Abstract of thesis entitled

“Evidence-based educational interventions increase acceptability of HPV vaccination among university students”

Submitted by

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**Background:** Human Papillomavirus (HPV) causes cervical, vulvar, vaginal, penile, head and neck cancer. HPV vaccines are considered to be very effective and safe in preventing HPV vaccine-type infections (HPV types 6,11,16&18). However, the vaccination rate among young adults aged 18 to 26 years is low (Printz, C., 2013). In this translational nursing research, an evidence-based protocol has been developed to
increase the intention and uptake of HPV vaccination among university students by educational interventions.

**Aim:** The aim of this study is to identify the best evidence of educational interventions to formulate an evidence-based practice (EBP) protocol that can be implemented in the university health service for prevention of HPV infection. The goal is to increase the acceptability of HPV vaccination.

**Method:** A literature review was performed by searching in 4 databases: PubMed, CiNahl (EBSCO host), PsycINFO and Google Scholar. A systematic review was done on educational interventions targeted at university students that merited implementation in a university setting in Hong Kong. Qualities and levels of evidence of the selected studies were assessed using the checklists of the critical appraisal and grading system of Scottish Intercollegiate Guidelines Network respectively.

**Results:** Nine randomized controlled trials were selected and an EBP protocol was innovated. After discussing the implementation potential of the EBP protocol, it was considered feasible, transferrable, low-costing and effective. Plans of communication, pilot testing and evaluation were developed. The EBP protocol will be implemented and evaluated accordingly.
Conclusion: The evidence-based educational interventions for increasing the acceptability of HPV vaccination among university students are potentially fit for implementation in universities in Hong Kong.
Evidence-based educational interventions increase acceptability of HPV vaccination among university students

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DECLARATION

I declare that this dissertation represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualifications.

Signed _______________________

CHAN Sau Nga Audrey
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LIST OF ABBREVIATIONS

CDC  Centers for Disease Control and Prevention

CHP  Centre for Health Protection

EBP  Evidence-based practice

HBM  Health Belief Model

HPV  Human papillomavirus

RCT  Randomized controlled trial

SIGN Scottish Intercollegiate Guidelines Network

UHS  University Health Service

WHO  World Health Organization
CHAPTER 1 INTRODUCTION

1.1 Background

Human papillomavirus (HPV) is known to cause cervical cancer and anogenital warts. There are more than 200 types of papillomavirus. Among these, the HPV types 16 and 18 are most commonly identified as high-risk HPV (HR-HPV) types and are associated with 70% of cervical cancers and precancerous cervical lesions (WHO, 2015). The most common low-risk HPV (LR-HPV) types are 6 and 11, and these are known to cause anogenital warts (WHO, 2015). Other cancers found in areas such as the vulva, vagina, penis, anus, head and neck are also associated with HPV infections (CDC, 2015). Transmission of genital HPV infection is mainly through skin-to-skin sexual contact, including vaginal, oral, and anal with an infected person (CDC, 2015). Prevention of HPV infection and precancerous or dysplastic lesions of the oropharynx is a priority as they cannot be screened for (CDC, 2015).

Cervical cancer was the fourth most common cancer among females worldwide (WHO, 2015). In 2012, around 530,000 new cases were diagnosed and 270,000 women died from cervical cancer worldwide (WHO, 2015). In Hong Kong, cervical cancer was the eighth most common cancer among females with 457 new cases in 2012 (Department of Health, 2015). It was the ninth leading cause of deaths from
cancer in females in 2013 (Department of Health, 2015).

Around 50% of men who are sexually active may acquire HPV in their lifetime (Dunne, Nielson, Stone, Markowitz & Giuliano, 2006). Around 7200 men are diagnosed with oropharyngeal cancer caused by HPV infection each year in the United States (CDC, 2015). In Hong Kong, according to Lin, C. (2010), the incidence rate of genital warts was 204/100000. It is estimated that every year there are 11524 new cases of genital warts among those aged 18 and over.

Based on the results of clinical trials, HPV vaccines are considered to be very effective and safe in preventing HPV vaccine-type infections (HPV types 6, 11, 16 & 18) (CDC, 2015; WHO, 2015). Quadrivalent HPV vaccines, such as Gardasil, are used to target HPV types 6, 11, 16 and 18, and they are approved for use in both females and males aged 9 or above in Hong Kong (Centre for Health Protection [CHP], 2013). It is used for the prevention of premalignant genital lesions, premalignant anal lesions, cervical cancers, anal cancers and genital warts caused by HPV types. Bivalent vaccines, such as Cervarix, protect against HPV types 16 and 18 for women. A series of 3 injections of the HPV vaccine given within 6 months produce full protection. Clinical studies following vaccinated individuals for ten years show there is no evidence of weakened protection over time, which suggests HPV vaccines offer long-lasting protection against HPV infection (CDC, 2015).
1.2 Affirming the Need

1.2.1 Low HPV vaccine coverage among university students

An annual cross-sectional survey tracking more than 27,000 adults showed that more than 75% of women aged 18 to 26 years had not received the HPV vaccine in the U.S. (Printz, C., 2013). As such, the promotion of enhancing HPV vaccination coverage in 18-26 years old young women and men has become increasingly important.

The target setting of this paper is the university health service (UHS) of a local university. The UHS provides medical service, health education and promotion to students, staff and staff dependents. University students who want to have HPV vaccination can go to the UHS and receive the vaccine at their own cost. The UHS offers HPV vaccination at a discounted rate. HPV promotion campaign involving exhibitions, talks, and vaccinations is held annually by the UHS in campus. However, HPV vaccination rate was low. According to the statistics provided by university Management Information Unit in 2014, the number of newly admitted undergraduates was 4,060. By reviewing the vaccination inventory of the UHS, it is estimated that the number of students who received HPV vaccination from June 2014-June 2015 was 300 (7.3% of newly admitted undergraduates). For the HPV campaign in 2014, the
number of people who received their 1\textsuperscript{st} dose of HPV was around 1000 (24.63 \% of newly admitted undergraduates). The average HPV vaccination coverage was 16\% of newly admitted undergraduates, which is low. Since the UHS offers discounted HPV vaccination, the cost is less than receiving the vaccination privately, therefore most students would prefer to receive vaccination in the UHS. As a result, it is crucial for the UHS to promote the implementation of scientific and evidence-based protocol in HPV vaccination campaigns and thus the increase of HPV vaccination acceptance in university students.

\textbf{1.2.2. Lack of evidence-based educational intervention to promote HPV vaccine among university students}

Public education and promotional effort are as important as cervical screening and HPV vaccination for cervical cancer prevention (CHP, 2013). Unfortunately, there is a lack of evidence-based guidelines of implementing and promoting HPV vaccination campaigns. Studies show that vaccine safety, vaccine efficacy, perceived barrier, perceived benefit, perceived susceptibility, HPV knowledge, and vaccine cost are factors that affect adolescents or young adults’ acceptability of HPV vaccination (Juraskova et al., 2011; Siu, J. Y.M, 2013). Education interventions targeting those decision factors could promote the acceptability of HPV vaccination in young adults.
1.2.3. Increasing risk of HPV infection among university students

A study with 1941 women aged 14-59 years old, showed that HPV infection was most prevalent among females aged 20 to 24 years in the U.S. (Dunne at al., 2007). HPV infection was found to be most common in people’s late teens and early 20s (CDC, 2015). As such, HPV education and vaccination promotion should be held in universities for students in order to target this high risk demographic.

In Hong Kong, according to ‘Youth Sexuality study 2011: Aged 18-27 Youth Study’ by Family Planning Association in 2014, 13%-20% of respondents are noted to be sexually active in the age group 18-19. The percentage increased significantly to 49% in the age group of 22-23 years old. The survey also showed that 34% of male and 13% of female respondents accepted multiple sexual partners; 21% of males and 6% of female respondents accepted extra-marital sex. Early first sexual intercourse and multiple sexual partners are risk factors for HPV persistence and development of cervical cancer (WHO, 2015). Therefore, the risk of HPV infection among university students is assumed to increase based on their multi-sexual partner, sexual attitudes and behaviors.

1.2.4. Need for systematic review of innovation

Promotion of HPV vaccine can be carried out through the existing facilities and
channels in universities such as university health service units, campus email or online portal system etc. Thus evidence-based educational interventions for increasing HPV vaccination acceptability can be implemented in a low cost, low effort and effective way.

Although there has been a review on educational interventions to increase HPV vaccination acceptance (Fu et al., 2014), there are several reasons to review and analyze relevant studies again systematically.

Firstly, Fu et al. (2014) categorized studies of educational intervention for adolescents and young adults in the same group. Four studies of adolescents included subjects from secondary or high schools who were aged 12-16 years old. Four studies of young adults included subjects from colleges who were aged 18-26 years old. The differences of age and education level between these two target groups are so great that they should be reported and analyzed separately.

Secondly, Fu et al. (2014) classified studies into three categories: (1) vaccine parental education, (2) adolescent/young adult education and (3) comparative message persuasiveness. However, it is unclear how cross-category studies such as comparison of the impact of different messages on young adults should be categorized. This limitation was also mentioned by Shapiro, Joyal-Desmarais, Perez & Rosberger (2014). Shapiro et al. (2014) listed an example of a study by Krawczyk et al. (2012)
where the aim of the study was to compare the effectiveness of written and video methods of educational intervention. This particular study was categorized into adolescent/young adult education instead of comparative message persuasiveness, which would have been more appropriate. Consequently, Shapiro et al. (2014) suggested future systematic review to avoid overlapping of categories by narrowing down the research topic.

Thirdly, Fu et al. (2014) included studies that were conducted before the HPV vaccine was licensed. It is unjustified to assess participants’ acceptability or intention of HPV vaccination if it was not yet licensed or available in the market as factors such as cost, side-effects, and efficacy would have been uncertain.

1.3 Objectives

There are two objectives for this thesis: (i) to determine the effectiveness of educational interventions to enhance HPV acceptability among university students; (ii) to explore the feasibility of applying the evidence-based HPV education protocol using the UHS as the target setting.

1.4 Significance

Epidemiology studies suggest that up to 75% of sexually active people will be infected with HPV at some point during their lifetime (CHP, 2013; CDC, 2015).
HPV can cause genital cancers e.g. anus, penis, vagina, cervix, vulva and oropharynx; and genital warts. The mortality rate from cervical cancer is 52%, which is globally regarded as high (WHO, 2015). HPV vaccines are effective and safe in preventing HPV vaccine-type infections (CDC, 2015; WHO, 2015). By increasing the acceptability of HPV vaccination, the need for medical care, biopsies, and invasive procedures associated with the follow-up from treatment for cervical pre-cancer lesions and cervical cancer can be reduced (National Cancer Institute, 2011). Males who receive HPV vaccine can also reduce the spread of HPV infection to their female sexual partners (CDC, 2015).

Ideally, HPV vaccination should be completed before individuals become sexually active or are exposed to the HPV virus (CDC, 2015; WHO, 2015). The Advisory Committee on Immunization Practices of CDC recommends catch-up vaccination for 18-26 years old young women in the United States. Evidence showed that females and males who are sexually active may also benefit from HPV vaccination (Krawczyk et al., 2012; CDC, 2015). Although sexually active women may already be exposed to one or more of the HPV vaccine types, very few are infected with all of them, and they can still get protection from HPV vaccine types that have not been acquired. Therefore, catch-up HPV vaccination targeting university students will be effective in preventing HPV vaccine type infections.
1.5 Research Question

The PICO format has been used to formulate the searchable and answerable research question: "How effective are educational interventions in comparison with the usual care in increasing acceptability of HPV vaccination among university students?" where patient(P) is university students, intervention(I) is educational interventions, comparison(C) is usual care, and outcome(O) is increased acceptability of HPV vaccination.
CHAPTER 2 CRITICAL APPRAISAL

2.1 Search and Appraisal Strategies

2.1.1 Inclusion and Exclusion Criteria

2.1.1.1. Inclusion criteria:

(1) Randomized controlled trials (RCT);

(2) target populations of university/college students/young adults (aged 18-26; female and/or male);

(3) educational interventions which are designed to increase HPV vaccine acceptability (intention and uptake).

