

**Normalization and informed decision-making in public health programs:
A case study of HPV vaccination in Canada**

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ABSTRACT

This thesis examined the evidence, policy decision-making, and implementation of HPV vaccination in Canada as a case study to explore normalization versus individualized decision making in public health programs. Mixed methods were used: a systematic review, content analyses and policy document analysis.

Overall, the scientific evidence supported an effect of vaccination against HPV infection and precancerous cervical lesions, but evidence regarding cervical cancer incidence or mortality is lacking. Scientific and medical communities appeared optimistic about the vaccine, but cautious about its readiness for routine implementation. Policy decision-making was initially cautious, but shifted towards active program implementation, possibly related to the availability of federal funding. The educational materials and media coverage both sent clearly normalizing messages about HPV vaccination.

The discussion suggests that HPV vaccination might be more suited to an individualized than population approach, but many factors coincided to promote its implementation, in Canada, within a traditional public health model.

EXECUTIVE SUMMARY

Introduction: Consideration of normalization in the context of health interventions requires an understanding of the differences between 'pure' population interventions, in which the entire population receives the intervention 'by default', and individualized interventions in which the individual makes their own informed decision. Between these two extreme ends of the spectrum, there are some interventions which are generally considered to be within the domain of public health, but which depend on individual acceptance. In Canadian health policy there has been an increasing emphasis on health policy which reflects values such as individual rights and autonomy. However, there is evidence that this policy intent is not always matched in the way that programs are implemented.

Aim: To use HPV vaccination as a case study to examine policy making and program implementation in Canadian public health, specifically examining the intersection of individual and population-level interventions. This was addressed through a set of overlapping enquires focusing on four discrete objectives.

Objective A: Determine the current state of scientific evidence on HPV vaccination.

Methods: Review of systematic reviews. *Results:* Randomized controlled trials provided evidence of vaccine efficacy in preventing HPV infection and precancerous cervical lesions, but there is yet no evidence of an effect on cervical cancer incidence or mortality.

Objective B: Evaluate the scientific and medical discourse surrounding HPV vaccination.

Methods: Content analysis of editorial comment in peer-reviewed scientific and medical journals. *Results:* While the editorials were mostly positive towards the vaccine as a potential

intervention, this was accompanied by caution regarding a number of knowledge and infrastructure gaps which needed to be addressed for effective implementation.

Objective C: Examine the creation and implementation of federal and provincial health policy regarding HPV vaccination. *Methods:* Narrative review of federal and provincial documents and websites pertaining to Canadian HPV immunization policy. *Results:* The HPV immunization decision-making process adopted a new approach to collaborative policy-making. was unique in that it provided the testing ground for a new approach to collaborative policy-making. Over the course of two years, initial caution in policy discussions shifted towards positive support for population vaccination. Recommendations eventually favoured a routine immunization strategy using school-based programs which followed the manufacturer's dosing schedule. Program implementation and vaccine uptake and programs varied across the provinces and territories.

Objective D: Evaluate the public health campaign, specifically the educational materials available to the public. *Methods:* Content analysis of online HPV vaccination-related educational materials produced by federal and provincial public health agencies.

Results: Educational materials were generally written at too high a reading level, although their suitability was adequate. Complete information on HPV immunization was lacking and normalizing messages were identified in over half of the documents.

Objective E: Evaluate the media discourse surrounding HPV vaccination.

Methods: Content analysis of Canadian print media coverage of HPV vaccination.

Results: Articles were generally positive or mixed towards HPV vaccination. Explicit and implicit messaging was identified which promoted HPV vaccination in positive terms, with critical messages often marginalized within the discourse.

Discussion: HPV immunization has been implemented using the established model for immunization against infectious diseases, in which the goal is high uptake and normalization is desirable. However, as HPV immunization provides primarily an individual benefit and, under current implementation programs, is likely to lack a population-level effect, this intervention is not an identical match for traditional vaccination programs. It may be more appropriate to consider HPV vaccination as a preventive service, which would allow for informed decision-making, and allow individuals to consider more carefully the acceptability issues and limitations of the vaccine.

Conclusions: The evidence-base for the use of HPV vaccination as a cervical cancer prevention strategy is promising but limited. There was a certain amount of discordance between, on one hand, the evidence and the caution expressed in the scientific discourse and, on the other, the policy process, which eventually indicated urgency, and program implementation, which encouraged normalization. Normalizing messages were also found in the media coverage. As this was a single case study the transferability of the findings to other public health interventions is unknown. However, the overall findings indicate that as emerging preventive technologies sometimes challenge the traditional distinction between population and individual interventions, an appreciation of the relationship between the aims of a service, how success is defined and measured and how programs are implemented, is important.

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LIST OF ABBREVIATIONS

BBP	Bulk Procurement Program
BGTD	Biologics and Genetic Therapies Directorate
CAIRE	Canadian Association for Immunization Research and Evaluation
CCDR	Canada Communicable Disease Report
CDCEG	Communication Disease Control Expert Group
CIC	Canadian Immunization Committee
CIHR	Canadian Institutes of Health Research
CIN	Cervical intraepithelial neoplasia
CIRID	Center for Immunization and Respiratory Infectious Diseases
FNIHB	First Nations and Inuit Health Branch
hrHPV	High risk human papillomavirus
IRID	Immunization and Respiratory Infections Division
lrHPV	Low risk human papillomavirus
NACI	National Advisory Committee on Immunization
NIS	National Immunization Strategy
PHAC	Public Health Agency of Canada
PHN	Pan-Canadian Health Network
SBD	Summary Basis of Decision
VAIN	Vaginal intraepithelial neoplasia
VIN	Vulvar intraepithelial neoplasia

CHAPTER 1

INTRODUCTION

Normalization, informed decision-making and public health policy

Norms and normalization

Norms are shared expectations or social rules of behaviour that connote what is considered culturally desirable and appropriate. Norms are often implicit and tacitly developed, and while they are similar to rules or regulations in essentially being prescriptive, they usually lack any formal or explicit status. Unlike laws and rules which are codified, norms are constructed, understood and disseminated through social interaction and communication.¹

The term 'normalization', taken from the work of social theorists such as Michel Foucault, is used to denote the process by which norms are formed.² According to Foucault, normalization uses subtle authority to control individual behaviour.^{3, 4} The process of normalization is generally not formalized, rather it describes the situation where what is accepted as 'normal' emerges through repetition, familiarity, propaganda, etc.

The central idea is that social norms are enforced by other members of one's social group. An individual is defined as a member of a social group if he or she "is situated in a way that enables him (1) to learn about what the other members do when they interact and (2) to bestow punishments and rewards on other members by means of gossip, ostracism, adjustment of exchange relationships and other self-help methods."⁵ When actual behaviours differ from accepted norms, they may be deemed 'deviant', in sociological terms. A person who violates a norm risks becoming the target of 'social punishment' which can vary from expulsion from the group to negative gossip. These ideas hold when considering social norms at a population level,

although the notion of deviance may not be articulated, and rewards and punishment may be less evident as overt behaviours than in smaller ideas of the 'group'.

Norms, however, are not static or universal; they can change over time and differ across cultures, social classes, and geography. New norms emerge and unfavourable norms disappear. New norms can be created by an "exogenous shock", i.e. an event that creates new conditions within the social group. for example the advent of a new medical technology.⁵

Normalization in public health and clinical medicine

Normalization can be applied to considerations of clinical medicine and public health policy.⁶ For example, health behaviours are directed not only by individual attitudes, abilities, barriers and knowledge, but also by perceptions about others' beliefs and behaviours, what are termed 'subjective norms'. The greater the perceived prevalence of a behaviour, the greater the likelihood that individuals will believe that the behaviour is 'normal' and adopt it themselves.¹ For example, certain health behaviours (e.g. importance of personal hygiene) have become normalized over time, while others (e.g. cigarette smoking) have become de-normalized (or deviant).⁷ Smoking rates have diminished not only because of formal social control legislation (and taxation), but also because of informal social control. Smoking, in fact, has become stigmatized in many societies.

The tendency towards automatic adoption of a new health intervention can also be considered as a type of normalization, leading to its widespread acceptance and integration into a health system, irrespective of the status of formal evidence. The promotion of a new technology or intervention as a new 'standard of care' can help foster expectations of its availability and acceptance of its benefits by providers and users. In cases where the technology is highly

effective, the costs and loss of autonomy that come with its default use may be accepted without opposition; in fact normalization may be a positive force that promotes high uptake and widespread benefit. For example, in the mid-20th century, the use of antibiotics became rapidly normalized as their general safety and efficacy compared to alternative treatments became apparent. Even with current concern about antibiotic resistance, antibiotic use is often automatic and occurs without much deliberation.

