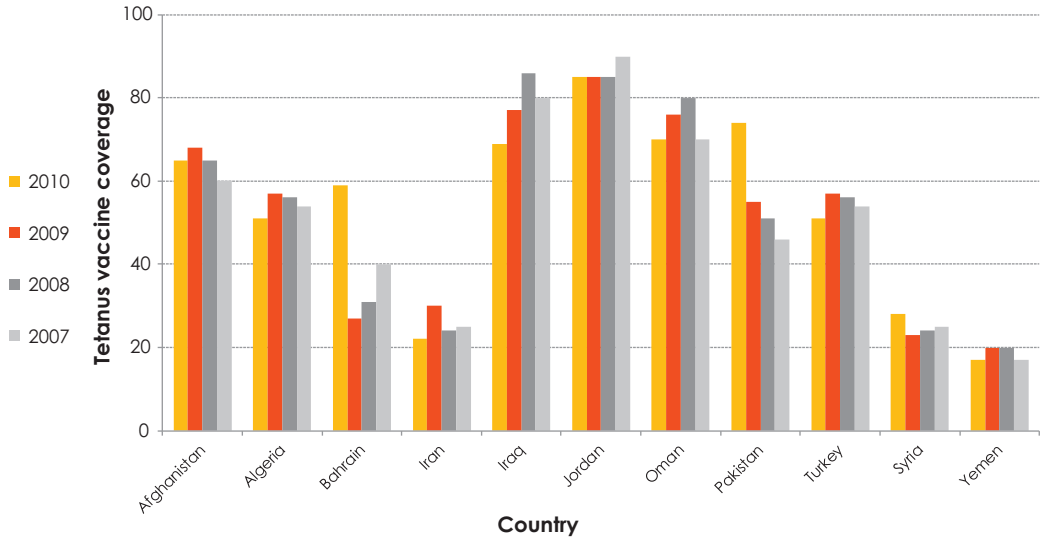

Figure 2. Second or subsequent tetanus toxoid vaccine coverage from EMENA countries with available data by year, 2007-10 [16].

3.1. HPV vaccination strategies

Strategies for HPV vaccination will depend on the target group for vaccination. Catch-up vaccination may be considered in some countries with the financial means, including the UAE. Available data from developed countries with HPV vaccination programs reveal that school-based vaccination results in higher vaccine coverage compared to provider-based vaccination [17,18]. Demonstration projects conducted by the Program for Appropriate Technology in Health (PATH) in four low-resource countries, India, Peru, Vietnam, and Uganda, also revealed that school-based vaccination achieved high vaccine coverage (80–95%) [19]. Although concerns that school-based vaccination may miss a large number of girls not attending schools, findings from these countries indicate that school attendance for girls aged 9–14 years was high [5,19–23]. Moreover, 2000–2006 estimates from UNICEF indicated that primary school attendance in MENA is 83% for girls and 87% for boys [24].

3.2. HPV vaccination in Gulf Cooperation Council countries

In 2012, GCC countries convened a high-level meeting to highlight the need to address chronic diseases, including cancer. Many of these countries, including Saudi Arabia, have invested heavily in tertiary care for cancer but efforts for cancer prevention and its early detection lag [25]. All GCC countries have licensed one or both HPV vaccines—Bahrain, Kuwait, Oman, UAE, and Saudi Arabia have licensed both HPV vaccines, and bivalent HPV vaccine is licensed in Qatar. GCC countries are considering introducing HPV vaccine into national immunization programs in the near future [26]. The UAE has licensed both HPV vaccines and introduced a voluntary school-based vaccination in 2008 in Abu Dhabi for girls aged 15–17 years [J. Taher, Abu Dhabi MOH, personal communication, May, 2012].