2.1.1.2. Exclusion criteria:

(1) studies published before 2006 (HPV vaccines were licensed and became available since 2006 in the U.S and Hong Kong);

(2) irrelevant or complicated outcome measures: HPV vaccine completion instead of initiation; multi-conditioned outcomes;

(3) descriptive only, pilot and qualitative projects;
(4) non-educational interventions;

(5) non-English articles;

(6) meta-analysis or reviews.

2.1.2 Search Strategy

Four electronic databases: PubMed, CINAHL (EBSCO host), PsycINFO and Google Scholar were searched for identifying studies. The keywords used for the search were based on three categories:

1. Target population: university students, college students, young adults
2. Intervention: education, interventions
3. Outcome: Human papillomavirus (HPV) vaccine, uptake, intention, initiation, willingness

Searching was limited to studies published after 2006 as HPV vaccines were licensed and approved for use since 2006 (as mentioned in “Exclusion Criteria).

2.1.3 Appraisal Strategy

In order to assess the quality of the studies included, a critical appraisal tool, checklist of critical appraisal of Scottish Intercollegiate Guidelines Network (SIGN) was used. The SIGN methodology checklists for controlled trials were used in all nine
selected studies for critical appraisal of study methodology. There are two sections in
the checklist: Internal Validity and Overall Assessment of the Study.

2.2 Results

2.2.1 Report of search results

Four electronic databases: PubMed, CINAHL (EBSCO host), PsycINFO and
Google Scholar were searched for identifying studies from 15 August 2015 to 15 Nov
2015.

A total number of 422 studies were yielded and an additional 18 records were
identified through reviewing the systematic review by Fu et al. (2014) and reference
lists of eligible studies. After screening for duplicated articles, 250 studies’ titles were
screened. 220 studies were excluded by screening of title and abstracts. Full-texts of
38 studies were screened and 29 were excluded, of those 21 articles were not RCT.
Finally, 9 studies were included in this study. Please refer to Appendix A (PRISMA
flow diagram) for summary of literature search.

Out of the 18 studies reviewed systematically by Fu et al. (2014), only 6 studies
(Doherty & Low, 2008; Patel et al., 2012; Hopfer, 2011; Juraskova, Bari, O’Brien, &
McCaffery, 2011; Krawczyk et al. 2012; DiClemente et al., 2011) were included in
this study. The other 12 studies were excluded from this study because (1) they were
Conducted before HPV vaccines were licensed (Gerend, 2007; Gerend, 2008; Gerend 2009; Gerend, 2009; Leader, 2009) and its safety, efficacy and costs were uncertain and not published to public before licensing, which may affect people’s acceptability. (2) The studies had non-specific target population: female college students and their corresponding mothers (Krieger, 2013). (3) They used irrelevant outcome measure: intention to “talk” about HPV vaccination (Krieger, 2013); completion of HPV series instead of initiation (Vanderpool et al., 2013). (4) The focus of the studies was on non-educational intervention: conversation with friend about the radio advertisement of HPV (Dunlop, Kashoma, wakefield, 2010); online blog (Nan & Madden, 2012). (5) They used multi-conditioned outcome measures: HPV vaccination intention in different message framing (gain versus loss), different motivational orientation (approach versus avoidance) and different gender (female versus male) (Nan, X., 2012); HPV vaccination intention in different message framing (gain versus loss) and different time orientation (Future-minded versus present-minded) (Nan, X., 2012); motivation to get vaccinated against HPV in different frame (gain versus loss), different response cost (high risk versus low risk) and Pap Status (yes versus no) (Gainforth & Latimer, 2012).

2.2.2 Table of evidence
In order to facilitate the summary and synthesis of new evidence, important and relevant data were extracted from the selected 9 studies and compiled into tables of evidence (Appendix B). Contents of table of evidence include (1) subject characteristics: age, race, significant difference between groups; (2) study type: randomized controlled trial; (3) intervention: content details of educational intervention; (4) control: content details of control feature; (5) outcome measures: intention and/or uptake of HPV vaccination; (6) length of follow-up: immediate intention of HPV vaccination; uptake or intention of HPV vaccination in months ranged from 1 to 3 months; (7) effect size: difference of outcome measures between intervention and control.

2.2.3 Summary of appraisal results

The SIGN Methodology Checklists for controlled trials were used to assess the internal validity and overall quality of the studies. (Appendix C).

2.2.3.1. Appropriateness and clearly focused question. All nine selected studies were able to address an appropriate and clearly focused question of evaluating the effectiveness of educational interventions in increasing the HPV vaccination:
(1) intention (Doherty & Low et al., 2008; DiClemente, Salazar, Nash & Younge, 2011; Gerend, Shepherd & Lustria, 2013; Krawczyk et al., 2012; Mehta, Sharma & Lee, 2013);

(2) uptake (Bennett et al., 2015; Hopfer, 2012; Patel et al., 2012);

(3) both intention and uptake (Juraskova et al., 2011)

2.2.3.2. Randomization. All 9 studies mentioned their subjects were randomly assigned to either intervention or control groups. However, only 5 studies mentioned the methods of randomization. Gerend et al. (2013) used random number list created with random number generator. Hopfer (2012) used random number generator. Mehta et al. (2013) used online software: Research Randomizer. Patel et al. (2012) used computer randomization program. Bennett et al. (2015) used automated algorithm. The other 4 studies did not specify method of random allocation at all and therefore their qualities are downgraded (DiClemente et al., 2011; Doherty & Low, 2008; Juraskova et al., 2011; Krawczyk et al., 2012).

2.2.3.3. Allocation Concealment. Five studies used adequate concealment methods: sequentially numbered, sealed, opaque envelopes (Patel et al., 2012); random number list created with random number generator (Gerend et al. 2013);
automated algorithm (Bennett et al. 2015); centralized allocation of randomization by non-researchers (Hopfer, 2012) and computer online software: Research Randomizer (Mehta et al., 2013). The other 4 studies did not mention concealment method at all.

2.2.3.4. **Blinding.** Blinding of investigators is difficult in educational interventions. Blinding of subjects are not mentioned but possible in 8 studies as the control groups received usual care instead of null care. Except study of Doherty & Low (2008) whereas the control group received null care so that blinding is unlikely.

2.2.3.5. **Difference between groups.** Seven studies applied statistical analysis to detect baseline differences between intervention and control groups except Patel at al. (2012) and DiClemente et al. (2011). They did not mention the baseline difference between groups. Seven studies reported no significant difference between groups except Bennett et al. (2015) and Mehta et al. (2013). Bennett et al. (2015) reported there were more women in intervention group who had engaged in anal sex (p = 0.02). Mehta et al.(2013) reported difference in groups for perceived benefits and barriers, while Chi-square tests showed differences in demographic variables.
2.2.3.6. **Outcome Measures.** HPV vaccination intention were measured in 6 studies (DiClemente et al., 2011; Doherty & Low, 2008; Gerend et al., 2013; Juraskova et al., 2011; Krawczyk et al., 2012; Mehta et al., 2013). Reliability and validity of measuring scales e.g. multiple choice questions or Likert-type scales were mentioned in 4 studies: Doherty & Low, 2008 (Cronbach’s Alpha); Mehta et al., 2013 (Cronbach’s Alpha and test-retest reliability coefficients); Gerend et al. (2013) and Juraskova et al. (2011) (validated in previous research). Reliability test of Likert-type scale were not mentioned in 2 studies (Krawczyk et al., 2012; DiClemente et al., 2011).

HPV vaccination uptake was measured in 4 studies (Bennett et al., 2015; Hopfer, 2012; Juraskova et al., 2011; Patel et al., 2012). Dates of HPV vaccination were abstracted from medical records or self-report vaccination history in 6 months (Patel et al., 2012). Self-report of HPV vaccination as “yes, no, or don’t know” in 3-month follow-up (Bennett et al., 2015). Self-report of HPV vaccine uptake (yes/no) measured in 2 months (Hopfer, 2012; Juraskova et al., 2011).

2.2.3.7. **Attrition rate.** Immediate post-intervention outcomes (vaccination intention) were measured and thus with zero attrition rate in studies of DiClemente et al., 2011; Doherty & Low, 2008; Gerend et al., 2013; Juraskova et al., 2011; Krawczyk et al., 2012 & Mehta et al., 2013.
In the study of Hopfer (2012), attrition rate in 2-month follow-up was zero. Attrition rate in other studies with 1-3 months’ follow-up, ranged from 34.5% to 82.2% (34.5%, Doherty & Low, 2008; 46%, Juraskova et al., 2011; 49.8%, Bennett et al., 2015; 82.2%, Mehta et al., 2013)

Study of Patel et al. (2012) did not mention attrition rate in 6-month follow-up which may have over-estimated the effect size.

2.2.3.8. **Intention-to-treat analysis.** Intention-to-treat analysis was not applicable to 6 studies with immediate post-intervention outcomes (Doherty & Low, 2008; Gerend et al., 2013; Juraskova et al., 2011; Krawczyk et al., 2012; Mehta et al., 2013; & DiClemente et al., 2011). However, there is insufficient information to make an assessment on intention-to-treat analysis for the other studies with drop-out (Bennett et al., 2015; Doherty & Low, 2008; Juraskova et al., 2011; Mehta et al., 2013).

2.2.3.9. **Comparable for all sites.** Only 1 study was carried out at 2 sites (DiClemente et al., 2011). However, no site specific data was given.

2.2.3.10. **Overall Quality Assessment.** Funding was declared by Krawczyk et al., 2012 (Canadian Institutes of Health Research), Patel et al., 2012 (Canadian National Institutes of Health/ National Cancer Institute); Mehta et al., 2013 and DiClemente et al., 2011 (pharmaceutical companies); Gerend et al., 2013 and
Bennett et al, 2015 (U.S. National Cancer Institute). All results were unlikely to be biased based on the study nature and funding institutes. Course credits, coupons, cash or raffles were given to subjects for participation in all 9 studies.

Level of evidence and quality of study were rated based on SIGN Grading System 1999-2012 (Appendix D). Two studies, Hopfer (2012) & Gerend et al. (2013) fulfilled most of the criteria in SIGN checklist and have very low risk of bias and therefore graded 1++. Three studies are graded as 1+ (Bennett et al., 2015; Patel et al., 2012; Mehta et al., 2013). Four studies are graded 1- as (1) randomization method and concealment were not specified (DiClemente et al., 2011; Doherty & Low, 2008; Juraskova et al., 2011; Krawczyk et al., 2012) and (2) baseline difference between groups was not mentioned (DiClemente et al., 2011).

2.3 Summary and Synthesis

2.3.1 Summary

2.3.1.1 Subjects’ characteristics. All 9 studies investigated the effectiveness of educational interventions aimed at university students. The age ranged from 18-26 years old; mean age 18.86-21. The target populations included female only (Bennett et al., 2015; Gerend et al. 2013; Hopfer, 2012; Juraskova et al. 2011; Patel et al., 2012); male only (DiClemente et al., 2011; Mehta et al., 2013) and
both female and male (Doherty & Low, 2008; Krawczyk et al., 2012). Majority of
subjects (>50%) were Caucasian in all studies, except DiClemente et al., (2011)
where majority (53.3%) were African American or black. Juraskova et al., (2011)
did not mention subjects’ race.

Studies of Doherty & Low (2008), Gerend et al. (2013), Hopfer (2012) and
Krawczyk et al. (2012) reported no significant between groups. Juraskova et al.
(2011) reported that there was no significant difference in participants’
demographic characteristics and sexual history between groups except fathers’
education level, which would not affect response to the intervention.