Normalization emerges when different factors converge to implicitly encourage the acceptance of a technology. For example, even without promotion by the manufacturers, the approval of a new drug by a regulatory authority or government, along with its provision free at the point-of-use, may strongly imply that its merits are clear and that it can be assumed to be useful. The passage of a law, legislation, or policy which provides for a new intervention is a signal that a 'norm cascade', a series of changed or created norms, has occurred.⁵ In other instances normalization is more explicit, for example the encouragement of uptake by providers, patients, and the general population through policy guidance, information distribution, and the professional and mass media: case in point, efforts to increase participation in screening programs. In the most extreme example, normalization is enforced through mandated use of the intervention or technology, for example newborn screening in some states in the US.⁸

Population-level and individual interventions

In considering normalization in the context of health interventions, it is necessary to consider whether there are differences between interventions targeted at populations and at individuals. 'Pure' population interventions might be thought of as those which, by their nature, are delivered to an entire population - i.e. the population is the unit of interest and individuals

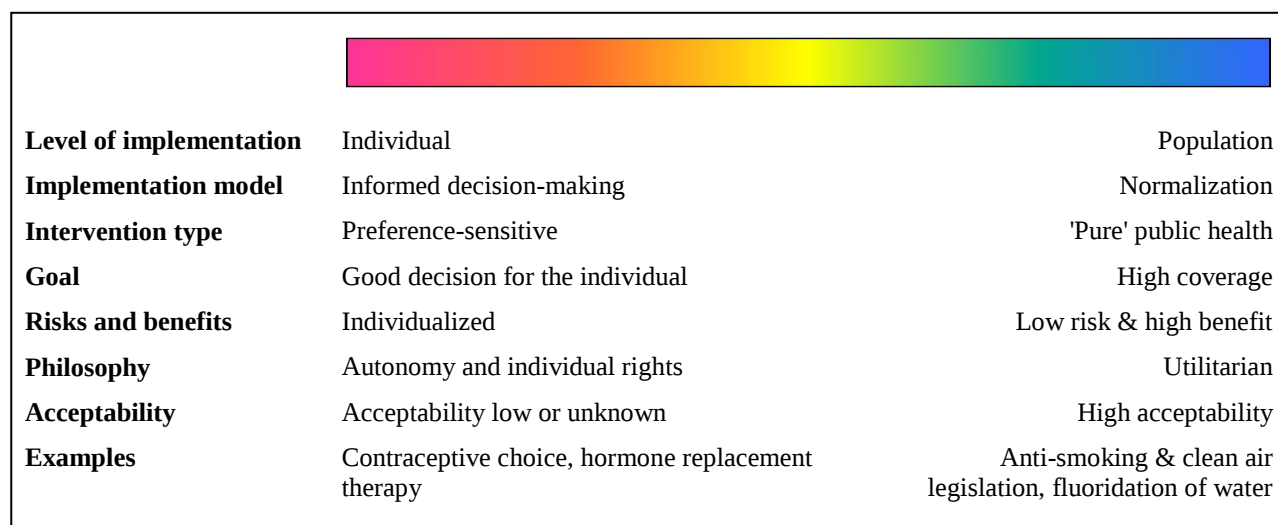
within the population cannot decline or avoid it. For example, fluoridation of municipal water supplies and compulsory quarantine are both pure population interventions: although a person could avoid drinking fluoridated water, there is no provision for different water supply by the municipality to those who 'decline' this intervention; similarly, although a person might wish to 'decline' a quarantine order, and even take steps to evade it, the law applies equally to all. Here, normalization is inevitable because use of the intervention is essentially unavoidable. Public health interventions of this type may be considered to be built on a paternalistic decision-making approach by the state, a utilitarian philosophy, and (usually) the need obtain a very high uptake in order to ensure a positive cost-benefit calculus at the population level.⁹

In contrast, there are many entirely individualized interventions in clinical medicine where each patient can decide to accept or decline. At the most extreme, the balance of benefits and harms are considered so subjective that health care providers would see their role not as offering any opinion, but instead encouraging so-called 'preference-sensitive' decisions, which reflect patients' individual, personal valuations of the options.¹⁰ In contrast to normalization, the approach here is 'informed decision making', in which the goal is to ensure the individual has the appropriate knowledge and where personal values and attitudes come into play as part of the decision-making process.¹¹ Examples of such interventions are hormone replacement therapy, non-curative cancer therapies, and prenatal screening tests.

Health interventions might be thought of as being on a spectrum, with the 'pure' population and individual interventions at the extreme ends (see Figure 1.1). Between these two extremes there are some interventions, including many immunization and screening programs, which are generally considered to be within the domain of public health, but which depend on individual acceptance. For example, annual influenza vaccination programs are not normalized

to the same extent as childhood immunization, and generally have a lower overall uptake. Many population screening programs (e.g. colorectal cancer screening) depend on a minimum level of uptake to be cost-effective when viewed from a population perspective, yet fall short of being fully normalized. This intersection of population-level, normalized interventions and individual informed decision-making interventions is illustrated by the revisions to the Wilson & Jungner criteria for assessing the validity of screening programs. These criteria encapsulated a macro-level cost-benefit approach.¹² However, in some jurisdictions, their potentially normative effect has been undermined by the addition of new criteria which clearly lean towards individual informed decision-making. For example, the UK National Screening Committee has included an additional criterion which states "Evidence-based information, explaining the consequences of testing, investigation and treatment, should be made available to potential participants to assist them in making an informed choice".¹³

Figure 1.1 Implementation framework spectrum



Macro public health policy decision making and program implementation

Like all collective human endeavours, health policy development is inherently value

driven. Great importance is given to taking into account (and *being seen* to take into account) 'public values' in all aspects of health policy decision making.¹⁴ For example, the 2002 Romanow report *Building on Values: The Future of Health Care in Canada* promised "value-driven" health care and the 1997 Canadian National Forum on Health stated "In recommending a course for Canada's health system, we considered it essential that its foundations be consistent with the values of the majority of the public".¹⁵ While this area is characterized by terminological and conceptual confusion,¹⁶ undoubtedly the notions of societal values, engagement, and acceptability of policy decisions have become much more prominent in political and social discourse.

In parallel, a culture has emerged in which people are more likely to expect to make their own decisions about health interventions and behaviour, or at least participate in them.¹⁷ These decisions are often made by assessing less traditional, varying and often contradictory sources of advice and information including social peers and the media.^{6, 18} This shift has been accompanied by a decrease in the level of trust in health care and medical professionals,^{19, 20} which can be exploited to create anti-intervention momentum even in the face of strong opposing medical evidence (e.g. anti-MMR vaccination campaigns).²¹

In Canada, this shift is visible in approaches to public policy development and implementation. The compatibility of a potential public health policy with societal values has become a major consideration in the development of new policy.^{22, 23} The focus, in public and political discourse, has swung towards the rights of the individual, and towards autonomy-centered rather than utilitarian policy-making framework. Specifically, health policy in Canada has emphasized a commitment to values such as autonomy and 'client-centeredness'.²⁴ For example, Canadian pandemic planning has focused on autonomy and individual rights, possibly

to the detriment of population-level benefits.²⁵

However, there is evidence that this policy intent is not always matched in the way that programs are actually implemented in practice. For example, the province of Ontario espouses a policy of respecting individual rights to decision making,²⁶ but its newborn screening program has strong elements of normalization: it employs a policy of presumed parental consent; there are no systematic approaches to informing parents about newborn screening during pregnancy so that they have time for deliberation (a necessary part of informed decision-making); and, until recently, the program's public web pages warned that parents who refuse screening may be reported to the Children's Aid Society.²⁷ It is evident that there is either confusion between policy intent and implementation, or there is an implicit attempt to normalize newborn screening at program level while, at policy level, maintaining a public argument that parents have the right to autonomy in decision-making on behalf of their children.

Another example of this type of discordance regarding informed decision -making occurs within the practice of genetic counselling. Historically, the central ethos of genetic counselling has been a non-directive approach, on the part of the professional, which prioritizes individual autonomy in decision-making.²⁸⁻³⁰ However, genetic counsellors often find this difficult to implement in practice, and the value and feasibility of this principle is now being called into question.³¹⁻³⁴

Rationale for thesis research

In Canadian public health policy and practice there appears to be *prima facie* evidence that macro policy development seems often to espouse a 'preference-oriented' philosophy, but that this is not always matched by the ways in which programs are implemented. If so, there is potential for confusion about how programs should be developed and implemented, and how

their performance is judged.³⁵ For example, in a 'pure', utilitarian, public health model, resource allocation would prioritize uptake and coverage over other goals, and these would provide the primary outcome measures for assessing performance. In contrast, in a 'preference-sensitive' model, pursuing high uptake would actually undermine the 'real' goal of fully informed decision making (where, by definition, a proportion of genuinely 'appropriate' decisions will be to decline the intervention). Elucidating more fully how each model plays out in terms of practical implementation and evaluation is important for genuinely effective public health policy, and necessary not only for transparency in the translation of macro decisions to micro-level public health interventions, but also for healthy political discourse.

In this thesis, a specific case study, human papillomavirus (HPV) vaccination, will be used for a detailed investigation of these two approaches to public health policy decision-making and implementation. It is a recently emergent technology designed to address an important health problem where there are few alternative primary prevention approaches; its presentation to the population suggests it is both a public health intervention and an individual care intervention; its target group includes some individuals who may be considered legally not competent to make health care decisions on their own behalf; and there is evidence that it is not universally acceptable to the entire population.