3.2.1. HPV vaccine introduction in Abu Dhabi, United Arab Emirates

The UAE is the first country in EMENA region to implement HPV vaccination in Abu Dhabi, the largest Emirate in UAE. The Health Authority of Abu Dhabi (HAAD) made the recommendation to introduce voluntary HPV vaccination in 2008; the recommendation was approved by the Government [J. Taher, Abu Dhabi MOH, personal communication, May, 2012]. HPV vaccination is included the Standard Recommended Immunization Schedule for School Children. Two major issues were considered when making the recommendation. First, HPV vaccine is most efficacious when administered prior to marriage (being sexually active) in UAE, girls can marry at age 18 years onward. The second issue is the feasibility of reaching young adolescent girls; therefore, a school-based program was selected. HPV vaccine is currently recommended for girls aged 15–17 years, and catch-up for cohorts aged 18–26 years [J. Taher, Abu Dhabi MOH, personal communication, May, 2012].

In October 2006, prior to implementation of HPV vaccination, a survey was conducted in the UAE to assess acceptability of HPV vaccines [J. Taher, Abu Dhabi MOH, personal communication, May, 2012]. About 45% of mothers reported that they are willing to vaccinate their daughters and 80% of young adult females reported that they are willing to be vaccinated. Prevention of cervical cancer and HPV infections was cited as the main reason for vaccine acceptance (50–70%). In a similar study conducted on a sample of Abu Dhabi female high school students, the parents indicated high acceptance of the vaccine; 94% of parents responded positively to implementation of the HPV vaccination program [J. Taher, Abu Dhabi MOH, personal communication, May, 2012].

In March 2008, HPV vaccine was introduced in Abu Dhabi Emirate's public and private schools. The program was funded by the Abu Dhabi government and provided free. Prior to administering the vaccine, parents or guardians receive educational brochures and consent forms; vaccine is only administered to girls with signed consents. Vaccine is administered by school nurses who also establish records and send demographic and vaccine related data to HAAD electronically through the school e-notification for the vaccine registry.

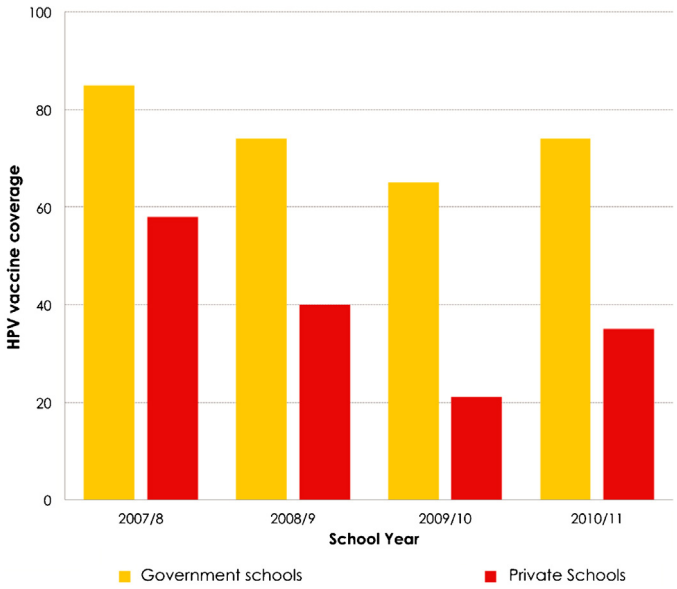

Figure 3. HPV vaccination coverage in Abu Dhabi, United Arab Emirates, 2007/08 to 2010/11 school years.

The overall vaccine uptake was high in the first year at 77%, but declined from 77% to 59% in 2010/11 [J. Taher, Abu Dhabi MOH, personal communication, May, 2012]. Uptake was much higher in public schools than in private schools (Fig. 3); vaccine coverage in 2007/8 was 85% compared to 58% in private schools. Although vaccine coverage declined by 15% in subsequent years to 74% in 2010/11 in public schools, the decline was steeper in private schools, by 40%, reaching 35% coverage in 2010/11. The majority of girls attend public schools, about 63%, compared to 37% who attend private schools. Moreover, most of the girls attending private schools are non-nationals, about 69% [J. Taher, Abu Dhabi MOH, personal communication, May, 2012].