Bennett et al. (2015) reported there was no substantial differences between
groups in baseline demographic characteristics except more women in
intervention group had engaged in anal sex (p = 0.02); Mehta et al. (2013)
reported difference in groups for perceived benefits and barriers, while
Chi-square tests showed differences in demographic variables. Therefore,
participants’ responses to the intervention may be affected by baseline differences
between groups in both studies of Mehta et al. (2013) and Bennett et al. (2015).

2.3.1.2 Intervention. Some educational interventions are theory-based or
model-based: Culture-centric narrative theory and Exemplification theory (Hopfer,
2012); Social cognitive theory (DiClemente et al., 2011) and the Health Belief Model (Krawczyk et al., 2012; Mehta et al., 2013).

Formats of educational intervention included: video (Hopfer, 2012); website (Doherty et al., 2008; Bennett et al., 2015); pamphlet and video (Krawczyk et al., 2012); HBM-based presentation, role play, brain storm, discussion (Mehta et al., 2013); leaflets or written pamphlets (Juraskova et al., 2011; Gerend et al., 2013); presentation (DiClemente et al., 2011); discussion and follow-up mailed materials (Patel et al., 2012).

Contents of intervention versus control: online information with Q &A, personal story of a woman with HPV versus no information (Doherty et al., 2008); individually tailored message about HPV and HPV vaccine versus non-tailored message (Gerend et al., 2013; Bennett et al. 2015); narrative video of peer only, expert only and peer-expert versus non-narrative video/ general HPV website/no intervention (Hopfer, 2012); HBM-guided pamphlet or video on HPV and vaccine versus pamphlet on general cancer (Krawczyl et al., 2012); HBM-based interventions versus knowledge-based interventions (Mehta et al., 2013); HPV vaccine protects cervical cancer and genital wart versus HPV vaccine protects cervical cancer (Juraskova et al., 2011); HPV vaccine protects in altruism condition versus in personal sexual protection condition versus in personal cancer
protection condition (DiClemente et al., 2011); HPV-specific education and mailed reminder versus standard “HPV and vaccination fact sheet” (Patel et al., 2012).

2.3.1.3 Length of follow-up. Six studies carried out immediate post-intervention assessment to measure the intention of HPV vaccination (Doherty & Low, 2008; Mehta et al., 2013; Krawczyk et al., 2012; Gerend et al., 2013; DiClemente et al., 2011; Juraskova et al., 2011); Six studies with follow-up length ranging from 1 month (Doherty & Low, 2008), 2 months (Hopfer, 2012; Juraskova et al., 2011); 3 months (Mehta et al., 2013; Bennett et al., 2015) and 6 months (Patel at al., 2012).

2.3.1.4 Outcome measure and effect size. HPV vaccination intention or willingness were measured in 6 studies (Doherty & Low, 2008; Mehta et al., 2013; Krawczyk et al., 2012; Gerend et al., 2013; DiClemente et al., 2011 & Juraskova et al., 2011). All six studies showed significant increase intention in HPV vaccination after educational interventions (p=0.036, Doherty & Low, 2008; p=.000, Mehta et al., 2013; p<0.01, Krawczyk et al., 2012; p<0.001, Gerend et al., 2013; p=0.0001, DiClemente et al., 2011; p=.001, Juraskova et al. 2011).

Juraskova et al. (2011) reported that information framing (effect of sexualized message “cervical cancer versus cervical cancer plus genital warts”) did not influence intention and receipt of HPV vaccination (difference between
The overall mean post-intervention intention score (4.16) was significantly higher than pre-intervention intention score (3.95; p=.001). It means both information of HPV vaccines prevent cervical cancer and information of HPV vaccines prevent cervical cancer and genital warts increase intention of vaccination. Type of outcome expectation, stemming from HPV vaccination (DiClemente et al., 2011) would not affect the intention and uptake of HPV vaccination (difference between group, p=0.56). The overall mean post-intervention intention score (M=3.91) was significantly higher than pre-intervention intention score (M=3.19). Therefore, intervention of HPV information conditions increase men’s intention of HPV vaccination.

Uptake of HPV vaccination significantly increased in combine peer-expert narrative intervention (p=0.036; Hopfer, 2012) and HBM-guided pamphlets (p<0.01; Krawczyk et al, 2012). However, HPV-specific education and mailed reminder (RR=0.84, 95% CI[0.31-2.28], Patel et al., 2012) and online tailored message (chi-squared=0.009, p=0.76, Bennett et al. 2015) have no significant difference in HPV vaccine uptake among participants in intervention group compared with controls.

2.3.1.5 Sample size. Number of subjects in 9 studies ranged from 90 to 661. The small sample size of 90 men in the study of Mehta et al. (2013) was statistically

In conclusion, six studies supported that educational interventions increase intention of HPV vaccination (printed tailored message: Gerend et al., 2013; HBM-based workshop: Mehta et al., 2013; website: Doherty & Low, 2008; leaflets or pamphlets: Juraskova et al., 2011 & Krawczyk et al., 2012; and PowerPoint: DiClemente et al., 2011). All of them showed significant increase immediately after interventions. Only one of them (Mehta et al., 2013) showed HBM-based workshop intervention significantly increased vaccination intention in 1 to 3 months follow-up.

In the 4 studies that measured HPV vaccination uptake, only one study (Hopfer, 2012) showed peer-expert video narrative significantly increased HPV vaccine uptake. Three studies showed no significant difference of intervention and control in increasing HPV vaccine uptake (online tailored message: Bennett et al., 2015; discussion and mail reminder: Patel et al., 2012; leaflet: Juraskova et al., 2011).
2.3.2 Synthesis

After critically analysing the 9 studies, only 2 were graded 1++ (Hopfer, 2012 & Gerend et al., 2013) and 3 were graded 1+ (Bennett et al., 2015; Patel et al., 2012; Mehta et al., 2013). Four studies were graded as 1- because of high risks of bias (Doherty & Low, 2008; Juraskova et al., 2011; Krawczyk et al., 2012; DiClemente et al., 2011). There are a number of possible reasons for unpreventable risks of bias in those studies. Firstly, high attrition rate was common as vaccination is a preventive measure and subjects had no existing illness. Therefore, subjects may not be motivated to follow-up because dropping out of the study would be harmless and it would not affect them negatively. Secondly, although results generated from self-report may cause recall bias from participation, self-report on yes/no questions were the most possible and relatively reliable method to measure vaccine uptake. Self-report of vaccination behavior was the most possible way of evaluating vaccination uptake as subjects could receive HPV vaccination outside target setting where objective measurement by researcher is impossible. It also explained high attrition rate in studies measuring vaccine uptake. Thirdly, double blinding is difficult in studies of educational intervention, as in many previous similar studies. Fourthly, baseline difference in perception of HPV and vaccine is unavoidable due to inadequate knowledge of HPV vaccine even in highly educated university students (Fontenot, H., Collins F.H.,
innovating evidence-based educational interventions to promote HPV vaccination acceptability in university students is needed.

From the results of studies assessing immediate post-intervention intention of HPV vaccination, it was found that online information (Doherty & Low, 2008), video information (Krawczyk et al., 2012), workshop (Mehta et al., 2013) and printed information, such as leaflets (Juraskova et al., 2011), pamphlets (Krawczyk et al., 2012) and individual tailored messages (Gerend et al., 2013) are effective in increasing the intention of HPV vaccination.

Health Belief Model-based educational interventions: workshop (Mehta et al., 2013); pamphlet and video (Krawczyk et al., 2012) are also effective in increasing the intention of HPV vaccination. Mehta et al. (2013) showed that HBM educational workshop increased both immediate and 3 months’ intention of HPV vaccination when compared with Knowledge-based educational interventions (p=0.000).

Individual-tailored message has different effects between intention and uptake of HPV vaccination. Bennett et al., (2015) reported that individually online tailored message has no significant difference in HPV vaccine uptake compared with control. However, Gerend et al. (2013) reported individually printed tailored message about
HPV vaccine significantly increased the intention of HPV vaccination compared with control.

Education increased HPV vaccination intention regardless of information framing of HPV vaccines i.e. HPV vaccines protect against cervical cancer or against both cervical cancer and genital warts (Juraskova et al., 2011). Also, education increased HPV vaccination intention regardless of the types of outcome expectation and stemming of vaccine (DiClemente et al., 2011).

The effect of education on HPV vaccination intention after 1 to 3 months was reported as not significant in Doherty & Low (2008); but significant in Mehta et al. (2013) (p=0.000). However, both studies had high attrition rates (34.5% and 82.2 % respectively) and low methodology qualities. Therefore, time effect of education on HPV vaccination intention cannot be concluded.

In conclusion, educational interventions significantly increase the intention of HPV vaccination in university students. However, its effectiveness in increasing HPV vaccine uptake is inconclusive.
3.1 Transferability

3.1.1. Target setting and audience

The target setting is the UHS of a local university. The UHS provides medical consultation, health education and health promotion to students, staff and staff dependants. Students or staff opting for HPV vaccination can attend the UHS and have the vaccine administered at their own cost. The UHS also holds HPV campaigns annually to promote the awareness of HPV infection and HPV vaccination. The 4-day HPV campaign includes HPV vaccination as well as an exhibition.

The target population is university students, mainly undergraduates who are 18-26 years old.

3.1.2 Transferability in target setting

The target setting of the innovation is a local university. As the target settings of all research studies were in universities, the proposed innovations can be directly transferred to the proposed setting.
In Hong Kong, most undergraduates start full-time bachelor degree studies after graduating secondary school at the age of 18. Therefore, students within the 18-26 age who will benefit from the innovation consist mostly of undergraduates and some postgraduates.

One of the service goals of the target UHS setting is promotion of health, including sexual health. The promotion of HPV vaccination acceptability by implementing evidence-based protocol meets the service goal of the target setting.

The proposed educational interventions are conveyed by different formats: video (Hopfer, 2012; Krawczyk et al., 2012), internet website (Doherty & Low, 2008), printed information: message (Gerend et al., 2013); pamphlet & leaflet (Juraskova et al., 2011; Krawczyk et al., 2012); PowerPoint presentation (DiClemente et al, 2011) and workshop (Mehta et al, 2013). The contents of educational interventions included individual tailored message (Gerend et al., 2013), video narrative (Hopfer, 2012), and HBM-based interventions: workshop (Mehta et al, 2013) and leaflets (Krawczyk et al., 2012). The formats and contents of proposed educational interventions will be well accepted by the target population as students in Hong Kong are already acquainted with similar western teaching styles and education strategies since primary school.

Although the reviewed studies were all carried out in western countries, they can still be applied to the target population due to similarities between the sexual attitude
and practice of young adults in Hong Kong and that in western countries. According to ‘Youth Sexuality study 2011: Aged 18-27 Youth Study’ (Family Planning Association, 2014), 34% of male and 13% of female respondents accepted multiple sexual partners; 70% of male and 59% of female respondents accepted pre-marital sex; 21% of male and 6% of female respondents accepted extra-marital sex. The norm of non-single sex partners is similar to that in western countries which increases the risk of HPV infection and other sexually transmitted diseases.

According to the statistics of Management Information Unit and vaccination log record of the target university in 2014, the current average HPV vaccination rate is estimated at 16%. This leaves a large number of people who have not received vaccination and can benefit from the innovation.

In the target setting, the health education unit is responsible for the promotion of health in the university. With team members of the health education unit contributing towards the preparation, it is estimated to take 2 to 3 months to implement the innovation. The proposed evidence-based interventions can be implemented as part of daily operations e.g. e-video and online information on the UHS website, display and distribution of pamphlets within the waiting area of the UHS. Workshops will be held during the annual HPV campaign. Levels of HPV vaccination acceptability can be evaluated using electronic surveys immediately after students access the HPV
webpage and watch the HPV e-video. An evaluation will also be conducted after each workshop during the campaign. Uptake rate of HPV vaccines can be evaluated by counting the number of HPV vaccine recipients at the UHS. Therefore, the innovation will not take too long to implement and evaluate.

Health education nurses in the UHS have skill sets consistent with those needed for the innovation. For example, they are experienced in designing and compiling information for pamphlets and webpages, conducting workshops, and PowerPoint presentations.