Human papillomavirus infection, cervical cancer and the HPV vaccine

The epidemiology of human papillomavirus infection

HPV infections are currently the world's most commonly diagnosed sexually transmitted infections.³⁶ They are a large group of viruses that infect skin and mucosa and cause epithelial proliferation. More than 120 types of HPVs have been identified, of which at least 40 infect the

genital tract. Two serotypes, low risk HPV (lrHPV) 6 and 11, cause approximately 90% of anogenital warts.³⁷ High-risk HPVs (hrHPV), which include types 16, 18, 31, 33, 35, 45 and 58 have oncogenic potential.³⁸ They are associated with cancers of the vulva, vagina, and anus in women and cancers of the penis and anus in men and can cause oral malignancies in both sexes. However their strongest association occurs with cervical cancer in women: more than 99% of cervical cancers contain at least one hrHPV with about 70% containing either hrHPV type 16 or hrHPV type 18.³⁹ Infections with multiple HPV types are common (approximately 50%) because of their shared primary route of sexual transmission.⁴⁰

Risk factors for HPV infection are related to individual sexual behaviour. The most important are early age of sexual activity, high number of sexual partners and sexual contact with high risk individuals. Male circumcision and the strict and systematic use of condoms can reduce, although not completely prevent, the risk of transmission of HPV.⁴¹ Almost all sexually active individuals will become infected with at least one type of HPV at some point during their lives. The Public Health Agency of Canada (PHAC) estimates that high-risk types of HPV have a prevalence of 11-25% in the female population, with prevalence over 50% in some high-risk populations including First Nations, recent immigrants and women of lower socio-economic status.⁴²

The epidemiology of cervical cancer

Despite the high level of HPV infection, this has not translated into high cervical cancer incidence rates in the developed world. The incidence of cervical cancer in Canada is 1,300 cases/year with a mortality rate of 370 deaths/year.⁴³ Both the incidence and mortality of cervical cancer have been declining in Canada and the rest of the developed world during the past few decades, although recently this decrease has been slowing.⁴⁴ This relatively low incidence is the

result of two main factors. First, more than 90% of HPV-infected women will spontaneously resolve the infection without treatment.⁴⁵ The second major factor has been the use of preventive measures including improved sexual health practices and the widespread availability of publicly funded programs for Papanicolaou (Pap) smear testing.⁴⁶ However, in the developing world, where access to screening programs is limited or non-existent, incidence rates are much higher. Almost 80% of the 500,000 worldwide cases of cervical cancer occur in low-income countries where it is the most common cancer in women.⁴⁷

Cervical cancer is a progressive disease following a natural history: incident HPV infection, persistent HPV infection, cervical intraepithelial neoplasia (CIN) I, CIN II, CIN III, invasive cancer. Although the majority of women worldwide will become infected with at least one type of HPV during their sexual lifetime only a small percentage will not clear the virus through their own immune system. These women have a high risk of progression and development of neoplastic lesions of the anogenital tract.⁴⁸ The main determinants of progression are viral type, the persistence of the infection upon repeated examinations, and most probably, the viral load per cellular unit, as well as the integration of the viral DNA into the cellular DNA. Other established progression factors include HIV infection, prolonged use of oral contraceptives, high parity and tobacco use.⁴⁹ Possible factors include diet and co-infection with other STIs such as Chlamydia trachomatis and Herpes Simplex Virus type 2.⁵⁰ Rapidly invasive cancers are rarely diagnosed in young women, as the average time from initial HPV infection to invasion is believed to be on average over 20 years.⁴⁰

The human papillomavirus vaccine

Two pharmaceutical companies have developed HPV vaccines with demonstrated immunogenicity and effectiveness in the reduction of HPV infection and cervical cancer

precursors in randomized controlled trials. Given the long natural history of invasive cervical cancer, surrogate outcomes, such as infection and CIN were used as the endpoints of these trials. *Ceravix* is GlaxoSmithKline's bivalent vaccine which targets hrHPV types 16 and 18 and *Gardasil* is Merck's quadrivalent vaccine which targets hrHPV types 16 and 18 and lrHPV types 6 and 11. Health Canada issued a Notice of Compliance for *Gardasil* on July 10, 2006 and for *Ceravix* on February 2, 2010. While there are differences in the platforms used to produce the vaccines, both consist of HPV virus-like particles based on the major capsid antigen L1.⁵¹ In Canada, both vaccines are currently approved for use and HPV vaccination is approved for males and females aged 9-26. At the time of writing, all publically funded vaccination programs are school-based, use the *Gardasil* vaccine and immunize females only. As neither vaccine provides protection against all carcinogenic HPV types, cervical cancer screening programs will continue for the foreseeable future.

AIMS & OBJECTIVES

Research questions

The overall aim of this thesis is to use HPV vaccination as a case study to examine policy making and program implementation in Canadian public health, specifically assessing how the program is positioned on the population - individual spectrum (Figure 1.1). While the logistics of policy formation, including political concerns, personal biases and conflicting motivations, may provide interesting details to this analysis, they are beyond the scope of this thesis and will not be discussed. As well as attempting to assess concordance or discordance between policy intent and actual program implementation, the thesis will review the broader public discourse around HPV immunization. It attempts to answer the following research questions:

1. What is the epidemiological evidence on the benefits and harms of currently available HPV vaccines?
2. What are the broader arguments in support of and against HPV vaccination as a cervical cancer prevention intervention?
3. What explicit policy decisions and implementation processes were made regarding HPV vaccination by Canadian jurisdictions, at the federal and provincial level?
4. In terms of promoting normalization, to what extent has there been congruence between the scientific evidence, policy decision-making, practical implementation, and public discourse about HPV vaccination?

NOTE ON THE STRUCTURE OF THE THESIS

The thesis addresses the four research questions in different ways, examining the scientific and medical discourse, policy decision-making, and messages to the public. A range of methodologies are used. In order to assist comprehensibility, these areas are addressed in three free-standing chapters (2-4), each of which contains its own specific objectives (see below), background, methods and results. The findings are drawn together in a 'synthesis section' at the beginning of chapter 5. Together, chapters 2-5 address the four research questions articulated above.

Chapter objectives

Chapter 2 Scientific and medical discourse

- A) Determine the current state of scientific evidence on HPV vaccination.
- B) Evaluate the scientific & medical discourse surrounding HPV vaccination.

Chapter 3 Policy decision-making

- C) Examine the creation and implementation of federal and provincial health policy regarding HPV vaccination.

Chapter 4 Messages to the public

- D) Evaluate the public health campaign, specifically the education materials available to the public
- E) Evaluate the media discourse surrounding HPV vaccination.

CHAPTER 2

SCIENTIFIC AND MEDICAL DISCOURSE

This chapter aims to evaluate the scientific evidence on the efficacy of the HPV vaccines and to assess the response to this evidence by the medical and scientific community. The analysis was performed in two stages: A) A review of systematic reviews regarding the efficacy of the vaccines and B) A content analysis of the scientific and medical literature with a focus on editorials and commentary in peer-reviewed journals.

Objective A - Review the current state of scientific evidence on HPV vaccination

APPROACH

Review of systematic reviews.

BACKGROUND

The evidence-base is commonly the starting point of any evaluation or examination of an intervention. This section reviews the scientific evidence regarding the efficacy of HPV vaccination as a cervical cancer prevention strategy.

METHODS

Due to the large scope of the research question as well as the availability of recent "first-level" systematic reviews on the topic of HPV vaccination a "second-level" narrative review of reviews was selected as the most appropriate methodology. The methodology used was based on the process proposed by Whitlock et al.⁵² and White et al.⁵³

Search Strategy

A search strategy was developed to identify systematic reviews of human papillomavirus vaccination (see Appendix A). The strategy was applied to five databases: OVID Medline (R) Daily Update (Week 38), OVID Medline (R) In Process & Other Non-Indexed Citations (Week 38), Ovid Medline (R) (1950- Week 38 2010), Embase (1980 - 2010 Week 38), and the Cochrane Library Database of Systematic Reviews.

Selection of Reviews

Selection of systematic reviews for inclusion into the narrative review was based on inclusion and exclusion criteria of the reviews themselves (see Table 2.1). Reviews were accepted from any year but only reviews available in English were included. Reviews that targeted studies of males were excluded. No restrictions were made based on age or any other demographic characteristics of the female population within the review.

Data abstraction

Data was extracted by one reviewer on:

- type of vaccines reviewed (monovalent, bivalent, quadrivalent)
- reported pooled effect estimates (odds ratios, relative risks, other measures of effect, with 95% confidence intervals (CIs) where reported), by individual outcome

Quality assessment was performed by two independent reviewers, using the AMSTAR tool.^{53, 54}

The AMSTAR tool scores systematic reviews on eleven, equally weighted, quality criteria.

Table 2.1 Eligibility criteria based on characteristics of original reviews

Characteristic	Included in overview	Excluded from overview
Population	female participants, any age group	- males only - males and females analyzed as one group
Design	randomized controlled trials only	non-randomized studies or RCTs and non-randomized studies
Intervention	- HPV vaccine designed to target ≥ 1 oncogenic HPV strain - HPV vaccination used for prophylaxis	- HPV vaccine designed to target non-oncogenic strains only - HPV vaccine used for therapeutic purposes only
Control	- placebo - no intervention	no control group
Outcomes	- incident HPV infection - persistent HPV infection - low-grade cervical lesions (low-grade squamous intraepithelial lesion, grade 1 cervical intraepithelial neoplasia) - high-grade cervical lesions (high-grade squamous intraepithelial lesion, grade 2 or 3 CIN, carcinoma in situ) - adverse events - death	none of these outcomes

RESULTS

The search strategy produced an initial result of 71 reviews, of which 53 were duplicates. Eleven were excluded at title and abstract screening (eight did not address vaccination, two addressed only cost effectiveness and one evaluated only males). At full text screening, four further reviews were excluded (one was a methodology piece, one was a review of modelling studies, one did not report relevant outcome data, and one was a narrative review). (See Appendix B for a list of the excluded studies). This left three systematic reviews eligible for inclusion in the analysis (see Figure 2.1).