3.3. HPV vaccination in Morocco

Morocco has made the decision to introduce HPV vaccination into the national EPI schedule for girls aged 11 years. This was a result of efforts by the Lalla Salma Association, illustrating the positive role of high-level advocacy [M. Braikat Morocco MOH, Personal communication, May 2012]. Several NITAG meetings were held in 2011 to discuss HPV vaccination, which led to supporting the introduction of the vaccine and to focus the education messages to parents and the target population on cervical cancer prevention. Vaccination of 11–year-old girls will be done at schools and using mobile teams for out-of-school girls. Morocco has demonstrated success in reaching adolescent girls and young women aged 15–24 years with rubella vaccination; coverage in 2008 reached 83% [M. Braikat Morocco MOH, Personal communication, May 2012]. Plans are underway to develop and provide information, education and communication (IEC) materials to train health professionals and to inform and sensitize the general population, families, and the target population. However, the major hurdle for HPV vaccine introduction is related to cost, as the funds are not yet available.

Table 3
Summary of HPV vaccine-related studies in EMENA countries.

Author	Study sample	Country	Year	Findings
Sait KH *et al.* [30]	Saudi female physicians	Saudi Arabia	2009	Lack of physicians' knowledge concerning HPV screening and prevention
Ali SF *et el.* [31]	Turkish interns, nurses	Pakistan	2009	Lack of health professionals knowledge concerning cervical cancer
Al Nuaimi NS *et al.* [32]	Grade 11 & 12 Abu Dhabi schoolgirls	UAE	2010	Low HPV vaccine uptake was due to the lack of knowledge among secondary school girls
Durusoy R *et al.* [33]	Turkish first-year university students	Turkey	2010	Lack of HPV knowledge among first-year students entering university
Dursun P *et al.* [34]	Turkish Women	Turkey	2009	Lack of HPV knowledge among Turkish women but their acceptance of HPV vaccine for themselves and their children
Marlow LAV *et al.* [35]	British adolescents including ethnic minorities	UK	2009	Muslim and Hindu girls in UK were less likely to accept the HPV vaccine
Marlow LAV *et al.* [36]	British women including ethnic minorities	UK	2009	Awareness of HPV was lower among ethnic minority women than among white women in UK

4. Challenges

There are multiple hurdles that face the introduction of HPV vaccination. These hurdles are not unique to developing countries, although their relative importance may be more significant compared to developed countries.

4.1. Perception of HPV vaccines by different stakeholders

The first group of hurdles relates to the perception of HPV vaccines by parents, physicians, and government officials that mostly relate to poor understanding of cervical cancer and its prevention by HPV vaccines (Table 3). In particular, pediatricians and other primary care providers are asked to vaccinate against a disease that they do not encounter in their daily practice. Since physician recommendation is often a very influential factor in HPV vaccine uptake [27], it is critical that physicians are made aware of HPV vaccines and their use in order to make a firm recommendation to their patients. Research on the acceptability and feasibility of introducing HPV vaccines in developing countries indicated that many people were not aware of the connection between HPV infection and cervical cancer [28–30]. Data from the EMENA region about physician awareness and attitude toward HPV vaccine are scarce. A study conducted in the Western region of Saudi Arabia among female physicians, both gynecologists and non-gynecologists, showed that 65% and 39% of gynecologists and non-gynecologists, respectively, were aware of HPV vaccine [30]. In the same study, 60% of gynecologists said that they would recommend the vaccine to their patients, whereas only 45% of non-gynecologists said they would. In Pakistan, a study among 393 interns and nursing staff showed that only 37 were aware of HPV vaccine [31]. However, 91% of interviewees expressed interest in learning more about the vaccine.

On the other hand, although knowledge among the population is limited in the region, significant variability exists among different countries. In a study conducted in Al-Ain in the UAE, grade 11 and 12 school girls (age range 15–17 targeted by the vaccine) were interviewed [32]. Only 28% had information about the HPV vaccine, mostly derived from school-based awareness programs. Another study from Turkey disclosed poor awareness among first-year college students, where only one-fourth of the students were aware of the HPV vaccine and only 11% intended to get vaccinated [33]. However, in a different study from Turkey, 1434 women with a median age of 35.8 were interviewed where 40% were aware of the HPV and cancer relationship, 45% had heard about the HPV vaccine, and 64% were willing to vaccinate their daughters [34]. These numbers were similar to numbers obtained from developed countries.