3.2 Feasibility

Nurses play important roles in promoting sexual health. Nurses are used to promote breast self-examination, pap smear screening and provide contraceptive advice. Nurses are also responsible for vaccination programs for students. In the UK and Australia, there are specialized sexual health nurses. In Hong Kong, nurses of the Student Health Service under the Department of Health also provide sex education to primary and secondary students. Therefore, nurses are the best professionals to implement the proposed educational interventions for promotion of HPV vaccination.

As the innovation includes multiple educational interventions, the preparation and implementation of the innovation will be carried out in a team. The innovation
will be carried out mainly by the nurses in the health education unit of the UHS. Health education nurses are responsible for health promotion and education to university students. This includes the promotion of HPV vaccination to university students. Therefore, implementation of the innovation will not interfere inordinately with current staff functions. However, training and briefing of the innovation should be offered to the staff involved. As some educational interventions such as pamphlet (Krawczyk et al., 2012), and workshop (Mehta et al., 2013) are developed based on the Health Belief Model, briefing on the Health Belief Model should be given to nurses. Briefing on the details of innovations to nurses, doctors and clerical staff is also needed to facilitate smooth implementation. Nurses are mainly responsible for the preparation of detailed content of interventions, for example, drafting and compiling the content of pamphlets and the HPV website, writing scripts in expert-peer video narratives. Health education nurses and doctors in the UHS are responsible for holding workshops on HPV education. Clerical staff are responsible for printing pamphlets, organizing the logistics for workshops etc. An in-house information technology technician will be responsible for the HPV webpage design and for uploading the video narrative to the UHS main website. A doctor from the UHS will be invited to act in “medical expert and peer video narrative”. A junior member of staff (regardless of job position) in the UHS will be invited to act as peer.
As the responsible doctors in the UHS will need time off to hold workshops, write scripts, rehearse and act for “medical expert and peer video narratives”, special approval for reservation of responsible doctors’ consultation time (time off) is needed from the director of the UHS.

The university and staff are likely to accept and support the innovation. The UHS currently provides HPV vaccination to students. The innovation increases HPV vaccination by optimizing utilization of resources and providing educational interventions with scientific evidence. Minimal additional nursing skills are needed. It would therefore be more acceptable by staff. Also, the UHS is a service unit of an academic institution, administrators and management board members of which always support evidence-based practice.

Facilities and equipment needed for implementation of the innovation are mostly available within university, for example, lecture hall for PowerPoint presentations & workshops; an online portal system, bulk email, e-notice system and the UHS website for online information. Equipment for the bulk printing of pamphlets is available within the campus. However, a video camcorder would need to be purchased or borrowed for the preparation of “medical expert and peer video narrative” intervention. The quality of a compact video camcorder is good enough for a 4-minute video as a video narrative intervention. The cost of a video camcorder is estimated at
around HK dollars 2500-5000. This cost could be partially or fully covered by the funding from pharmaceutical companies. The cost could also be accepted by the unit administrator as the camcorder could also be useful in other situations e.g. video taking for clinical drill, lunchtime CME talks etc. Alternatively, a video camcorder can be borrowed from the Learning Environment Service, a service department within the university, which provides free equipment loan services. Recorded videos can be uploaded to the UHS webpage by in-house information technology technician.

Although there are no existing evaluation tools for measuring the effectiveness of the innovation, it can be evaluated in terms of HPV vaccine uptake and intention of HPV vaccination. HPV vaccination uptake can be evaluated by checking HPV vaccination records in the UHS treatment room monthly via the clinic computer system and by counting the number of vaccine recipients in the HPV campaign. HPV vaccination intention can be evaluated by electronic survey using Likert scales adopted from the reviewed studies.

3.3 Cost-Benefit Ratio

As the innovations are educational, prophylactic and preventive interventions, the target population will not be exposed to any risks during the implementation of the innovation. For potential benefits, studies of HPV vaccine efficacy showed that
bivalent HPV vaccines demonstrated 93% efficacy in preventing cervical pre-cancers due to HPV 16 or 18 in HPV naïve women while quadrivalent HPV vaccines demonstrated nearly 100% efficacy among HPV naïve women in preventing cervical pre-cancers, vulvar and vaginal pre-cancers, and genital warts; 90% vaccine efficacy in preventing genital warts and 75% vaccine efficacy in preventing anal pre-cancers in men (CDC, 2015; CHP, 2013). Although genital warts are a non-fatal disease, they can cause emotional stress and uncomfortable treatment. Up until 2013, clinical studies published the maximum duration of protection of HPV vaccine is around 8 years (CHP, 2013). Some later studies suggest that vaccine protection is long-lasting with no evidence of waning protection (CDC, 2015).

HPV infection is most common in people in their late teens and early twenties (CDC, 2015). If university students can receive HPV vaccination before they are exposed to any HPV types, the vaccine efficacy will be more than 90%. By implementation of the innovations, HPV vaccination of university students can be increased so that incidence of HPV related diseases can be reduced. Although recipients (university students) receive HPV vaccination at their own cost, the university health service can offer vaccinations at cost price, which will be lower than private clinics. Students can therefore benefit from a lower price for HPV vaccination via the UHS.
Another non-material benefit of the innovation is optimizing utilization of existing resources and services, so that the UHS can provide the service more efficiently and effectively. By implementing the evidence-based protocol, pamphlets are re-designed and workshops will be added to the HPV campaign. In addition to pamphlets and workshops, tailored messaging, webpage information and video narrative can also increase the HPV vaccination uptake, awareness and intention.

The material costs of implementing the innovation are costs for pamphlet printing, lunchboxes for lunchtime briefing for nurses, clerical staff, doctors and the volunteer (junior member of staff) who acts as peer in video narrative; and video camcorder purchase (optional). Most of the costs of implementing the innovation are non-material, such as time and manpower. Preparation time is needed for designing pamphlets, tailored messages, webpage, video narrative and workshop. The innovation involves health education nurses, doctors, clerical staff, a junior member of staff and an in-house information technology technician. The human resources who involved all prepare and implement the innovation during official work hours except the doctors. Doctor’s consultation time should be reserved and used for preparation and implementation of innovation. Details of costs are as follows: 100 copies of the pamphlet are to be distributed each month and 1000 copies during the annual campaign. In total, 2200 copies of pamphlets will be printed in one year. As the cost
of printing is around $0.8 per copy, the total cost for printing is around $1760 each year. A one-off cost of lunchboxes for the lunchtime briefing is around $450 for a total of 15 persons including nurses, clerical staff, doctors and the volunteer (junior member of staff) who acts as peer in video narrative. Another one-off cost is the purchase of a video camcorder which is optional as it can be borrowed from another university service unit for free. The estimated cost of a video camcorder is $2500-$5000. Therefore, the total cost for the first year is $2210 (with a borrowed video camcorder) or $4710 ~ $7210 (with a purchased video camcorder). Total annual costs for subsequent years will be $1760 for printing pamphlets only. (Appendix D)

Different from curative or treatment interventions, educational interventions on vaccination are preventive and prophylactic. Theoretically, by increasing HPV vaccination, the number of HPV vaccine-specific infections could be reduced. Hence, expenses on surgical, medical and oncological treatments for treating HPV related diseases could be reduced. For example, since the introduction of quadrivalent HPV vaccines in 2006 in the U.S., the prevalence of HPV infections covered by the vaccine decreased in women in their early 20s (CDC, 2015). However, data on actual benefits were not mentioned as it is difficult to calculate the benefits of preventive interventions practically. Data of benefits were not mentioned in the 9 reviewed studies. Therefore, cost-benefit ratio cannot be calculated in this innovation.
3.4 Evidence-Based Practice Protocol

The evidence-based protocol was developed by the critical appraisal of 9 RCT studies by using the SIGN checklist. Conclusions of the selected studies were summarized and synthesized into recommendations. The protocol is divided into two parts: formats of interventions and contents of interventions. Five recommendations were made for formats of interventions whilst three were made for contents of interventions. By using this evidence-based protocol, educational interventions are implemented in order to increase the uptake, intention and awareness of HPV vaccination. As a result, HPV vaccine-specific type infections will decrease (Appendix F).
CHAPTER 4 PLANS FOR IMPLEMENTATION AND EVALUATION OF

THE INNOVATION

Plans for implementation and evaluation of the protocol have been designed. The implementation plan consists of two parts: communication and pilot testing. In the evaluation plan, outcomes are identified and the nature and number of clients to be involved are determined. Data measurement and analysis are also specified.

The implementation plan consists of plans for communication and pilot testing. It will take around 16 weeks from initiating communication with stakeholders to preparation of the interventions in the evidence-based protocol. It will take another 11 weeks for pilot testing and evaluation of pilot testing.

4.1 Communication Plan

The communication plan is tailored to initiate and sustain the implementation of the proposed evidence-based protocol to increase the acceptability of HPV vaccination in university students. The stakeholders of the proposed innovation are the management of the UHS, nurses, users of the protocol, supporting information technology personnel, clerical staff and doctors. Communication with stakeholders is very important and therefore a communication plan has been developed.

The proposed protocol dictates that approval and support from UHS management
should be sought first. Meetings with the Director of UHS and nursing officers will be arranged in the 1st and 2nd week. In the meetings, evidence from the literature about the significance and need of promoting HPV vaccination will be provided. Current statistical data of HPV vaccination in the UHS will be provided to show that the university’s HPV vaccination rate is low. The details and reference of the proposed evidence-based protocol will be provided and explained by the proposer. The implementation potential, such as transferability, feasibility and cost-benefits of the protocol will be explained during the meeting. The estimated cost of setting-up and running the protocol will be listed and explained to the management. The approval for applying for funding from pharmaceutical companies will be sought from management. The nomination of doctors for acting in the video narrative and conducting workshops will be sought from the Director as well as approval for time reservation for participating doctors.

After getting approval and support from the Director and nursing officers, briefing sessions and training to nurses should be initiated in the 3rd week. As nurses are the users of the evidence-based protocol, briefing and training on the content and details of the proposed evidence-based protocol will be offered during lunch time meetings. As the Health Belief Model is applied in some of the interventions in the evidence-based protocol, a 10-minute presentation on the Health Belief Model will be
given to nurses by the proposers. In order to sustain the change, feedback from nurses will be collected by conducting surveys in different phases, for example during pilot testing; at the beginning of implementation (at the end of the first month) and from time to time throughout the implementation of the protocol (every two months in the first year). In the questionnaire, nurses will be asked to list out difficulties and barriers encountered when implementing the new evidence-based protocol. They will also be asked to make comments on the evidence-based protocol if necessary. After collecting feedback from nurses, the evidence-based protocol will be refined if necessary. Additional guidance such as an updated resource manual and standby support from the proposer will be offered to nurses during implementation.

Also during the 3rd week, communication with doctors who are nominated by the Director to participate in the narrative video and workshops will commence after gaining support and approval from UHS management. Verbal consent from the nominated doctors will be sought. Lunchtime meetings will be organized with participating doctors, during which their role and responsibilities in the process will be explained, and details of the narrative video and workshops will be discussed.

After the nurses and doctors have been briefed, communication with supporting staff and units will be initiated from the 5th week. Briefing sessions on specific roles and tasks of the information technology technician and clerical staff will be given.
Since the information technology technician is responsible for the website design, details of the general layout and content of the website will be communicated to them. For clerical staff, as they are responsible for printing the leaflets and pamphlets, making the video and organizing the workshop logistics, the content and details of those interventions will be instructed to them. The university’s Information Technology Service will be contacted for dissemination of information via the online portal system, e-notices system and bulk emails etc. Also, a female junior member of staff in the UHS will be invited to act as “peer” in the expert-peer video narrative. She will be given a script and 2 weeks to prepare before the video is made.

The communication between stakeholders for initiation of the evidence-based protocol is estimated to take 5 weeks. After communication with stakeholders, the preparation of educational interventions will begin and is estimated to take 11 weeks. Timeline of the communication plan is shown in Appendix G.