The characteristics of the selected studies are reported in Table 2.2. All three reviews were published between 2007 and 2009. Two reviews included six primary studies, one included

five. Overall, eight primary studies were included in the three reviews, of which three were included in all three reviews (later systematic reviews used updated versions).⁵⁵⁻⁵⁷ See Table 2.3 for a complete list of the primary studies included in the three systematic reviews. Of the primary studies included in the selected reviews, the majority assumed a vaccine efficacy of 70-80% and had a power between 80% and 90% (see Table 2.4). The AMSTAR assessment indicated that the review by Rambout and colleagues⁵⁸ met nine of the 11 quality criteria, followed by Mederios⁵⁹ (7/11) and La Torre⁶⁰ (6/11). Details of the quality assessment are reported in Appendix C.

Figure 2.1 Selection process for inclusion in the review synthesis.

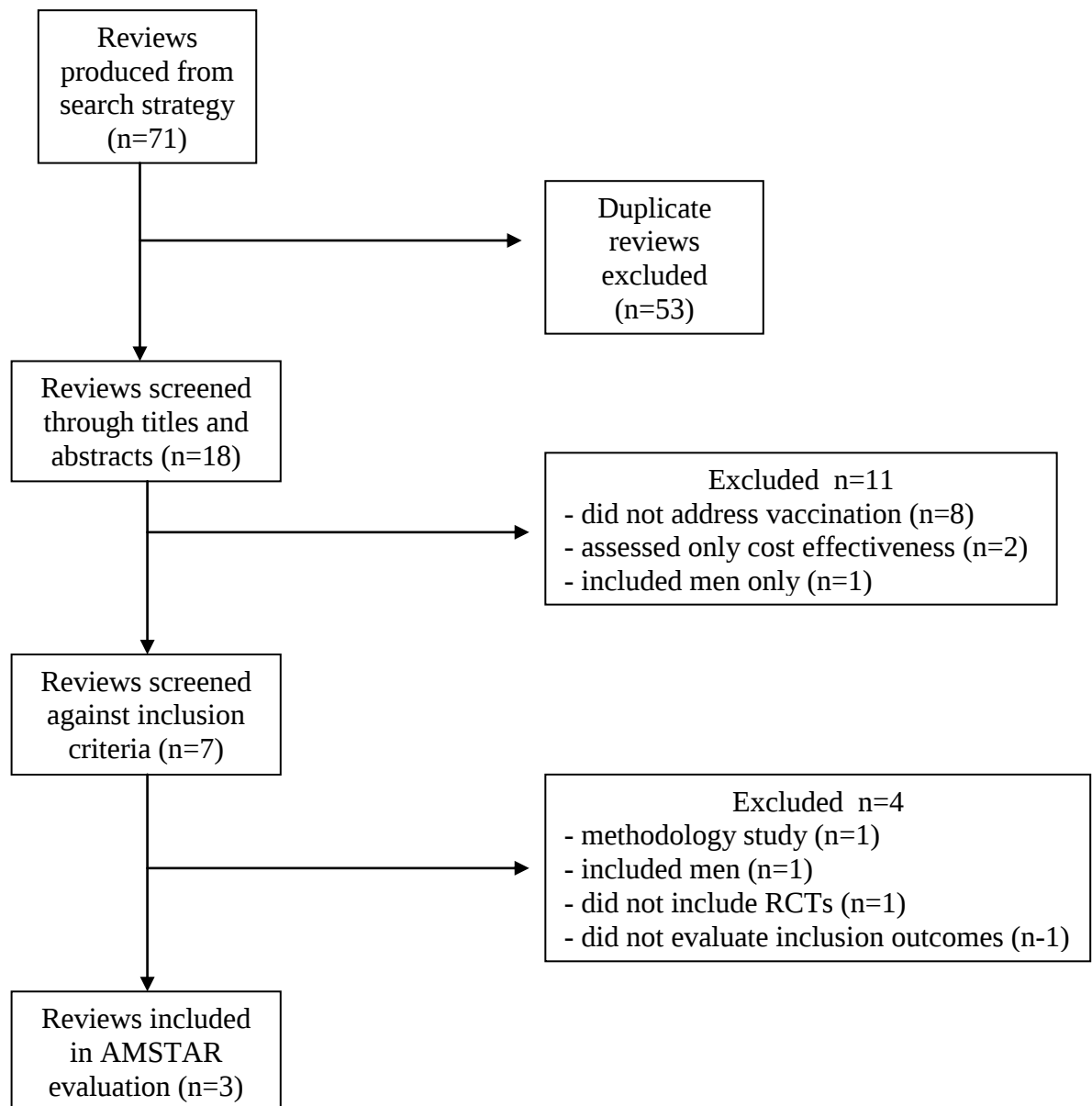


Table 2.2 Characteristics of selected reviews

Review	Rambout. L, Hopkins. L, Hutton, B et al. ⁵⁸	La Torre. G, de Waure. G, Mannocci, A. et al. ⁶⁰	Medeiros. L, Rosa. D, Rosa. M, et al. ⁵⁹
Year	2007	2007	2009
Types of studies	RCTs	RCTs	RCTs
Number of studies included	Six	Five	Six
Population	Women, all ages	Women, all ages	Women, aged 9-26
Interventions included	Any vaccine against HPV with activity against at least one oncogenic strains (prophylactic intent only)	Tetravalent vaccine, bivalent vaccine, monovalent vaccine	Quadrivalent <i>Gardasil</i> , univalent (16, Merck), Bivalent Cervarix
Controls included	Placebo/no vaccination group	Placebo	Placebo
Outcomes included	Primary: efficacy at preventing high-grade cervical lesions. Secondary: 1. persistent HPV infection 2. low-grade cervical lesions 3. external genital lesions 4. serious adverse events and death	Efficacy in preventing persistent infection	Primary: vaccine efficacy (Low-grade cervical lesions, high grade cervical lesions, vulval intraepithelial neoplasia, vaginal intraepithelial neoplasia, anal intraepithelial neoplasia) Secondary: safety and vaccine immunogenicity
AMSTAR SCORE	9	6	7

Table 2.3 Studies included in the selected systematic reviews

Review	Rambout, 2007 ⁵⁸	La Torre, 2007 ⁶⁰	Medeiros, 2009 ⁵⁹
Studies Included	Koutsky et al (2002) ⁵⁵ Harper et al (2004) ⁵⁶ Villa et al (2005) ⁶⁴ FUTURE I (2007) ⁶⁶ FUTURE II (2007) ⁶⁸ Paavonen et al (2007) ⁵⁷	Brown et al (2004) ⁶¹ Harper et al (2006) ⁶² <i>Follow up to Harper 2004</i> Mao et al (2006) ⁶⁵ <i>Follow up Koutsky 2002</i> Villa et al (2006) ⁶⁷ <i>Follow up to Villa 2005</i> Paavonen et al (2007) ⁵⁷	Harper et al (2006) ⁶² Hildesheim et al (2007) ⁶³ Paavonen et al (2007) ⁵⁷ Mao et al (2006) ⁶⁵ FUTURE I (2007) ⁶⁶ FUTURE II (2007) ⁶⁸

Table 2.4 Assumed vaccine efficacy and power of studies included in the selected systematic reviews

Study	Assumed vaccine efficacy	Power
Brown et al (2004)	NR*	NR
Harper et al (2004/2006)	70%	80%
Koutsky et al (2002)/Mao et al (2006)	75%	90%
Villa et al (2005/2006)	NR	NR
Paavonen (2007)	80%	83%
FUTURE I (2007)	80%	91%
FUTURE II (2007)	80%-90%	90%
Hildesheim et al (2007)	NR	NR

*NR = Not reported

Table 2.5 Temporal results of studies included in the selected systematic reviews, selected outcomes

Study	Vaccine type	Outcome	
		Any CIN	Serious adverse effects
		OR (95% CI)	OR (95% CI)
Koutsky et al (2002)	Monovalent		1.36 (0.31-5.98)
Harper et al (2004)	Bivalent		
Brown et al (2004)	Monovalent		
Villa et al (2005)	Quadrivalent		
Harper et al (2006)	Bivalent	0.13 (0.03-0.52)	0.83 (0.42-1.64)
Mao et al (2006)	Monovalent	0.24 (0.14-0.42)	
Villa et al (2006)	Quadrivalent	0.13 (0.03-0.58)	1.01 (0.14-7.19)
Paavonen (2007)	Bivalent	0.20 (0.10-0.40)	1.02 (0.88-1.14)
FUTURE I (2007)	Quadrivalent		1.07 (0.71-1.61)
FUTURE II (2007)	Quadrivalent	0.46 (0.35-0.60)	0.83 (0.56-1.24)
Hildesheim et al (2007)	Bivalent		

Overall findings

There was incomplete overlap between the three reviews in terms of specific vaccine(s) evaluated (monovalent, bivalent, and quadrivalent) and the outcomes assessed (see Table 2.6). Two of the major outcomes of interest for HPV vaccination are incidence and mortality of cervical cancer. However, as indicated in Chapter 1, the length of time required for progression to the outcomes of interest, have prevented any completed studies from evaluating them directly. All primary clinical trials included in the systematic reviews used surrogate outcomes related to HPV infection and cervical cancer such as persistent infection and cervical lesions.