4.2. Sources of HPV vaccine information and cultural and religious norms

In the studies above, most interviewees indicated that they would prefer to obtain their information about HPV vaccine from their health providers. In reality, multiple sources for information, sometimes largely inaccurate, seem to disseminate more forcefully in the population. In addition, whatever information about HPV vaccine is present in the population gets complicated by cultural and religious influences that negatively affect the acceptability of the vaccine. This cultural sensitivity towards the prevention of a sexually transmitted disease is evident in some published studies. For example, a study of British adolescents evaluating predictors of interest in HPV vaccine showed that adolescents who were practicing Muslims were less likely to accept the vaccine [35]. Concerns about the vaccine being a "license to have premarital sex" are present. In another study done in Britain, ethnic differences in HPV vaccine acceptability were measured. It was found that among the most common reasons to decline vaccination were sex-related concerns (e.g., "it encourages promiscuity" or "risk of premature sex") [36]. Pakistani (Muslim) mothers cited these reasons much more commonly (20%) than white British mothers (2%).

Among parents and health care providers who live in EMENA countries, there is a perceived lack of sexual activity among adolescents and young adults prior to marriage [F. El-Kak, personal communication, March, 2012]. This is contrary to data from some countries indicating rapidly changing moral and cultural norms due to the dizzying changes in media and communication that largely affect the younger, information technology-savvy population. In addition, reports from local newspapers in the region show an increasing practice of "temporary" marriages that fall under different names depending on the religious sect. These temporary marriages serve as an additional source of exposure to HPV that should be considered by health authorities when it comes to decision-making regarding HPV vaccine.

4.3. HPV vaccine safety

A further hurdle is the concern about safety of HPV vaccines [37]. Unfortunately the large amount of disinformation that is available on the internet has made its way to the EMENA region and is contributing to the negative perception of HPV vaccines in the region. For example, in the study in Al-Ain, 42% of school girls asked about the reasons for not receiving the HPV vaccine indicated that fear of side effects was the main concern [32]. This was evident in the drop in vaccine coverage in academic year 2009/10 that occurred after the media reported the death of a girl in United Kingdom that was initially reported to be HPV vaccine-related.

HAAD carried out IEC sessions resulting in increased vaccination coverage in the academic year 2010/11.

4.4. Decision-making and political will

There are also hurdles in decision-making that relate to several factors. In some countries, there are a lack of data on cervical cancer and other HPV-related disease burden. Even when these data are available, health authorities may not have access to them, as they are generated by academic institutions or international bodies. This generally results in the lack of appreciation of the burden of HPV-related disease and concerns about the cost-effectiveness of HPV vaccination, as discussed elsewhere in Kim JJ et al., Vaccine, this issue [38]. Finally, because of the political nature of the position of decision-makers in the health care field (Minister, General Director, etc), the lack of immediate results following introduction of HPV vaccination translates into low political gain for these individuals, thus placing it much lower among their priorities. Finally, data from developing countries show a disconnect between policy makers and communities' perceptions on the acceptance of HPV vaccines. Policy makers tend to under-estimate communities' willingness to accept the vaccines [28–30,39].

4.5. Adolescent vaccination programs

Another major hurdle is the lack of a pre-adolescent/adolescent immunization platform in countries in the EMENA region. With the exception of TT (with or without diphtheria and oral polio vaccine in some countries), there are few vaccines that are included in the EPI schedule of most countries that specifically target pre-adolescent or adolescent girls. Most EMENA countries have established school-based vaccination (Table 2) and it is conceivable that HPV vaccine could be added to regular visits that are conducted for school-based vaccination of adolescent girls. However, even with TT, current coverage in different countries ranges from 17–58% [16]. To complicate matters further, HPV vaccines, with three doses given over a period of 6 months, present a significant challenge and strain on immunization infrastructure. Moreover, compliance with three doses in the adolescent age group is expected to be a major challenge, as it has been in developed countries. Even in developed countries with full reimbursement of vaccine cost, compliance with three doses of HPV vaccine was less than 43% and this was thought to be due to the lack of a school-based program [40]. Finally, in some cases, the lack of agreement between professional societies (Pediatric, Gynecology, and Family Practice) regarding the recommendations of the use of HPV vaccines confuses decision-makers within governments.