4.2 Pilot Study Plan

Before the full-scale implementation of the proposed evidence-based protocol, a pilot test will be carried out to explore the feasibility of implementing the innovation. Pilot testing will be carried out over a period of 8 weeks in order to obtain sufficient data for analysis. Evaluation of the pilot test and revision of the proposed
evidence-based protocol will be carried in the following 3 weeks, from the 9th week to the 11th week. The proposed evidence-based protocol will be revised based on the evaluation of the pilot test. Timeline of the pilot study plan is shown in Appendix H.

One hundred subjects are expected to be recruited for the pilot test, of which 20 subjects will be invited to attend the workshop. Since many university students will be out of campus or out of town during long holidays e.g. summer holiday (June to August) and term break (December to January), these times will be avoided for pilot testing.

The target clients of the evidence-based protocol are university students. Students who attend the UHS will be recruited for the pilot test by convenient sampling. During nurse triage, nurses will invite students to attend the workshop and introduce the HPV website and e-video or distribute printed information e.g. pamphlets, leaflets or tailored messages. Feedback from nurses and students will be collected using a survey and the data will be analyzed and evaluated during the subsequent 3 weeks.

By the end of the pilot test, a questionnaire will be distributed to all nurses adopting the evidence-based protocol (Appendix I). In the survey, open-ended questions will be used to ask the nurses the difficulties or barriers encountered when implementing the evidence-based protocol. They will also be asked to provide comments on the intervention. The purpose of the survey is to find out the difficulties
or barriers of implementing the evidence-based protocol so that refinement of the evidence-based protocol can be made to further facilitate the implementation and increase the nurses’ compliance.

The utilization rate of interventions will be assessed by the number of leaflets, pamphlets and tailored messages distributed, workshop attendance and the number of website and e-video views. Feedback from target clients will also be collected by means of evaluation forms. There will be evaluation forms for the workshop intervention (Appendix J), printed educational materials (Appendix K), educational website (Appendix L) and educational e-video (Appendix M). Students who receive the interventions will be invited to complete a corresponding evaluation form. Each evaluation form contains 5 items that uses a Five-point Likert scale, ranged from strongly disagree (1) to strongly agree (5). The total possible score for the Likert scale is in the range 5-25. If they answer “disagree” or “strongly disagree”, they will be asked to indicate the reasons. Students are also invited to provide additional comments on the intervention.

In the evaluation form for the workshop intervention (Appendix J), Questions 1, 2 and 5 are assessing the satisfaction levels. Questions 3 & 4 are specifically designed for assessing the appropriateness of location and the duration of workshop. In the evaluation form for printed materials, (Appendix K), questions 1, 2 and 5 are
assessing the satisfaction levels. Questions 3 & 4 are specifically designed to assess the clarity and quality of the printed materials. Students who access the HPV online information (website & e-video) will be invited to complete the electronic survey via online portal system. In the evaluation form for the educational website (Appendix L), questions 1, 2 & 5 are assessing the satisfaction on intervention. Questions 3 to 4 are assessing the accessibility and design of the website. In the evaluation form for e-video (Appendix M), questions 1, 2 & 5 are assessing the satisfaction on intervention. Questions 3 to 4 are assessing the accessibility and quality of the e-video.

After collecting the completed evaluation forms, scores of each intervention will be calculated and analyzed. A higher score indicates a more satisfactory intervention. Reasons provided as part of “disagree” or “strongly disagree” ratings and any other comments will be noted down and evaluated by the proposer of the innovation and nurses from the health education team. The evidence-based protocol will be revised according to the comments and data gathered from the pilot testing evaluation.

4.3 Evaluation Plan

After implementation of the proposed evidence-based protocol, patient outcomes, health care provider outcomes and system outcomes will be assessed to determine
whether the evidence-based protocol is effective.

4.3.1. Outcomes to be achieved

4.3.1.1. Patient Outcomes. HPV vaccines are very effective and safe in preventing HPV vaccine-type infections (6, 11, 16 & 18) (CDC, 2015; WHO, 2015). The aim of the proposed innovation is to increase the acceptability of HPV vaccination among university students through educational interventions. Increase in HPV vaccination acceptability includes increase in HPV vaccine uptake and increase in HPV vaccination intention. Therefore, there are two patient outcomes to be assessed: HPV vaccination uptake and HPV vaccination intention. The rate of HPV vaccination uptake will be assessed by counting the number of students having received HPV vaccination. The intention of HPV vaccination will be evaluated by intervention surveys before and after the implementation of the protocol. The respondents will be asked to use the 5-point Likert scale system to score statements such as “I intend to receive the HPV vaccination in the near future?” (Juraskova et al., 2011; Doherty & Low, 2008). The scale will range from strongly disagree (1) to strongly agree (5) and a higher score will indicate greater vaccination intention.
**4.3.1.2. Healthcare Provider Outcomes.** For healthcare provider outcomes, nurses and doctors will be the ones who implement the evidence-based protocol. The main users of the evidence-based protocol will be nurses as they will design and distribute printed information (pamphlet, leaflet and tailored message), they will design and prepare the video narrative and they will be responsible for delivering workshops and designing and preparing the website. By implementing the protocol, it is hypothesized that there will be an increase in nurses’ satisfaction level, their knowledge on HPV, HPV vaccine and the Health Belief Model and acceptance level of the protocol. The assessment of which will be obtained by self-administered questionnaires. In the questionnaire, nurses will be asked to list out difficulties or barriers encountered when implementing the evidence-based protocol in full-scale. In the survey, 5 items using identical 5-point Likert scale will be used to assess their level of satisfaction, knowledge and acceptance respectively and the scale will range from strongly disagree (1) to strongly agree (5). The possible total score can range from 5-25 and a higher score indicates a higher level of satisfaction, knowledge and acceptance on the protocol.

**4.3.1.3. System Outcomes.** For system outcomes, the utilization rate of the protocol will be assessed. For printed educational interventions, the number of
pamphlets, leaflets and tailored message distributed will be assessed. The attendance levels at workshops and the number of visits to the website and e-video will also be assessed. The higher the utilization rate, the more students receive education on HPV and HPV vaccination. Ultimately, HPV related-infection rate could decrease.

4.3.2. Nature and Number of clients to be involved

The target population of the protocol are university students who have never had HPV vaccination before. Clients will be recruited from both a convenience sample of students who attend the UHS and through the university online portal system. The sample size is calculated by online computer program Piface JAVA Applets for Power and Sample Size (Lenth, 2006-9). The sample size for evaluation of pre-post intervention vaccination rate is estimated by using two-tailed z-test for testing one proportion with level of significance set to be 0.05 and power as 0.8. Null value as 0.16 and actual value as 0.24. With an estimated attrition rate of 20%, the minimum sample size is 225.

By using the same software, the sample size for evaluation of pre-post intervention vaccination intention is estimated by using one-sample paired t-test with
sigma as 3, true as 2, level of significance set to be 0.05 and power of 0.8. With an estimated attrition rate of 10%, the minimum sample size is 22.

4.3.3. Data collection

The target clients will be recruited by convenience sampling. As the vaccination rate before the implementation of protocol was measured yearly, measurement of vaccination uptake after implementation of the protocol will be done yearly (at week 52) so that the before and after vaccination rates are comparable. For change in vaccination intention, the target clients will be asked to complete the survey immediately after they received the interventions (Gerend, 2013; Doherty & Low, 2008; Krawczyk et al., 2012 & DiClemente et al., 2011) and at 2-3 months (Juraskova et al., 2011; Mehta et al., 2013). For those who received printed educational information and/or attended workshops, they will be asked to fill in the written survey. For those who received online educational information, they will be asked to complete the survey online.

For nurses’ outcome, their levels of satisfaction, knowledge and acceptance will be evaluated by self-administered surveys at months 1, 3, 6 & 12.

For system outcome, the utilization rate of interventions will be evaluated monthly as part of the UHS monthly report to the Director. The number of units of printed
educational information (leaflets, pamphlets and tailored message) distributed, attendance of workshop and number of visits to the website and e-video will also be assessed.

4.3.4. Data analysis

Data will be analyzed with the SPSS software by the protocol proposer. Descriptive statistics will be used to analyze the change in patients’ vaccination rate, intention of vaccination and nurses’ satisfaction, knowledge and acceptance.

In order to test if the HPV vaccination uptake has increased after implementation of the protocol, the pre-intervention uptake rate and post-intervention uptake rate will be analyzed by two-tailed z-test. One sample paired t-test will be used to analyze the before and after change in HPV vaccination intention as patient outcome. Nurses’ satisfaction, knowledge and acceptance will be analyzed by total score of the Likert scale.

4.4 Basis for Implementation

The proposed evidence-based protocol is considered as effective based on an increase in vaccination uptake rate, vaccination intention and nurses’ outcome.

The protocol will be regarded as effective if the post-intervention vaccination rate is increased by half of the pre-intervention rate. The pre-intervention vaccination rate is
around 16%. Effect size is anticipated to increase by half of the pre-intervention rate i.e. increase in 8% of vaccination uptake rate after implementation of protocol. The post-intervention vaccination rate should achieve 24% as effective.

The protocol will be regarded as effective if intention of HPV vaccination increases significantly, i.e. p-value less than 0.05 in the two-tailed paired t-test.

For nurses’ levels of satisfaction, knowledge and acceptance, they will be assessed by questionnaire with 5 items using identical 5-point Likert scale. The possible total score can range from 5-25. The option “agree” scores 4, therefore the total score of 5 items should be at least 20 to be considered as effective.

CHAPTER 5 CONCLUSION

HPV vaccine-type infections can be effectively prevented by HPV vaccines. Educational interventions increase the intention and uptake of HPV vaccination among university students, therefore reducing HPV vaccine-type infections. This translational nursing research innovates an evidence-based protocol by systematic review and critical appraisal of randomized controlled trials. It also demonstrates the implementation potential of the protocol. Plans for communication, pilot testing, implementation and evaluation have also been developed.
APPENDIX A

PRISMA 2009 Flow Diagram

Identification

Records identified through database searching (n = 422)

Additional records identified through other sources (n = 18)

Records after duplicates removed (n = 440)

Screening

Records screened (n = 250)

Records excluded (n = 212)

Eligibility

Full-text articles assessed for eligibility (n = 38)

Full-text articles excluded (n = 29)
Reason:
- Non RCT (n = 21)
- multi-conditioned measure outcomes (n = 3)
- irrelevant measure outcome (n = 2)
- non-educational intervention (n = 2)
- non-specific target population (n = 1)

Included

Studies included in qualitative synthesis (n = 0)