Taken together, the reviews provide evidence generally consistent with a protective effect of vaccination against persistent HPV infection and cervical intraepithelial neoplasia (CIN) but no definitive evidence of an effect on carcinoma-in-situ or mortality rates. Safety results relating to serious adverse effects (including spontaneous abortion, vaccine-related events, new-onset chronic disease and new-onset autoimmune disease) and death found no significant increased risk in the vaccine group. However the evidence regarding adverse events in general is equivocal.

The primary clinical trials had a number of limitations, including the short follow-up times which resulted in a lack of data on long term immunity and did not allow for distinction between regressing and progressing infections and lesions. Another limitation was the lack of representativeness of the study populations used. External validation of the results beyond the study populations, which were mostly 15-25 years of age, Caucasian, and healthy is unknown. In addition, a large number of participants were either lost to follow-up or excluded from the analysis. Limitations of vaccine implementation were discussed within the systematic reviews including the possible implications of vaccinating against only two strains of the virus and the need for cancer screening to continue after vaccination.

Table 2.6 Results of the selected systematic reviews

Review	Rambout, 2007 ⁵⁸	La Torre, 2007 ⁶⁰		Medeiros, 2009 ⁵⁹	
Outcome	Monovalent, bivalent & quadrivalent vaccines OR [95% CI]	Monovalent, bivalent & quadrivalent vaccines RR [95% CI]	Bivalent and quadrivalent vaccines RR [95% CI]	Bivalent Vaccine OR [95% CI]	Quadrivalent Vaccine OR [95% CI]
CIN Grade 1				0.06 [0.03-0.15]	0.13 [0.01-2.04]
CIN Grade 2 or worse	0.52 [0.43-0.63]			0.09 [0.03-0.34]	0.54 [0.30-0.98]
Any cervical lesions	0.36 [0.29-0.45]			0.07 [0.04-0.14]	
Adenocarcinoma in situ					0.45 [0.12-1.73]
Persistent HPV infection (16)		0.10 [0.07-0.15]	0.13 [0.09-0.20]		
Persistent HPV infection (18)			0.22 [0.13-0.38]		
Persistent HPV infection (16 & 18) 6-month outcome	0.22 [0.18-0.27]				
Persistent HPV infection (16 & 18) 12-month outcome	0.26 [0.16-0.41]				
Serious adverse events	0.998 [0.87-1.14]			1.05 [0.91-1.21]	
Death	0.91 [0.39-2.14]				
All adverse events				1.35 [1.05-1.73]	1.16 [0.94-1.43]

Objective B - Evaluate the scientific and medical discourse surrounding HPV vaccination.

APPROACH

Review of editorial comment in peer-reviewed scientific and medical journals.

BACKGROUND

This section examines the discourse within the medical and scientific communities regarding HPV vaccination. Peer-reviewed journals were chosen as a measure of this discourse as they are an important source of information and opinion for many within these communities, including medical professionals and health researchers.⁶⁹

METHODS

For this component, a systematic approach was used to identify relevant literature, while the analysis was essentially qualitative.

Search strategy

The search strategy was devised with the assistance of a research librarian. The goal of the search was to identify all editorials that dealt explicitly with HPV vaccination that were published in peer-reviewed journals classified as specializing in medical or scientific subject matter.

We searched the Scopus database using the search terms HPV or "human papilloma virus" or "human papillomavirus" or "cervical cancer" AND vaccin* or immunization or Gardasil or Cervarix. Record type was limited to 'editorial' or 'letter', the publication period was restricted to January 2005 - December 2009, and the language to English. A second search was

done using the Medline database, restricted to 'editorials', using the search terms HPV or "human papillomavirus" AND vaccine. The addition of alternate search terms in the Medline database did not yield new results. The results of the search strategy were then evaluated against the inclusion/exclusion criteria (see Table 2.7).

Table 2.7 Eligibility criteria for content analysis of editorial comment

Inclusion Criteria	Exclusion Criteria
Articles published in medical or scientific journals	Articles published in exclusively social science or humanities journals
Editorial or commentary journal articles	Research articles
Articles where HPV vaccination was a major topic of the article	Articles which mentioned HPV vaccination only in passing
Articles covering the epidemiological aspects of HPV vaccination, public health, clinical or policy aspects of HPV vaccination	Articles concerned exclusively with virology, immunology

Analysis

The primary analysis was conducted by one reviewer, using a descriptive content analysis approach. Content analysis is a common tool in qualitative analysis and is often used to analyze messages conveyed by media (print and visual) as well as other written material such as interviews and textbooks. Similar to a narrative review, in that it allows for the summarizing of various data sources, content analysis differs in being more systematic than narrative review. "Content analysis is a quantitatively oriented technique by which standardized measurements are applied to metrically defined units and these are used to characterize and compare documents."⁷⁰ Content analysis typically has both qualitative and quantitative dimensions. Generally content analysis follows a number of steps: 1) Decide on the unit of analysis; 2) Decide how units are going to be sampled; 3) Determine what is to be measured and how - what is to be recorded, how are things to be classified; 4) Determine how the information is to be recorded - development of the coding instrument, independent coding by two reviewers, resolve any disagreements;

5) Determine how the information is to be analyzed (e.g. Will computer analysis be used? How is the information going to be presented?).

Tone

Tone was assessed as a measure of the article's portrayal or opinion of the HPV vaccine as a potential intervention. The tone of the article is more than the sum of the content discussed within it, it is a measure the impression of the vaccine left on the reader. Tone encompasses not only what is said, but how it is said, including the choice of words and phrases and the structure of the article (i.e. which content is discussed at the beginning of the article and which is placed at the end). 'Negatively toned' articles were defined as those which expressed only, or mostly, negative comments regarding the HPV vaccine. 'Positively toned' articles were defined as those which expressed only, or mostly, positive comments regarding the HPV vaccine. 'Mixed' articles were those which expressed opinions on both sides. 'Neutral' articles were those which appeared to express no comments or opinions regarding the vaccine and tend to be reporting of facts rather than offering opinion.

Content

Content was assessed using a tool devised by the investigator based on previously published content analysis methodologies.⁷⁰⁻⁷² This measure assessed what issues were discussed in the articles, particularly surrounding the translation of evidence into actual immunization programs. Initially, 30 articles were randomly selected and examined. Based on a preliminary reading of these articles, supplemented by previous reviews of the literature, a list of content items was developed. This list was then refined through reflexive consultation with a thesis advisor. The entire set of articles was then coded using this framework. The framework

was re-evaluated and revised, and applied again to the articles line by line. In the end, 38 discrete content items were identified. The content items were grouped according to whether they were positive, negative or neutral towards HPV vaccination. Positive content items were defined as those which were supportive of vaccination. Negative content items were defined as those which were cautious and/or critical of vaccination. Neutral content items were defined as content items that were either split between positive and negative attributes or were neither positive nor negative.

Coding validation

Following the coding of the entire sample by the primary reviewer, a second reviewer coded a random selection of 10% of the sample in order to ensure agreement between two independent reviewers. Disagreements on coding between the two reviewers were discussed and resolved,

RESULTS

Selection

The first search using the Scopus database resulted in 85 editorials, 42 of which failed to meet the inclusion criteria (20 due to irrelevant subject matter, 22 due to language) at title and abstract screening. The second search using Medline produced 58 editorials, of which 23 remained after irrelevant and duplicate articles were removed at title and abstract screening. Of the total of 66 editorials, 14 were excluded at full text review because of irrelevant subject matter. Overall, 52 editorials from 35 journals were included in the analysis (See Figure 2.2). (See Appendix D for a complete list of the editorials reviewed).