4.6. HPV vaccine cost

Lastly, the cost of the vaccine remains a major hurdle across the region. Very few publications have specifically addressed the importance of cost as a barrier for vaccination in the region. The price for the three-dose series in the private markets of EMENA countries ranges from $330 for the bivalent vaccine to $600 for the quadrivalent vaccine. For most EMENA countries, particularly middle-income countries that are not eligible for GAVI support, this is beyond the financial means of the majority of the population [40]. It would be expected that if governments chose to include HPV vaccine on their EPI schedule, they would be able to procure it at a much lower price. However, the current price tag would remain a significant hurdle for middle- and low-income countries.

5. Prospects and recommendations

Overall, it appears that HPV vaccine is competing with other vaccines of higher priority such as *Haemophilus influenzae* type b (Hib), PCV, and rotavirus vaccine in most countries of the region. Countries where Hib, PCV, and rotavirus vaccines have already been included in their EPI schedules and are financially able to purchase the vaccine are in the best position to add HPV vaccine. These countries include GCC countries; although there is interest in HPV vaccines in Turkey, Iraq and Morocco, allocating funds continues to be an impediment. When making recommendations for the introduction of HPV vaccine in specific countries in the region, it is prudent to look at the big picture. It is therefore important to establish or support the existing NITAGs to enhance their technical capacity to make and implement policy decisions regarding the introduction of new vaccines. Establishing a focal point at the EMR office for HPV vaccine-related issues to serve as an advisor to countries interested in HPV vaccines would strongly support the role of the NITAGs with regard to HPV infection prevention strategy. Evaluation of other vaccine-preventable diseases not yet included on the EPI schedule must be performed when priorities are decided. For example, it is likely that Hib infections, invasive pneumococcal infections, and possibly rotavirus infections result in a higher burden of disease in most countries of the region compared to HPV infections. However, specific data about these diseases are not always readily available, blurring the decision-making process. Therefore, it is crucial to establish, enhance, or utilize cervical cancer registry data to accurately estimate the burden of disease and document the HPV serotypes circulating in MENA countries. The data would serve to support policy decision-making on HPV vaccine introduction and serve as a baseline when measuring the impact of HPV vaccine introduction in the future. In this regard, the burden of HPV disease appears to be underappreciated by health care providers, government officials, and the population at large. From published data, it is clear that a significant amount of education about HPV-related disease and its prevention is needed, particularly among health care providers who serve as information disseminators to the rest of the population, especially those targeted by the vaccine. This should focus on gynecologists, family physicians, and/or pediatricians, depending on the identified immunizer in each country. Targeted community education that responds to concerns about HPV vaccine has proven to be effective [28–30]. It is therefore important to enhance advocacy, communication, and social mobilization strategy to increase awareness among decision makers and demand among the population. The strategy should include multiple partners including non-governmental organizations, religious leaders, women's groups, and professional organizations.

As the price of HPV vaccines remains a major hurdle, it is important to improve the purchasing power of middle-income countries by establishing a joint vaccine procurement program for EMENA to extend the purchasing power of EMENA member countries by issuing joint tenders for vaccines.

The weak or non-existent adolescent vaccination platform should be strengthened through school-based vaccination to increase access to vaccines and conduct regular training for immunization staff on monitoring, supervision, and management.

It is clear from published data that HPV vaccines are safe and effective in preventing HPV-related precancerous lesions as well as incidental and persistent infection. However, the true impact of the vaccines will not be measurable for another 2–3 decades in countries that have already introduced these vaccines. The promising information that some countries in the EMENA region are planning to introduce HPV vaccine on their EPI in the next 5 years is dampened by the fact that these countries represent only a small fraction of the population in the EMENA region. It would be unfortunate for the remaining countries in EMENA region to wait another decade or more before their decision-makers are convinced of the importance of HPV vaccines. Some bold decisions

are needed in the immediate future to minimize further loss of life and morbidity from this prevalent vaccine-preventable disease.

Disclosed potential conflicts of interest

GSD: Advisory Boards for GSK and Pfizer. Has received honoraria for lectures from GSK, MSD, Pfizer, and Hikma and has received research funding through his university from GSK, Pfizer, and MSD. AOJ, SG, JT, MB, SAA: Have disclosed no potential conflicts of interest.