Studies included in quantitative synthesis (meta-analysis) (n = 9)
## APPENDIX B

### Table of Evidence

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study type</th>
<th>Patient characteristics</th>
<th>Intervention</th>
<th>Control</th>
<th>Length of follow up</th>
<th>Outcome</th>
<th>Effect size</th>
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<tbody>
<tr>
<td>Doherty, Low (2008)</td>
<td>RCT (−)</td>
<td>N=119 (M:51, F: 68) -undergraduate from psychology -Mean age: 18.86 (M) 19.19 (F) - Majority : white (111) -no significant difference of dependent variables between groups at baseline</td>
<td>N=61 -baseline survey -Emailed the link to educational website 48 hrs after the baseline survey was sent -educational website: 1. Q &amp; A 2. personal story of a woman with HPV 3. FU survey</td>
<td>N=58 -baseline survey -FU survey 48 hrs after baseline survey. No link to educational website</td>
<td>-immediate after intervention -One month (response rate 65.5%)</td>
<td>-immediate after intervention; - 1 month after intervention</td>
<td>Repeated measures ANOVAs; Post hoc simple effects Immediate after intervention: 1. more positive attitudes in Ix gp; ( t(117)=2.2, p=0.036 ) 1 month FU (post-test only as only 29 of the 78 respondents could be matched) ( 1.F(1,77)=1.4, p=.NS )</td>
</tr>
<tr>
<td>Citation</td>
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</table>
| Gerend et al. 2013 | RCT (+++) Random assignment list created with random number generator | -N=94; (64 from general students; 30 from psychology students)  
-Female university students  
-aged 18-26 years; mean 20.3 (SD 1.9)  
-67% Caucasians  
-received $10 (general students), or course credit (psychology students)  
-no significant difference in demographic variables, sexual history variables or HPV/HPV vaccine awareness (descriptive; data not shown) | n= 45 Individually tailored message about participants’ perceived barriers to HPV vaccine uptake (eg. Safety concerns, cost, and not sexually active) | n=49 Non-tailored message about HPV vaccination | Nil | (1) Intentions to receive the HPV vaccine in the next year (7-point Likert scale)  
(2) HPV awareness and knowledge (irrelevant to study) | (1) I: p<0.001, Partial eta2=0.316  
C: p<0.001, partial eta2=0.138 (significant)  
(2)Partial eta2: 0.702, p<0.001, mean difference 3.24 |
<table>
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<tr>
<th>Citation</th>
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</thead>
<tbody>
<tr>
<td>Hopfer (2012)</td>
<td>RCT (+ +) random number generator</td>
<td>- n=404 - female college students - Age: 18-26 mean: 21 - 72% caucasian - 50% sexually active - no significant difference between Intervention and control groups across socio-demographic characteristics</td>
<td>One of three: (1)n=101 video narrative delivered by peer (3.46 mins, 3.39 mins) (2) n=101 video narrative delivered by medical experts (1.25 mins) (3) n=50 video narrative delivered by peer-experts (4.11 mins, 4.15 mins) Videos includes 4 types of vaccine decision narratives - HPV susceptibility - vaccine self-efficacy - vaccine safety - regardless of dating status</td>
<td>One of three: (1) informational video without narratives (1 min) (2) campus website about information of HPV and vaccine (3) no message</td>
<td>-2 month (100% response rate)</td>
<td>- HPV vaccine uptake in 2 months (100% response rate)</td>
<td>(-\text{combined peer-expert narrative : OR} 2.07; 95% \text{CI}=1.05, 4.10; p=.036) (-\text{peer only narrative: OR} 1.61; 95% \text{CI}=0.08, 3.28; p=.185) (-\text{expert only narrative: OR}=0.48; 95% \text{CI}=0.13, 1.69; p=.25) * combined peer-expert intervention, vaccination was nearly double (22%) that of women receiving a control (12%) X^2(3,404)=8.6, p&lt;.035</td>
</tr>
</tbody>
</table>
### Table of evidence:

<table>
<thead>
<tr>
<th>Citation</th>
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<th>Patient characteristics</th>
<th>Intervention</th>
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</thead>
<tbody>
<tr>
<td>Krawczyk et al. (2012)</td>
<td>RCT (-)</td>
<td>N=200 -undergraduates (Canada) -F:140; M:60 -Mean age=20.4 (SD=2.3) -61% Caucasians -54.5% in a relationship -mean age of 1st sexual intercourse 17.1(SD=2.1) -SES was high (46% annual family income &gt;$ 100000 (Canada) -No difference on demographic, sexual, and health characteristics among groups</td>
<td>1. educational pamphlet guided by HBM on HPV and vaccine (n=61) 2. educational video by Health Care Professional guided by HBM on HPV and vaccine (n=74)</td>
<td>N=65 Education pamphlet on general cancer prevention</td>
<td>immediate post-test</td>
<td>Primary: (a)HPV vaccination intention -7-point Likert scale (b) efficacy education by video vs written pamphlet on vaccination intention (c)HPV and vaccine knowledge (not relevant to study)</td>
<td>Time by group interaction (p&lt;0.01); post hoc Tukey’s tests (a)written: M&lt;sub&gt;post-pre&lt;/sub&gt;=1.05 video: M&lt;sub&gt;post-pre&lt;/sub&gt;=1.25 Control: M&lt;sub&gt;post-pre&lt;/sub&gt;=0.37 (b) M&lt;sub&gt;post written-post video&lt;/sub&gt;=0.18 (not significant)</td>
</tr>
<tr>
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<tr>
<td>Mehta et al. (2013)</td>
<td>RCT(+) Online software: Research Randomizer</td>
<td>N=90 male university students 18-25 yrs old 71.1% Caucasians - Difference in groups for perceived benefits and barriers, while Chi-square tests showed differences in demographic variables - monetary incentive for participation</td>
<td>N=45 HBM-based educational intervention (PowerPoint presentation, role play, brain storming, discussion) (2 hr)</td>
<td>N=45 Knowledge-based educational intervention (information regarding STD, history of vaccine; PowerPoint presentation, discussion, videos)</td>
<td>-immediate post-test - FU (1-3 months)17.8%</td>
<td>(1) Intent to vaccinate -5-point scale (2) HBM construct (not relevant)</td>
<td>Repeated measures ANOVA (1) -pre-test/post-test /FU: p=.000 -pre-test/post-test: p=.000</td>
</tr>
<tr>
<td>Citation</td>
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<tr>
<td>Patel et al. (2012)</td>
<td>RCT (+) Computer randomization program</td>
<td>- N=256 - College female - Age: 18-26; mean=22.5 - Recruited in gyn clinic in UHS - Never had HPV vaccine before - 67.2% Caucasian - 73.6% sexually active - Received $5 in cash as a token of appreciation</td>
<td>N=128 HPV-specific patient education (study coordinator discuss in detail a “HPV and Vaccination” fact sheet) + after 2 week, mailed packet (contained reminder letter, copy of the “HPV and Vaccination” fact sheet)</td>
<td>N=128 Standard care (Information sheet similar to content as “HPV and Vaccination” fact sheet)</td>
<td>6 month: dates of HPV vaccination and the 3 most recent clinic visits were assessed via review of UHS medical record; if dates were unavailable, participants were mailed a brief questionnaire , telephoned, and e-mailed)</td>
<td>(1) HPV vaccine uptake (received at least 1 dose) (2) Intent to undergo HPV vaccination at baseline (Not related to this topic)</td>
<td>(1) 5.5% (n=14) RR=0.84; 95% CI[0.31-2.28] Follow-up rate was not mentioned</td>
</tr>
<tr>
<td>Citation</td>
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<tr>
<td>Juraskova et al. (2011)</td>
<td>Randomized (-)</td>
<td>N=159 female</td>
<td>N=78 Information leaflet: HPV vaccine protecting against cervical cancer + genital wart (CC+GW)</td>
<td>N=81 Information leaflet: HPV vaccine protecting against cervical cancer (CC)</td>
<td>(a) Immediate after intervention (b) 2 months (135 contacted, 73 reported; response rate 54%)</td>
<td>1. Intention to receive HPV vaccine in the near future (5-point Likert scale: 1- strongly disagree to 5 strongly agree)</td>
<td>(a) 1. Total mean&lt;sub&gt;pre&lt;/sub&gt;=3.95; Total mean&lt;sub&gt;post&lt;/sub&gt;=4.16 P=.001</td>
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<td>1&lt;sup&gt;st&lt;/sup&gt; yr psychology students from University of Sydney</td>
<td>(To test whether a potentially “sexualized” or stigmatized message would affect HPV vaccine intention or behavior)</td>
<td>(b) Secondary outcome (not relevant to this thesis)</td>
<td></td>
<td>2. actual vaccine uptake behavior in 2 months</td>
<td>Between groups F [1,155]= 0.09; p&gt;0.05 (no significant difference)</td>
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<td>&lt;27 yrs old (mean age:19 , SD=1.18)</td>
<td>N=78 Information leaflet: HPV vaccine protecting against cervical cancer + genital wart (CC+GW)</td>
<td>N=81 Information leaflet: HPV vaccine protecting against cervical cancer (CC)</td>
<td>(a) Immediate after intervention (b) 2 months (135 contacted, 73 reported; response rate 54%)</td>
<td>2. response rate 54% X&lt;sup&gt;2&lt;/sup&gt;(1,75) = 0.56; p=0.456</td>
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<td>excluded who had already received HPV vaccine</td>
<td>N=78 Information leaflet: HPV vaccine protecting against cervical cancer + genital wart (CC+GW)</td>
<td>N=81 Information leaflet: HPV vaccine protecting against cervical cancer (CC)</td>
<td>(a) Immediate after intervention (b) 2 months (135 contacted, 73 reported; response rate 54%)</td>
<td>2. response rate 54% X&lt;sup&gt;2&lt;/sup&gt;(1,75) = 0.56; p=0.456</td>
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<td>no significant difference between 2 conditions on demographic characteristics and sexual history except father's educational level</td>
<td>N=78 Information leaflet: HPV vaccine protecting against cervical cancer + genital wart (CC+GW)</td>
<td>N=81 Information leaflet: HPV vaccine protecting against cervical cancer (CC)</td>
<td>(a) Immediate after intervention (b) 2 months (135 contacted, 73 reported; response rate 54%)</td>
<td>2. response rate 54% X&lt;sup&gt;2&lt;/sup&gt;(1,75) = 0.56; p=0.456</td>
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<td>45% never had sex</td>
<td>N=78 Information leaflet: HPV vaccine protecting against cervical cancer + genital wart (CC+GW)</td>
<td>N=81 Information leaflet: HPV vaccine protecting against cervical cancer (CC)</td>
<td>(a) Immediate after intervention (b) 2 months (135 contacted, 73 reported; response rate 54%)</td>
<td>2. response rate 54% X&lt;sup&gt;2&lt;/sup&gt;(1,75) = 0.56; p=0.456</td>
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<tr>
<td>DiClemente et al. 2011</td>
<td>RCT (-)</td>
<td>N=150</td>
<td>- university-based men</td>
<td>N=150</td>
<td>Immediate after intervention</td>
<td>Audio computer-assisted self interview:</td>
<td>(1) Overall pretest-post test (t-test):</td>
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<tr>
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<td>(Oct - Dec 2009)</td>
<td>- 18-24 yrs old (mean: 20.2, SD=1.5)</td>
<td>(based on Social Cognitive theory) 6 slides and a photo PowerPoint presentation</td>
<td>3 conditions pre-test subjects as control respectively</td>
<td></td>
<td>- intention to be vaccinated in the next 12 months (6-point Likert-type scale: 1-very unlikely; 6-very likely)</td>
<td>- Pretest=3.19, SD1.33</td>
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<td>- African American or black (53.3%); white (19.3%); Asians/ Pacific Islanders (21.3%)</td>
<td>(1) altruism condition (averting cervical cancer)</td>
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<td>- post-test=3.91, SD1.34</td>
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<td>- 2 universities (75 each)</td>
<td>(2) personal sexual protection condition (averting genital warts)</td>
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<td>t=9.48 [147], p=0.0001</td>
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<tr>
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<td>- compensation of US $30 for participation</td>
<td>(3) personal cancer protection condition (averting head and neck cancers)</td>
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<td></td>
<td></td>
<td>(significant)</td>
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<td></td>
<td></td>
<td>- funding from pharmaceuticals</td>
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<td>(2) Among 3 interventions (one-way ANCOVA) F=0.59 [2/144], p=0.56</td>
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<td></td>
<td></td>
<td>(not significant)</td>
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<tr>
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<tr>
<td>Bennett et al. 2015</td>
<td>RCT (+) automated algorithm</td>
<td>N=661 -female university students -aged 18–26 67.3% Caucasians - no substantial differences between groups in baseline demographic characteristics - more women randomized to intervention group had engaged in anal sex ( p = 0.02)</td>
<td>N=330 - 144 question baseline survey - MeFirst tailored intervention website (unique, tailored website automatically configured for the individual participant based on their baseline survey responses. It consisted of seven tailored topic webpages; up to 160 items could be tailored to the participant on their individual MeFirst website)</td>
<td>N=331 144 question baseline survey - control website (text from the CDC Vaccine Information Statement on the quadrivalent HPV vaccine)</td>
<td>3months</td>
<td>37- question survey - HPV vaccine uptake -(other outcomes are not relevant to this study)</td>
<td>no difference chi-squared = 0.09, p = 0.76</td>
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</table>
APPENDIX C

Methodology Checklists: Controlled Trials

<table>
<thead>
<tr>
<th>Study identification (Include author, title, year of publication, journal title, pages)</th>
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</thead>
<tbody>
<tr>
<td>The Effects of a Web-Based Intervention on College Students' Knowledge of Human Papillomavirus and Attitudes toward Vaccination</td>
</tr>
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</table>

### Section 1: Internal validity

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used</td>
</tr>
<tr>
<td>1.4</td>
<td>The design keeps subjects and investigators ‘blind’ about treatment allocation.</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to</td>
</tr>
</tbody>
</table>
which they were randomly allocated (often referred to as intention to treat analysis).

| 1.10 | Where the study is carried out at more than one site, results are comparable for all sites. | Does not apply ☑ |

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

#### 2.1

*How well was the study done to minimise bias? Code as follows:*

| Low quality (-) |

#### 2.2

Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?