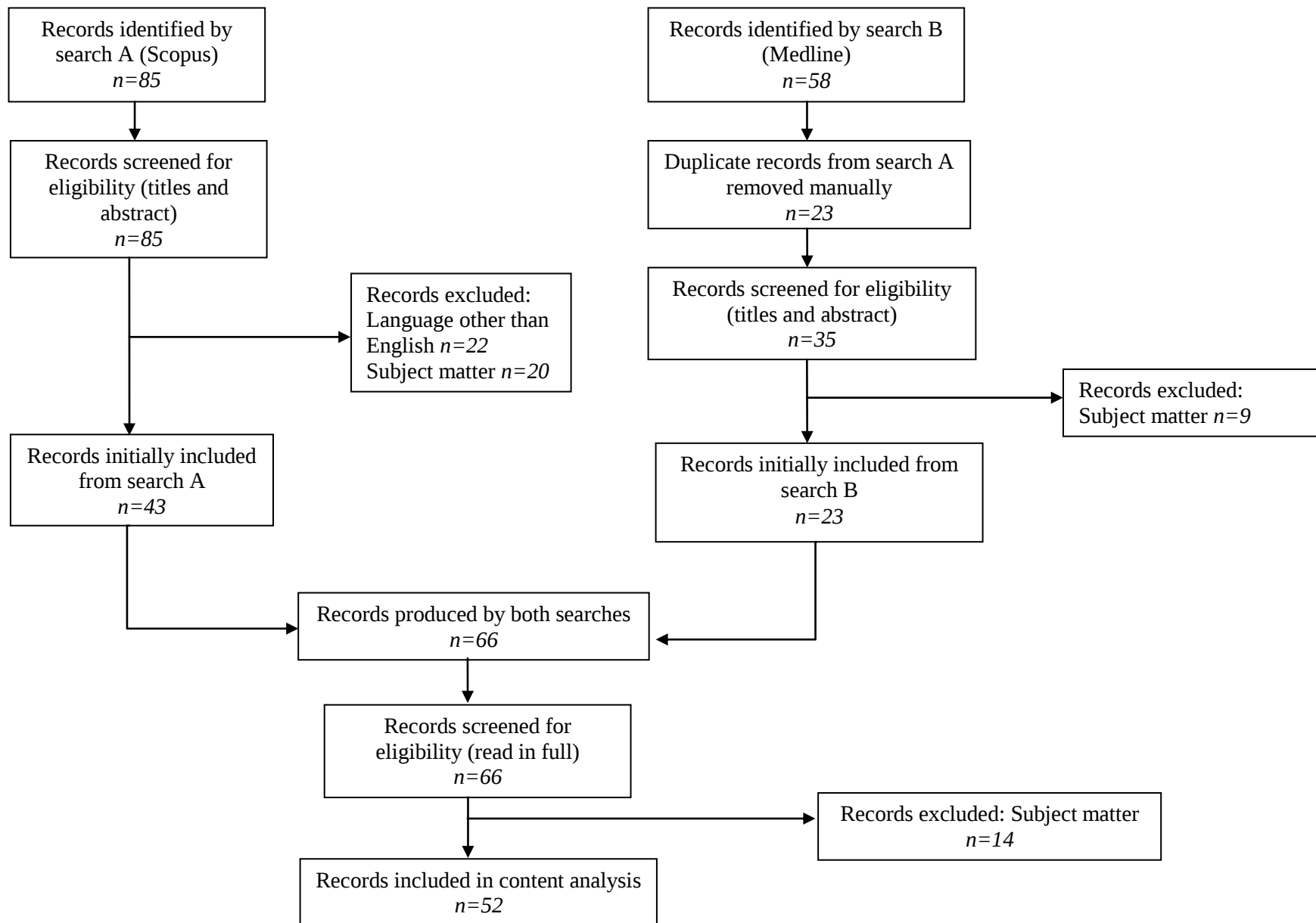
Sample Characteristics

The characteristics of the articles are summarized in Table 2.8. Most were published in 2007 or 2008, mainly in British or North American general medical, family medicine and obstetrics and gynaecological journals.

Table 2.8 Characteristics of included articles

Year of publication	n (%)
2005	2 (4)
2006	6 (12)
2007	19 (37)
2008	18 (35)
2009	7 (13)
Country of publication	
USA	26 (50)
UK	11 (21)
Canada	9 (17)
Australia	2 (4)
Other	4 (8)
Type of journal	
General medical	17 (33)
Family medicine	7 (13)
Obstetrics & gynaecology	7 (13)
Paediatric/adolescent medicine	3 (8)
Epidemiology/public health	3 (8)
Oncology/cancer	3 (8)
Medical law and bioethics journals	2 (4)
Other	10 (19)

Figure 2.2 Selection process for inclusion in the content analysis of editorial comment



Tone

Half of the editorials (26) were considered to have a clearly positive tone towards the HPV vaccine, and eleven (21%) to have a clearly negative tone. Eleven (21%) were considered to have a mixed tone and four (7%) to be neutral.

Content

A total of 38 content items or issues were identified and are summarized in Table 2.9 (see Table 2.10 for details on which articles content was identified in). Overall, 349 mentions of discrete content items were identified. Of these 244 (70%) were considered negative or cautious, 82 (23%) were positive and 21 (6%) were neutral.

No single issue was raised in more than half of the editorials and a number were discussed in only a few. The most commonly discussed content areas were concerns about cultural acceptability (44%), parental concern about risk compensation (37%), the need for greater education about HPV (32%), and the high cost of the vaccine (31%).

The mostly commonly discussed negative or cautious content items were concerns about cultural acceptability, public and parental concern about possible behavioural risk compensation, i.e. introducing a vaccine against an STI would result in increased risky sexual behaviour, the high cost of the vaccine and the fact that herd immunity is not possible with single-sex vaccination.

A major area of discussion within the negative content was the strength of the evidence and questions surrounding the persistence of immunity. This included issues such as the use of surrogate outcomes in the trials, specifically (potentially reversible) biological markers such as immunogenicity, rather than the outcome of cervical cancer incidence or mortality, especially when the intervention is to be applied as a universal recommendation.⁷³

A less commonly discussed item in this area was the lack of representativeness of the study populations considering the actual target populations for vaccination.

Another major category of negative discussion was implementation and effectiveness issues including possible mandating of vaccination for school admission, which was generally viewed as not justifiable, and the lack of accurate cost-effectiveness models given the large number of unknowns such as length of immunity and the burden of non-cervical HPV-associated cancers.

An additional area of negative discussion surrounded the issues of health and gender equity and included topics such as the social disparities in HPV infection and cervical cancer and the potential problem of repeating these disparities with vaccination. Discourse surrounding issues related to public education and public trust was also present in the negative content. These discussions included the issue of the high potential profit to be made through this vaccine, the politicalization of the issue and the use of 'heavy-handed' lobbying and marketing strategies by the manufacturers, particularly in the United States. Specifically authors discussed how these factors may have impacted decisions surrounding vaccine approval and implementation and the effect on the public's perception and trust in the vaccine.

Table 2.9 Frequency of content items identified in the scientific editorials

Content item	n (% of articles)
<i>Negative or cautious</i>	
1. There is concern about the cultural acceptability of the vaccine	22 (42)
2. There is public/parental concern about behavioural risk compensation	19 (37)
3. The vaccine is very expensive (price per person)	16 (31)
4. Herd immunity is not possible with single-sex vaccination	15 (29)
5. There are social inequalities in the distribution of cervical cancer/HPV infection	14 (27)
6. There is a lack of data on length of immunity/possible need for boosters	14 (27)
7. Screening will need to continue after vaccination and its use may be effected	13 (25)
8. The vaccine does not protect against all strains of HPV	11 (21)
9. There have been attempts to mandate vaccination but this is not justified	11 (21)
10. Disparities in screening may be repeated in vaccination	8 (15)
11. Surrogate outcomes were used in the clinical trials	8 (15)
12. There is a lack of accurate cost-effective models	8 (15)
13. Most HPV infections are self-clearing	7 (14)
14. The trial study population was not representative of the target population	7 (14)
15. There are ethical issues with the use of this vaccine	6 (12)
16. There is parental concern and media coverage on possible adverse events	6 (12)
17. This issue has been politicized	6 (12)
18. "Heavy-handed" lobbying and marketing was used	5 (10)
19. Lack of consensus about who has the right to consent	5 (10)
20. There has been a weakening of public trust in vaccination	4 (8)
21. There is potential for improvement of current screening practices	4 (8)
22. There has been a lack of attention to structural determinants of HPV infection	3 (6)
23. There is a need for greater education regarding personal choice	3 (6)
24. There may be resource competition between vaccination and screening	3 (6)
25. Single-sex vaccination may have negative effects on sexual health education	2 (4)
Total number of mentions of negative or cautious items	244
<i>Positive or supportive</i>	
26. Trial results show high efficacy in preventing infection & cervical lesions	14 (27)
27. There is a great need/potential for this vaccine in the developing world	13 (25)
28. This vaccine may be a better way to reach vulnerable populations	11 (21)
29. There is a lack of evidence to support fears of behavioural risk compensation	9 (17)
30. There are potential cost savings through reduction in mortality and morbidity	7 (14)
31. There are potential cost savings through vaccination-enabled changes in screening	7 (14)
32. Studies have found a high rate of parental approval	6 (12)
33. There are techniques for encouraging consent/high uptake	5 (10)
34. Vaccination has the potential to fill the current gaps in screening	4 (8)
35. There is a high emotional cost associated with false positives	3 (6)
36. HPV vaccination is a way of promoting women's health	3 (6)
Total number of mentions of positive or supportive items	82
<i>Neutral</i>	
37. There is a need for greater education about HPV	17 (33)
38. There are a number of difficulties that come with communicating about vaccines	4 (8)
Total number of mentions of neutral items	21

Table 2.10 Editorials in which content items were identified¹

Content item	Editorials
1	42, 74-94
2	42, 74, 76-82, 84-90, 92, 95, 96
3	42, 44, 76, 81, 84, 85, 87, 92, 94, 95, 97-101
4	75, 98, 99, 42, 44, 81-83, 88, 91, 92, 102
5	42, 44, 73, 75, 78, 80, 85-87, 95, 103-105
6	42, 44, 73, 75, 82, 87, 91, 92, 95, 98, 99, 103, 106
7	42, 90, 91, 99, 100, 103, 106-109
8	75, 90, 98, 101, 103, 106, 107, 110-113
9	74, 76, 84, 87-89, 92, 97, 98, 102
10	44, 79, 85, 86, 91, 100, 113, 114
11	44, 91, 95, 106, 110, 112, 115, 116
12	37, 42, 44, 87, 99, 106, 117
13	44, 87, 103, 105, 109, 111, 118
14	44, 73, 97-99, 106, 115
15	76, 87, 89, 92, 98, 113
16	79, 83, 84, 99, 116, 119
17	73, 84, 92, 97, 103, 114
18	84, 92, 96, 97, 109
19	77-79, 82, 85
20	73, 77, 79, 89
21	100, 108, 109, 114
22	103, 109, 114
23	78, 92, 119
24	75, 95, 103
25	75, 91
26	82, 86, 87, 91, 92, 95, 96, 99, 101, 105, 112, 115, 117, 120
27	42, 75, 77, 85, 90, 91, 93, 94, 96, 99, 101, 104, 107, 110, 118
28	42, 44, 75, 78, 79, 85, 86, 94, 95, 104
29	74, 76, 78 42, 77, 81, 87, 90, 92
30	44, 92, 97, 100, 105, 107, 117
31	90, 100, 105, 108, 116, 117, 121
32	42, 75, 80, 86, 91, 100
33	78, 79, 86, 90, 120
34	86, 94, 103, 121
35	75, 82, 120
36	75, 89, 119
37	44, 73, 75, 81-83, 86, 92-94, 96, 97, 100, 102, 109, 112, 119
38	77, 83