References

[1] http://www.technet21.org/index.php/documents/view-document-details/1286-global-hpv-vaccine-licensure-status-june-2011.html.Map_Global_HPV_vaccine_licensure_status_2011Jun.pdf (last accessed March 2012).
[2] Ault KA, Future II Study Group. Effect of prophylactic human papillomavirus L1 virus-like-particle vaccine on risk of cervical intraepithelial neoplasia grade 2, grade 3, and adenocarcinoma in situ: a combined analysis of four randomized clinical trials. Lancet 2007 Jun 2; 369(9576):1861-8.
[3] Paavonen J, Naud P, Salmeron J, Wheeler CM, Chow SN, Apter D, et al. Efficacy of human papillomavirus (HPV)-16/18 AS04-adjuvanted vaccine against cervical infection and precancer caused by oncogenic HPV types (PATRICIA): final analysis of a double-blind, randomized study in young women. Lancet 2009 Jul 25;374(9686):301–14.
[4] Schiller JT, Castellsagué X, Villa LL, Hildesheim A. An update of prophylactic human papillomavirus L1 virus-like particle vaccine clinical trial results. Vaccine 2008 Aug 19;26 Suppl 10:K53-61.
[5] World Health Organization. Human papillomavirus vaccines. WHO position paper. Wkly Epidemiol Rec 2009 Apr 10;84(15):118-31.
[6] Lim SS, Stein DB, Charrow A, Murray CJ. Tracking progress towards universal childhood immunization and the impact of global initiatives: a systematic analysis of three-dose diphtheria, tetanus, and pertussis immunization coverage. Lancet 2008 Dec 13;372(9655):2031–46.
[7] Centers for Disease Control and Prevention (CDC). Global routine vaccination coverage, 2009. MMWR 2010 Oct 29; 59(42):1367-71.
[8] World Health Assembly resolution 58.15, Geneva, Switzerland, May 16-25, 2005.
[9] http://www.childinfo.org/files/immunization_summary_en.pdf (last accessed March 2012).
[10] http://www.who.int/immunization/GIN_February_2012.pdf (last accessed March 2012).
[11] http://www.rostropovich.org/en/west-bank-and-gaza (last accessed June 2013).
[12] http://www.unrwa.org/userfiles/2010011610371.pdf (last accessed on June 2013).
[13] WHO Regional Committee for the Eastern Mediterranean, Fifty-eighth session EMRO, EM/RC58/4: Scaling up the Expanded Programme on Immunization to meet global and regional targets, Cairo, 2-5 October 2011.
[14] Clements CJ, Chandra-Mouli V, Byass P, Ferguson BJ. Global strategies, policies and practices for immunization of adolescents. WHO 1999/V&B/99.24.
[15] WHO Regional Consultation to Standardize EPI schedule in the Eastern Mediterranean Region of the World Health Organization. Consultation on EPI schedule, EMRO, Oct 2006, VPI/EMRO, Mar 2008.
[16] http://apps.who.int/immunization_monitoring/en/globalsummary/timeseries/tscoveragett2plus.htm (last accessed May 2012).
[17] Vaccination coverage among adolescents aged 13-17 years—United States, 2007. MMWR 2008; 57:1100-3.
[18] Brabin L, Roberts SA, Stretch R, Baxter D, Chambers G, Kitchener H, et al. Uptake of first two doses of human papillomavirus vaccine by adolescent schoolgirls in Manchester: Prospective cohort study. BMJ 2008;336:1056–8.
[19] LaMontagne DS, Barge S, Le NT, Mugisha E, Penny ME, Gandhi S, et al. Human papillomavirus vaccine delivery strategies that achieved high coverage in low- and middle-income countries. Bull World Health Organ 2011 Nov 1;89(11), 821-30B.
[20] Luciani S, Jaurequi B, Kieny C, Andrus JK. Human papillomavirus vaccines: new tools for accelerating cervical cancer prevention in developing countries. Immunotherapy 2009 Sep;1(5):795–807.