Yes. No significant difference of dependent variables between group in baseline. The effect size of intervention groups are significant in short-term.

#### 2.3

Are the results of this study directly applicable to the patient group targeted by this guideline?

Yes. Same target group (university students), same intervention (education), same control (usual intervention)

#### 2.4

**Notes.** Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.

University students received web-based educational intervention. For HPV knowledge, the effect of intervention was significant in short-term and long-term Fu; For attitude towards HPV vaccination, the effect of intervention was significant in short-term; not significant in long-term

Randomization is mentioned but method not specified.

Both intervention and control groups improved in attitudes from baseline to immediate FU(48 hrs apart), may due to media coverage

At 1 month Fu, post-test only as only 29 of the 78 respondents could be matched
Study identification  *(Include author, title, year of publication, journal title, pages)*

<table>
<thead>
<tr>
<th>Section 1: Internal validity</th>
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</thead>
<tbody>
<tr>
<td>1.1</td>
</tr>
</tbody>
</table>
| 1.2 | The assignment of subjects to treatment groups is randomised.\(^1\) | Yes ✔  
Random assignment list created with random number generator |
| 1.3 | An adequate concealment method is used.\(^2\) | Yes ✔ |
| 1.4 | Subjects and investigators are kept ‘blind’ about treatment allocation.\(^3\) | Can’t say ☐  
Single-blinded. Blinding of investigators are impossible |
| 1.5 | The treatment and control groups are similar at the start of the trial.\(^4\) | Yes ✔ |
| 1.6 | The only difference between groups is the treatment under investigation.\(^5\) | Yes ✔ |
| 1.7 | All relevant outcomes are measured in a standard, valid and reliable way.\(^6\) | Yes ✔ |
| 1.8 | What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?\(^7\) | 0% (immediate post-intervention) |
| 1.9 | All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).\(^8\) | Does not apply ☐ |
### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

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<tbody>
<tr>
<td><strong>2.1</strong></td>
<td><em>How well was the study done to minimise bias? Code as follows:</em>&lt;sup&gt;2&lt;/sup&gt;</td>
<td>High quality (++)&lt;sup&gt;☑️&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>2.2</strong></td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Yes. Strong statistical power of the study. Methodology is good designed</td>
</tr>
<tr>
<td><strong>2.3</strong></td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes. Same target group, same intervention and control</td>
</tr>
<tr>
<td><strong>2.4</strong></td>
<td><strong>Notes.</strong> Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td>Tailoring message intervention increases the intention of HPV vaccination among young female university students. However, the sample size is small (n=94), limited generalization due to convenience sample</td>
</tr>
</tbody>
</table>
### Study identification

*Include author, title, year of publication, journal title, pages*

Hopfer, Suellen. Effects of a Narrative HPV Vaccination Intervention Aimed at Reaching College Women: A Randomized Controlled Trial

<table>
<thead>
<tr>
<th>Section 1: Internal validity</th>
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<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes ☑</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes ☑ random number generator</td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Yes ☑ The allocation of randomization was centralized by non-researcher (UHS staff)</td>
</tr>
<tr>
<td>1.4 The design keeps subjects and investigators ‘blind’ about treatment allocation.</td>
<td>Can’t say ☑ single blinded. Most likely the subjects were blinded.</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes ☑</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes ☑</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes ☑</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>0 % (2 month FU)</td>
</tr>
<tr>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Does not apply ☑</td>
</tr>
<tr>
<td>1.10 Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Does not apply ☑</td>
</tr>
</tbody>
</table>
## SECTION 2: OVERALL ASSESSMENT OF THE STUDY

| 2.1 | How well was the study done to minimise bias? Code as follows: | High quality (++)

| 2.2 | Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention? | Yes. Good methodology Good statistical power

| 2.3 | Are the results of this study directly applicable to the patient group targeted by this guideline? | Yes. Female university students, same intervention (education), same control (usual intervention)

| 2.4 | **Notes.** Summarise the authors' conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above. | Four-armed RCT; combined peer-expert narrative intervention nearly doubled vaccination compared to control (22% vs 12 %)\(X^2(3,404)=8.6, p<.035\)

Participants received lunch coupon upon completion as compensation

### Section 1: Internal validity

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
<td>Yes ✔</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Can’t say ☐&lt;br&gt;Randomization is mentioned but method not specified</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>No ☒&lt;br&gt;Not mentioned</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Can’t say ☐&lt;br&gt;Not mentioned. Most likely the subjects were blinded</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Can’t say ☐&lt;br&gt;The difference in participants’ fathers’ education level was reported and this is minimal relevant to the response to the intervention.</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
<td>Yes ✔</td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes ✔</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>0% (immediate post-intervention)&lt;br&gt;46% (2 months FU)</td>
</tr>
</tbody>
</table>
1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis). Can't say  

1.10 Where the study is carried out at more than one site, results are comparable for all sites. Does not apply  

<table>
<thead>
<tr>
<th>SECTION 2: OVERALL ASSESSMENT OF THE STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 How well was the study done to minimise bias? Code as follows:</td>
</tr>
<tr>
<td>Low quality (-)</td>
</tr>
<tr>
<td>2.2 Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
</tr>
<tr>
<td>Yes. Sample size was adequate to detect large effect sizes (effect size=0.35) at p&lt;0.05</td>
</tr>
<tr>
<td>2.3 Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
</tr>
<tr>
<td>Yes. The study group was university female</td>
</tr>
<tr>
<td>2.4 Notes. Summarise the authors' conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
</tr>
<tr>
<td>HPV vaccination intention and uptake not influenced by information framing (as a CC+GW or a CC vaccine), p&gt;.05.</td>
</tr>
<tr>
<td>HBM subtype: barrier (p=0.029) and benefits (p=0.001) independently predicted HPV vaccination intention; susceptibility (p=0.023) and benefits (p=0.033) independently predicted HPV vaccination behavior</td>
</tr>
<tr>
<td>Participants received course credit for participation</td>
</tr>
</tbody>
</table>
How to Inform: Comparing Written and Video Education Interventions to Increase Human Papillomavirus Knowledge and Vaccination Intentions in Young Adults

Krawczyk, A., Lau, E., Perez, S., Delisle, V., Amsel, R., & Rosberger, Z.


### Section 1: Internal validity

<table>
<thead>
<tr>
<th>In a well conducted RCT study...</th>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Can’t say ✓ Randomization is mentioned but method not specified</td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Can’t say ✓ Not mentioned</td>
</tr>
<tr>
<td>1.4 The design keeps subjects and investigators ‘blind’ about treatment allocation.</td>
<td>Can’t say ✓ Not mentioned. Most likely the subjects were blinded</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Can’t say ✓</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into each</td>
<td>0 (immediate post-intervention)</td>
</tr>
</tbody>
</table>
### Section 2: Overall Assessment of the Study

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2.1</strong> How well was the study done to minimise bias? <strong>Code as follows:</strong></td>
<td>Low quality (-) ✓</td>
</tr>
<tr>
<td><strong>2.2</strong> Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Yes. The effect size of intervention groups are significant.</td>
</tr>
<tr>
<td><strong>2.3</strong> Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes. Same target group (university students)</td>
</tr>
<tr>
<td><strong>2.4</strong> <strong>Notes.</strong> Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td>University students received written and video educational intervention guided by HBM had significant higher knowledge and intentions than control. No differences were found between written and video interventions on knowledge or intention. Though it claimed it’s a randomized controlled-trial, no method of randomization was mentioned. No follow-up was done; limiting conclusion on the long-term effects of the intervention. High SES of the sample, results may not generalizable to a wider population.</td>
</tr>
<tr>
<td>Section 1: Internal validity</td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>1.1</strong> The study addresses an appropriate and clearly focused question.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td><strong>1.2</strong> The assignment of subjects to treatment groups is randomised.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td>Online software: Research Randomizer</td>
<td></td>
</tr>
<tr>
<td><strong>1.3</strong> An adequate concealment method is used.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td><strong>1.4</strong> The design keeps subjects and investigators ‘blind’ about treatment allocation.</td>
<td>Can’t say ✓</td>
</tr>
<tr>
<td>Not mentioned. Most likely the subjects were blinded i.e. single blinded</td>
<td></td>
</tr>
<tr>
<td><strong>1.5</strong> The treatment and control groups are similar at the start of the trial.</td>
<td>No ✓</td>
</tr>
<tr>
<td>Difference in groups for perceived benefits and barriers, while Chi-square tests showed differences in demographic variables</td>
<td></td>
</tr>
<tr>
<td>The only difference between groups is the treatment under investigation.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td><strong>1.7</strong> All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td><strong>1.8</strong> What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>0 % at immediate post-test 82.2% at 1-3 months follow-up</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>1.9</strong></td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
</tr>
<tr>
<td><strong>1.10</strong></td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
</tr>
</tbody>
</table>

**SECTION 2: OVERALL ASSESSMENT OF THE STUDY**

| **2.1** | *How well was the study done to minimise bias? Code as follows:* | Acceptable (+) ✓ |
| **2.2** | Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention? | Yes. With power calculation of the needed sample size. Mentioned methods to reduce coercion and conflict of interest |
| **2.3** | Are the results of this study directly applicable to the patient group targeted by this guideline? | Yes. Male university students, |
| **2.4** | **Notes.** Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above. | Repeated measures of ANOVA showed significant positive change in the intervention group for intention to vaccinate. \( p = .000 \) The research was supported in part by a research grant from Merck Sharp & Dohme Corp. Snowball sampling in recruitment. Pre-test: Intervention gp had higher scores for perceived benefits and perceived barriers while Chi-square tests indicated differences in demographic variables |
**Study identification**  *(Include author, title, year of publication, journal title, pages)*

**Patel, D., Zochowski, M., Peterman, S., Dempsey, A., Ernst, S., & Dalton, V.** *(2012).*

Human Papillomavirus Vaccine Intent and Uptake Among Female College Students  
Journal of American College Health, 60(2), 151-161

<table>
<thead>
<tr>
<th>Section 1: Internal validity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes [✓]</td>
</tr>
</tbody>
</table>
| 1.2 The assignment of subjects to treatment groups is randomised. | Yes [✓]  
Computer randomization program |
| 1.3 An adequate concealment method is used. | Yes [✓]  
Sequentially numbered, sealed, opaque envelop |
| 1.4 The design keeps subjects and investigators ‘blind’ about treatment allocation. | Can’t say [✓]  
Not mentioned. Most likely the subjects were blinded. |
| 1.5 The treatment and control groups are similar at the start of the trial. | Can’t say [✓]  
Not mentioned |
<p>| 1.6 The only difference between groups is the treatment under investigation. | Yes [✓] |
| 1.7 All relevant outcomes are measured in a standard, valid and reliable way. | Yes [✓] |
| 1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed? | Not mentioned |
| 1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis). | Does not apply [✓] |</p>
<table>
<thead>
<tr>
<th>1.10</th>
<th>Where the study is carried out at more than one site, results are comparable for all sites.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Does not apply ☑</td>
</tr>
</tbody>
</table>