¹ See Table 2.9 for content item details

The most common positive discussion regarded the strong trial evidence on the efficacy of the vaccine in preventing infection and precancerous cervical lesions. Another common discussion was the high potential for this vaccine in the developing world, where

infection rates are higher and secondary preventative services such as screening difficult to obtain. There was also discussion about the potential for the HPV vaccine to reach vulnerable, high-risk populations who do not use screening programs. While one of the most discussed negative attributes of HPV vaccination was concern about risk compensation fewer editorials mentioned the positive attribute concerning the lack of scientific evidence to support these fears. Also discussed was the potential cost savings of HPV vaccination, both as a result of reduced mortality and morbidity and possible changes to existing screening programs. Another potential cost saving discussed was the emotional cost of false positives that authors felt could be reduced as vaccination would lead to a reduction in overall infection.

Neutral discussions included the need for greater education about HPV, which was presented as both a positive (i.e. HPV vaccination programs will result in greater education about the topic) and a negative (i.e. increased education is needed before vaccination can begin, the lack of knowledge will be a barrier to the use of the vaccine). The other, closely related, neutral content area concerned the difficulties in communicating about vaccines, particularly the difficulty of communicating the risk of a future outcome (cervical cancer).

The more frequent occurrence of discussions of the negative attributes of HPV vaccination indicates a generally cautious view of HPV vaccination within the scientific and medical communities. Although half of the articles had an overall positive tone towards the potential of the vaccine itself, these articles often included discussions of the limitations of the vaccine or criteria which needed to be met before the vaccine could be effectively implemented. This accounts for the discrepancy between the tone of the articles and the content.

SUMMARY

The goal of this chapter was to provide an overview of the scientific evidence on HPV vaccination and the response to that evidence by the scientific and medical community. We found three systematic reviews that were generally of good quality. Together they provided some evidence of vaccine efficacy in preventing infection and precancerous cervical lesions, but no evidence yet of an effect on cervical cancer incidence or mortality. They were limited by a lack of primary evidence on length of immunity and the long-term effects of suppressing only a selected number of viral strains, the small number of trials, and the high attrition of trial participants.

The scientific and medical discourse on the issue of HPV vaccination was extremely varied. Although the general tone towards the vaccine was positive, authors of editorials identified many issues requiring further thought and research. A minority of commentators had major problems with the idea of vaccination, with most wanting to wait for further data or research before proceeding. Few authors however, saw the issue as black and white, most recognizing great potential in this technology while noting important outstanding research and policy questions.

CHAPTER 3

POLICY DECISION-MAKING & IMPLEMENTATION

Objective C - Examine the creation and implementation of federal and provincial health policy regarding HPV vaccination.

APPROACH

Narrative review of federal and provincial documents and websites pertaining to HPV immunization policy in Canada.

BACKGROUND

When considering whether a new program lies towards the normalization or informed decision making end of the spectrum, it is important to examine the process of policy decision-making and program implementation. Policy making as a process is very rarely based on considerations of scientific evidence alone. Policy decisions represent the merger of technical evidence, consideration of stakeholders' values, and political concerns. Chapter 2 described the limitations of the scientific evidence pertaining to HPV vaccination and the response of the scientific and professional health communities to the evidence was cautiously optimistic. Overall, the analysis suggested that while these groups saw that the HPV vaccine could offer an effective approach to prevention, they generally acknowledged the presence of evidence gaps and identified multiple practical, social, and ethical issues which would need to be addressed in developing policy and programs in this area.

The main goal of this chapter is to trace the development of HPV immunization policy in Canada, particularly the extent to which policy incorporated and reflected the evidence-base described in Chapter 2. Policy development is examined by reviewing the

decisions and actions of the key bodies within whose mandate policy decision-making and program development falls. This chapter presents findings in five sections:

1. Timeline of key events.
2. Policy decision-making (from regulatory approval to policy decision)
3. Jurisdiction and funding decisions
4. Program implementation
5. Program evaluation

METHODS

This analysis was in the form of a modified narrative review of primary information sources such as policy documents and statements and secondary sources such as analyses of policy. This methodology and topic did not lend itself to standard systematic search methodology. It was approached from a largely qualitative perspective, identifying and reviewing relevant documents from a wide range of sources, and combining data to create an overall picture of the development of HPV vaccination strategies in Canada.

General approaches to searching

A range of possible sources were identified and searched (see Box 3.1).

Box 3.1 Sources searched for documents related to HPV policy creation or implementation

- Peer-reviewed journal databases - Medline, EMBASE, PubMed
- Public Health Agency of Canada - Website and publication database
- Health Canada - Website and publication database
- Public Works and Government Services Canada - Website and publication database
- National Advisory Committee on Immunization (NACI) - Statements and position papers
- Canadian Immunization Committee (CIC) - Statements and position papers
- Hansard transcripts of the Parliament of Canada House of Commons debates
- Hansard transcripts of provincial parliaments
- General internet search for unpublished documents (e.g. conference presentations)
- Consultations with experts from the thesis committee

Analysis

Following the selection of information sources, the resulting documents were reviewed individually. Each document was read line by line for statements, comments, and assertions relevant to the topic. For each document, data/comments relevant to the topic were extracted and summarized.

RESULTS

1) Timeline of key events

The chronology of key events is summarized in Table 3.1. Although this table could only be constructed after all documents were analysed, it is presented at the beginning of the section mainly so that it may serve as a reference for the rest of the chapter. The events chronicled here will be fully described and discussed as the chapter progresses.

Table 3.1. Chronology of key events in HPV policy development and implementation.¹

November 17-18, 2005	Canadian Human Papillomavirus Vaccine Research Priorities Workshop held
December 2005	PHN identifies HPV vaccine as a priority in program planning
December 12, 2005	<i>Gardasil</i> submitted to Health Canada for authorization
May 2006	CIC-NACI HPV Vaccine Expert Working Group established
July 10, 2006	<i>Gardasil</i> granted market authorization by Health Canada
February 1, 2007	NACI issues statement on HPV vaccine
February 22, 2007	Ontario Standing Committee on Finance and Economic Affairs votes against establishing HPV vaccination program
March 2007	Federal government announces \$300M HPV Immunization Trust
March 16, 2007	Health Canada issues Summary Basis of Decision for <i>Gardasil</i>
June 2007	PHAC publishes literature review of HPV and HPV vaccine
September 2007	ON, NS, NL, & NS start provincial vaccination programs
December 2007	CIC issues recommendations for an HPV immunization program
September 2008	NB, PQ, MB, SK, AB & BC start provincial vaccination programs
February 2, 2010	<i>Ceravix</i> granted market authorization by Health Canada

¹ PHN - Pan-Canadian Health Network, CIC - Canadian Immunization Committee, NACI - National Advisory Committee on Immunization. PHAC - Public Health Agency of Canada

2) Policy and decision-making

Canada does not have a formalized national immunization program, rather it has 13 provincial/territorial (P/T) vaccine programs which collaborate and are supported by the federal government. The National Immunization Strategy (NIS) was implemented in 2003 to "support collaborative, national assessment and prioritization of new vaccines, using common criteria". An evaluation framework, the 'Erickson-de Wals framework', was developed as a part of this strategy (see Table 3.2),¹²² to allow for comprehensive and systematic evaluation of all factors that should be included in decisions about new immunization programs.¹²³

General process for policy decision-making for immunization

The process for policy decision-making regarding immunization generally follows a 'standardized' path. New vaccines must be submitted to Health Canada for authorization for use in Canada. Following approval, the vaccine is evaluated by the National Advisory Committee on Immunization (NACI), which publishes its recommendations regarding safety, efficacy, recommended use and dosage in the Canada Communicable Disease Report (CCDR) and the Canadian Immunization Guide (published every four years). The Canadian Immunization Committee (CIC) then considers issues of cost-effectiveness and feasibility, and makes program recommendations including P/T funding.

Table 3.2 Responsibility for criteria of Erickson-de Wals NIS analytic framework

Criteria	Key Question	Responsibility
Burden of disease	Does the burden of disease justify a control program?	NACI
Vaccine characteristics	Do the characteristics of the vaccine permit implementation of an effective and safe immunization program?	NACI
Immunization strategy	Is there an immunization strategy which allows goals of the control program as well as sanitary and operational objectives to be attained?	NACI/CIC
Cost-effectiveness	Is it possible to obtain funding for the program and are cost-effectiveness indices comparable to those of other health care interventions?	CIC
Acceptability	Does a high level of demand or acceptability exist for the immunization program?	CIC
Feasibility	Is program implementation feasible given existing resources?	CIC
Ability to evaluate	Can the various aspects of the program be evaluated?	CIC
Research questions	Have important research questions affecting implementation of the program been adequately addressed?	NACI/CIC
Equity	Is the program equitable in terms of accessibility of the vaccine for all target groups?	CIC
Ethical considerations	Have ethical considerations regarding implementation of the immunization program been adequately addressed?	CIC
Legal considerations	Have legal concerns regarding implementation of the immunization program been adequately addressed?	CIC
Conformity of programs	Does the planned program conform to those planned to be implemented elsewhere (other regions, countries)?	CIC
Political considerations	Will the proposed program be free of controversy and or/produce some immediate political benefit?	CIC

Roles and responsibilities of entities involved in the policy decision-making process for immunization

Health Canada

Health Canada's role in immunization policy formation is largely regulatory.