[21] Brabin L, Greenberg DP, Hessel L, Hyer L, Ivanoff B, Van Damme P. Current issues in adolescent immunization. Vaccine 2008 Aug 5;26(33):4120–34.
[22] Castellsagué X, Claeys P, Cutts FT, Goldie S, Franceschi S, de Sanjose S, et al. Human papillomavirus and HPV vaccines: Technical information for policy-makers and health professionals. Bull World Health Organ 2007 Sep;85(9):719–26.
[23] Broutet N, Huntington D, Cutts F, Hall P. Preparing for the introduction of HPV vaccines: policy and programme guidance for countries. WHO 2006.
[24] http://www.unicef.org/progressforchildren/2007n6/index_41798.htm (last accessed May 2012).
[25] Anonymous Middle East NCD Strategy. Lancet 2012;379 (9812):i.
[26] Bhattacharjee M. MoH to introduce hepatitis A, rotavirus and HPV vaccines. Muscat Daily Sep 20th, 2011.
[27] Jacob M, Mawar N, Menezes L, Kaipilyawar S, Gandhi S, Khan I, et al. Assessing the environment for introduction of human papillomavirus vaccine in India. Open Vaccine J 2010;3:96–107.
[28] Bartolini RM, Kidwell Drake J, Creed-Kanashiro HM, Díaz-Otoya MM, Mosqueira NR. Formative research to shape HPV vaccine introduction strategies in Peru. Salud Pública de México 2010 May-June;52(3):226–33.
[29] Katahoire RA, Jitta J, Kivumbi G, Murokora D, Arube Wani J, Siu G, et al. An assessment of the readiness for introduction of the HPV vaccine in Uganda. Afr J Reprod Health 2008;12(3):159–72.
[30] Knowledge Sait KH. attitudes, and practices regarding cervical cancer screening among physicians in the Western Region of Saudi Arabia. Saudi Med J 2011;32(11):1155–60.
[31] Ali SF, Ayub S, Manzoor NF, Azim S, Afif M, Akhtar N, et al. Knowledge and awareness about cervical cancer and its prevention amongst interns and nursing staff in tertiary care hospitals in Karachi, Pakistan. PLoS One 2010;5(6): e11059.
[32] Al Nuaimi NS, Al Ghas YS, Al Owais AH, Grivna M, Scheinder J, Nagelkerke NJ, et al. Human papillomavirus vaccination uptake and factors related to uptake in a traditional desert city in the United Arab Emirates. Int J STD and AIDS 2011;22:400–4.
[33] Durusoy R, Yamazhan M, Tasbakan MI, Ergin I, Aysin M, Pullukcu H, et al. HPV vaccine awareness and willingness of first-year student entering university in Western Turkey. Asia Pac J Cancer Prev 2010;11(6): 1695–701.
[34] Dursun P, Altuntas B, Kuscu E, Ayhan A. Women's knowledge about human papillomavirus and their acceptance of HPV vaccine. Aust N Z J Obstet Gynaecol 2009;49:202–6.
[35] Marlow LAV, Waller J, Evans REC, Wardle J. Predictors of interest in HPV vaccination: A study of British adolescents. Vaccine 2009;27:2483–8.
[36] Marlow LAV, Wardle J, Forster AS, Waller J. Ethnic differences in human papillomavirus awareness and vaccine acceptability. J Epidemiol Community Health 2009;63:1010–5.
[37] Rouzier R, Giordanella JP. Coverage and compliance of Human Papillomavirus vaccines in Paris: demonstration of low compliance with non school based approaches. J Adolesc Health September 2010;47(3):237–41.
[38] Kim JJ, Sharma M, O'Shea M, Sweet S, Diaz M, Sancho-Garnier H, et al. Model-Based Impact and Cost-Effectiveness of Cervical Cancer Prevention in the Extended Middle East and North Africa (EMENA). Vaccine 2013;31S: G65–77.
[39] Shaping a strategy to introduce HPV vaccines in India: Formative research results from the HPV vaccines: Evidence for impact project (2009). Available at: http://www.rho.org/HPV-vaccine-implementation.htm (last accessed June 2013).
[40] Kaufmann AM, Schneider A. New paradigm for prevention of cervical cancer. Eur J Obstet Gynec Reproduct Biol 2007 Jan;130(1):25–9.