**SECTION 2: OVERALL ASSESSMENT OF THE STUDY**

<table>
<thead>
<tr>
<th>2.1</th>
<th>How well was the study done to minimise bias?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acceptable (+) ☑</td>
</tr>
</tbody>
</table>

**Code as follows:**

<table>
<thead>
<tr>
<th>2.2</th>
<th>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Borderline. Drop-out rate was not reported. The effect will be under-estimated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.3</th>
<th>Are the results of this study directly applicable to the patient group targeted by this guideline?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes. Female university students, same intervention (education), same control (usual intervention)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.4</th>
<th>Notes. Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HPV vaccine uptake was low (5.5%) and did not differ by study group. However, Dropout rate was not mentioned. Participants could receive vaccine outside the study target setting. For those who didn’t received vaccination in target setting, vaccination uptake history was based on self-report. Vaccination uptake history was not known for those failed to follow-up. Result may be under-estimated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 1: Internal validity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Can’t say ✓</td>
</tr>
<tr>
<td>Randomization is mentioned but method not specified</td>
<td></td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>No ✓</td>
</tr>
<tr>
<td>1.4 The design keeps subjects and investigators ‘blind’ about treatment allocation.</td>
<td>Can’t say ✓</td>
</tr>
<tr>
<td>Not mentioned. Most likely the subjects were blinded.</td>
<td></td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Can’t say ✓</td>
</tr>
<tr>
<td>No details were provided</td>
<td></td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>0 % (immediate FU after intervention)</td>
</tr>
<tr>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Does not apply ✓</td>
</tr>
<tr>
<td>1.10 Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Can’t say ✓</td>
</tr>
</tbody>
</table>
### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

<table>
<thead>
<tr>
<th>2.1</th>
<th><em>How well was the study done to minimise bias? Code as follows:</em></th>
<th>Low quality (-)☐</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>yes</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes. (university male students)</td>
</tr>
<tr>
<td>2.4</td>
<td><strong>Notes.</strong> Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td>All three groups of interventions significant increase in university male students’ intent to get vaccination. No significant differences between 3 intervention groups. Limitation: convenience sample. Baseline difference between groups was not mentioned.</td>
</tr>
</tbody>
</table>
Study identification  
(*Include author, title, year of publication, journal title, pages*)  


### Section 1: Internal validity

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Yes ✓ automated algorithm</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>Yes ✓ automated algorithm</td>
</tr>
<tr>
<td>1.4</td>
<td>The design keeps subjects and investigators ‘blind’ about treatment allocation.</td>
<td>Can’t say ✓ Not mentioned. Most likely the subjects were blinded.</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Can’t say ✓ Except more women randomized to intervention group had engaged in anal sex (p = 0.02)</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes ✓</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>49.8 % (3 months FU)</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Can’t say ✓</td>
</tr>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Does not apply ✓</td>
</tr>
</tbody>
</table>
### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

| 2.1 | **How well was the study done to minimise bias?** | Acceptable (+)  
*Code as follows:* |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td><strong>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</strong></td>
<td>Borderline. More women in intervention group had engaged in anal sex at baseline survey (p = 0.02); high dropped out rate (49.8%)</td>
</tr>
<tr>
<td>2.3</td>
<td><strong>Are the results of this study directly applicable to the patient group targeted by this guideline?</strong></td>
<td>Yes. university female students; large sample size (Ix=330; control=331)</td>
</tr>
<tr>
<td>2.4</td>
<td><strong>Notes.</strong> Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td>Individually tailored, online educational tool had similar effects as a non-tailored factsheet on HPV vaccine uptake among female university students.</td>
</tr>
</tbody>
</table>
APPENDIX D

SIGN GRADING SYSTEM 1999 – 2012

LEVELS OF EVIDENCE

1++ High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+ Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1- Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++ High quality systematic reviews of case control or cohort or studies
High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+ Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2- Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3 Non-analytic studies, e.g. case reports, case series
4 Expert opinion
## APPENDIX E

**Costs of the Innovation**

<table>
<thead>
<tr>
<th>Items</th>
<th>Unit cost</th>
<th>No. of unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing pamphlet</td>
<td>$0.8</td>
<td>- 100 copies / month</td>
<td>$80/month</td>
</tr>
<tr>
<td></td>
<td></td>
<td>→1200 copies/ year</td>
<td>~$960/year</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 1000 copies/ campaign</td>
<td>$800/year</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total: 2200 each year</strong></td>
<td><strong>Total $1760/year</strong></td>
</tr>
<tr>
<td>Lunchboxes for</td>
<td>$30</td>
<td>6 nurses</td>
<td>$ 210</td>
</tr>
<tr>
<td>lunchtime briefing</td>
<td></td>
<td>6 doctors</td>
<td>$ 180</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 clerical staff</td>
<td>$  60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 volunteer (junior staff)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total $450</strong></td>
<td></td>
</tr>
<tr>
<td>Video Camcorder</td>
<td>$2500 ~</td>
<td>1</td>
<td>$2500-$5000</td>
</tr>
<tr>
<td>(optional)</td>
<td>$5000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Costs in**

1\textsuperscript{st} year:

$4710 \sim $7210

Subsequent years:

$1760
APPENDIX F

Evidence-based protocol of educational interventions to increase acceptability of
HPV vaccination in university students

1. Background

HPV infection is common in people’s late teens and early 20s (CDC, 2015). However, literature review and current statistic showed that HPV vaccination rate is low among adults aged 18 to 26 years and university students in Hong Kong and other countries. There is a need to develop and implement an evidence-based educational protocol to increase the acceptability of HPV vaccination in university students. This evidence-based protocol is developed after systematic reviews and critical appraisal of nine selected research articles.

2. Aim and Objectives

The aim of the protocol is to increase the intention and uptake of HPV vaccination among university students. The objectives of the protocol are (1) to describe evidence-based educational intervention strategies for increasing HPV vaccine acceptability in university students; (2) to promote vaccination against HPV in university students with the use of educational intervention (3) increase the efficiency and effectiveness of existing service of HPV vaccination
3. Target users

The target users of this protocol are nurses and health educators of university who provide HPV vaccination or intend to promote HPV vaccination.

4. Target population

Target population is university students who have never had HPV vaccination before.

5. Recommendations

5.1. Formats of interventions

5.1.1. Video is an effective format of education in increasing intention and uptake of HPV vaccination. Grade of recommendation: B

Evidence:

- Video narrative of combined expert and peer is effective in increasing uptake of HPV vaccination (Hopfer, 2012; 1++)
- Video of Health Belief Model-based education is effective in increasing intention of HPV vaccination (Krawczyk et al., 2012; 1-)

5.1.2. Educational website is an effective format in increasing intention of HPV vaccination. Grade of recommendation: B

Evidence:

Educational website with sections of Q&A, personal story and a self-quiz is effective in increasing intention of HPV vaccination (Doherty & Low, 2008; 1-)
5.1.3. Printed educational information is effective in increasing intention of HPV vaccination. Grade of recommendation: B

Evidence:

• Printed-based cards with individual tailored message increase intention of HPV vaccination (Gerend et al., 2013, 1++)
• Leaflet, pamphlet information of HPV and HPV vaccine information increase intention of HPV vaccination (Juraskova et al., 2011, 1-; Krawczyk et al., 2012, 1-)

5.1.4. PowerPoint presentation is effective in increasing intention of HPV vaccination. Grade of recommendation: B

Evidence:

PowerPoint presentation of information and photos of HPV related diseases and HPV vaccine information is effective in increasing intention of HPV vaccination (DiClemente et al., 2011, 1-)

5.1.5. Workshop is effective in increasing HPV vaccination intention. Grade of recommendation: A

Evidence:

Workshop of HPV education with PowerPoint presentation, role play and discussion is effective in increasing intention of HPV vaccination (Mehta et al., 2013)

5.2 Contents of interventions

5.2.1. Expert-peer video narrative. Grade of recommendation: A

Evidence:

A four minutes’ video narrative by both expert and peer significantly increase
uptake of HPV vaccine (Hopfer, 2012, 1++)). The video narrative covers 4 prototypical vaccine decision themes: susceptibility, vaccine self-efficacy, vaccine safety and mother-daughter.

5.2.2. Individually tailored message to perceived HPV vaccination barrier.

**Grade of recommendation: A**

Evidence:

Providing printed information tailored to subject’s perceived barriers to HPV vaccination which are assessed on baseline survey. The intervention increases intention of HPV vaccination. (Gerend et al., 2013, 1++)

5.2.3. Health Belief Model (HBM)-based educational interventions. Grade of recommendation: B

Evidence:

- Health Belief Model-based educational workshop increased intention of HPV vaccination. (Mehta et al., 2013, 1+)
- HBM-based educational pamphlet and video increased intention of HPV vaccination. (Krawczyk et al., 2012, 1-)

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## APPENDIX G

### Timeline of Communication Plan

<table>
<thead>
<tr>
<th>1st week</th>
<th>2nd week</th>
<th>3rd-4th week</th>
<th>5th week</th>
<th>6th-16th week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting with Director &amp; N.O.</td>
<td>Meeting with Nurses, Doctors</td>
<td>Meeting with I.T., clerical staff</td>
<td>Preparation of interventions</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX H

Timeline for Pilot Study Plan

<table>
<thead>
<tr>
<th>1st week – 8th week</th>
<th>9th week-11th week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot Testing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluation of pilot testing and refining EPB protocol</td>
</tr>
</tbody>
</table>

* To avoid pilot testing during December to January & June to August
APPENDIX I

HPV Evidence-Based Protocol Pilot Testing Evaluation Form (For Staff)

1. Please indicate which educational interventions of the Evidence-Based Protocol you have implemented (please circle the appropriate, can choose more than one):

   Workshop/leaflet/pamphlet/e-video/website

2. Please indicate difficulties and/or barriers you have encountered when implementing the evidence-based protocol

   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   __________

3. Do you have any comments for the evidence-based protocol?

   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   __________
APPENDIX J

Evaluation Form for HPV & HPV Vaccine Educational Workshop (For Students)

Please answer the following questions regarding the workshop you have attended (please circle the appropriate):

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Content is appropriate</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. Information is useful</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3. Location is appropriate</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. Duration and time is appropriate</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. Overall, the information meets my expectation</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Please indicate your reasons if you circled “Disagree” or “Strongly disagree”:

___________________________________________________________________________
___________________________________________________________________________

Additional Comments:
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
APPENDIX K

Evaluation Form for HPV & HPV Vaccine Printed Educational Materials
(For Students)

Please indicate which written material you have received:
Leaflet / pamphlet / tailored message (please delete the inappropriate)

Please answer the following questions regarding the written educational materials you have received (please circle the appropriate):

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Content is appropriate</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. Information is useful</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3. Information is clearly presented</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. Qualities of printing materials are good</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. Overall, the information meets my expectation</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Please indicate your reasons if you circled “Disagree” or “Strongly disagree”:
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

Additional Comments:
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
APPENDIX L

Evaluation Form for HPV and HPV Vaccine Educational Website (For student)

Please answer the following questions regarding the information (please circle the appropriate):

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Content is appropriate</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. Information is useful</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3. Easily accessible</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. Webpage design is user-friendly</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. Overall, the information meets my expectation</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Please indicate your reasons if you answered “Disagree” or “Strongly disagree”:

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

Additional Comments:

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
APPENDIX M

Evaluation Form for HPV and HPV Vaccine Educational e-video (For student)

Please answer the following questions regarding the information (please circle the appropriate):

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Content is appropriate</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. Information is useful</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3. Easily accessible</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. Quality of video is good</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. Overall, the information meets my expectation</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Please indicate your reasons if you answered “Disagree” or “Strongly disagree”:
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

Additional Comments:
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
REFERENCES


Printz, C. (2013 Aug 15). HPV vaccine uptake remains low: Why some adolescents are not receiving the vaccine, and what can be done about it. Cancer, 119(16), 2947-2948


http://www.who.int/mediacentre/factsheets/fs380/en