Vaccines are evaluated by the Biologics and Genetic Therapies Directorate (BGTD), part of the Health Products and Food Branch of Health Canada. The vaccine must have undergone sufficient clinical trials to provide evidence of its efficacy and safety. If Health Canada determines that the vaccine has a favourable benefit/risk profile it will authorize sale and use

and issue a Summary Basis of Decision (SBD) which outlines the decisions made and provides guidelines for use, including what conditions the vaccine is approved to prevent.

National Advisory Committee on Immunization (NACI)

The National Advisory Committee on Immunization's mandate is to "provide the Public Health Agency of Canada with ongoing, timely, medical, scientific and public health advice relating to vaccines and certain prophylactic agents, related to use of vaccines in humans".¹²⁴ Its membership consists of 12 voting members with expertise in the area of public health, clinical infectious disease, immunology, and nursing, along with liaison members from professional organizations and the federal government (see Appendix E). It reports to the Chief Public Health Officer of the Public Health Agency of Canada (PHAC). NACI uses a standard evidence-based guideline development process to make recommendations on the use of new and existing vaccines and evaluates the efficacy of vaccines in preventing disease.¹²⁵ In the simplest terms, NACI determines who should be eligible to receive the vaccine. NACI reaches these recommendations by evaluating the evidence; the committee reviews vaccine immunogenicity, safety, efficacy, burden of disease and epidemiology as well as the product monograph, the scientific literature and information on disease morbidity and mortality. NACI then publishes a statement in Canada Communicable Disease Report (CCDR).

Canadian Immunization Committee (CIC)

The Canadian Immunization Committee (CIC) makes recommendations on whether a vaccination program should be publically funded. Established in 2003, the CIC is a federal/provincial/territorial (F/P/T) body whose mandate is to provide leadership in immunization by making recommendations on program planning issues including "economic

considerations such as cost-effectiveness and ... the implementation of immunization programs",¹²⁶ and provides advice and recommendations on implementation of the NIS. While the CIC's mandate is to implement and meet the goals of the NIS, the CIC was also established as an apparatus for developing national goals and targets for immunization programs in Canada and for promoting the harmonization of immunization schedules.¹²⁷ Using the Erickson-de Wals framework, the CIC conducts a cost-benefit analysis and makes program recommendations addressing equitable access, special populations, public and professional education and vaccine-preventable disease surveillance.¹²⁸ The CIC reports to the Communicable Disease Control Expert Group (CDCEG) of the Pan-Canadian Health Network (PHN) which in turn reports to the Public Health Network Council.¹²⁹ The Public Health Network council then reports to the Conference of Deputy Ministers of Health. The CIC's membership consists of representatives from the provinces and territories, the Centre for Immunization and Respiratory Infectious Diseases (CIRID) branch of PHAC, BGTD, the general body of PHAC and the First Nations and Inuit Health Branch (FNIHB) of Health Canada (see Appendix E).

Specific process followed for HPV immunization policy decision-making

HPV immunization policy-making partially followed the general process described above. The first product, *Gardasil*, was approved by Health Canada, and recommendations then followed from NACI and CIC. However, there were then two additional steps that were not part of the standard process for immunization policy-making, a vaccine priorities workshop and a joint NACI-CIC working group.

The Canadian HPV Vaccine Priorities Workshop

The first departure from the traditional approach was the convening of a special workshop, the Canadian HPV Vaccine Priorities Workshop. Held in November 2005, prior to the approval of an HPV vaccine in Canada, this workshop was organized by PHAC, the Canadian Association for Immunization Research and Evaluation (CAIRE) and the Canadian Institutes of Health Research (CIHR). Although a similar workshop had been held before by these agencies (the Influenza Research Priorities Workshop in 2005) it dealt with pandemic planning rather than immunization policy.¹³⁰ The purpose of the HPV workshop was to examine the "current Canadian and international status of HPV vaccine research and develop national research priorities before the vaccine becomes approved for use in Canada".¹³¹ The workshop's main outcome was a list of research questions (see Box 3.2) which addressed the knowledge and infrastructure gaps present in the Canadian healthcare system. The report from the workshop also stated that participants felt that national goals for an HPV immunization program should be clearly articulated as should the impact of a vaccine program on cervical cancer screening programs. They noted that "many questions need to be answered before administration of the new vaccine can be justified".¹³¹

Box 3.2 Top 10 research questions raised at the Canadian HPV Vaccine Priorities Workshop

1. Most efficient way to deliver an HPV vaccination program
2. Knowledge, attitudes and beliefs and acceptability of HPV vaccination programs in recipients, providers, parents
3. Vaccine program delivery costs
4. Immunogenicity of two-dose HPV vaccine schedule
5. Impact of vaccination programs on cervical screening programs
6. How to promote HPV vaccine in an acceptable and effective way
7. Co-administration with other vaccines and effect on safety and immunogenicity
8. Economic burden of HPV-related diseases and conditions in Canada
9. Efficacy/effectiveness of a two-dose HPV vaccine schedule
10. As vaccine programs progress, what will be observed with cervical screening programs

Health Canada Findings

On July 10, 2006 Health Canada approved *Gardasil*. The vaccine was granted Priority Review status because it "provided effective prevention of a disease or condition for which no drug is presently marketed in Canada".¹³² Health Canada found a favourable benefit/risk profile for *Gardasil* in girls and women aged 9 to 26 for the prevention of infection caused by HPV types 6, 11, 16 and 18, cervical cancer, vulvar and vaginal cancers, genital warts, cervical adenocarcinoma in situ, CIN grades 1, 2 and 3, vulvar intraepithelial neoplasia (VIN) grades 2 and 3 and vaginal intraepithelial neoplasia (VAIN) grades 2 and 3. The committee based their decision on submitted data from 12 clinical studies (4 pivotal and 8 non-pivotal). The 4 pivotal studies were all placebo-controlled, double-blind, randomized Phase II^{55, 64} and Phase III^{66, 68} clinical efficacy trials. Details of the non-pivotal studies were not included in the Summary Basis of Decision (SBD).

As part of the benefit/risk assessment BGTD noted possible unintended negative outcomes of HPV vaccination including the possibility of non-vaccine HPV types replacing HPV types eliminated by immunization. The committee also detailed a number of limitations of the vaccine (see Appendix F).

NACI Recommendations

In February 2007, the National Advisory Committee on Immunization (NACI) released their statement on the HPV vaccine.¹³³ This statement reviewed the clinical trials^{55, 64, 66, 68} that formed the basis for the Health Canada approval of the vaccine. Although NACI reported the trial results concerning immunogenicity and the reduction of infection and precancerous lesions, the committee also noted that vaccination would only be effective on certain strains and would lack efficacy in women already infected. The recommendations

did not raise any issues with the use of surrogate outcomes in the clinical trials and referred to the results of CIN 2/3 prevention as equivalent with cervical cancer prevention. The statement recommended use for females between 9 and 13 years of age although it did note that efficacy of the vaccine had not been demonstrated in this age group and that immunogenicity bridging data was being used to support efficacy in this group. The statement also recommended vaccination for women between the ages of 14 and 26, although these women may already be sexually active and therefore possibly infected. No recommendations are made for women over 26 years of age as there was no data to support vaccination of this population, but indicated that vaccination of this group could be considered in individual cases. NACI did not recommend vaccination in females under 9 or males, due to lack of data on these populations. The committee also noted that, as the vaccine does not protect against all HPV strains, vaccinated women would still need to participate in cervical cancer screening.

The statement called for special attention to be paid to implementation in certain high-risk groups such as street youth and immigrants and noted that the data used to supplement their recommendations and finding might not apply to these subpopulations. NACI also recommended the development and linkage of Pap smear screening databases, cervical cancer registries and vaccine registries and the expansion of networks of researchers working on HPV disease evaluation, cervical cancer screening and treatment, public health and vaccinology.

HPV Working Group and CIC Recommendations

The second new approach used in the development of HPV immunization policy was the formation of a joint NACI-CIC HPV Working Group by the CIC in May 2006. This was designed as a collaborative approach to promote the harmonization of HPV immunization programs and to develop comprehensive recommendations for HPV vaccine programs.^{134,135} The membership included representatives from NACI, CIC, the Cervical Cancer Prevention and Control Network, the Society of Obstetricians and Gynaecologists, the College of Family Physicians of Canada, PHAC groups including IRID, Community and Acquired Infections Division, and BGTD among others (see Appendix E).

Gardasil was the first vaccine to undergo a CIC review subsequent to receiving NACI recommendations. As such, it was widely considered to be a test case for collaborative program planning, coordinated by NACI and CIC.¹³⁴ Although the CIC is supported by many working groups that assist in developing recommendations, this was the first joint working group created by the CIC in order to develop its own scientific and programmatic recommendations. The working groups used the Erickson-de Wals framework to formulate their recommendations, specifically focusing on the epidemiology of HPV, vaccine characteristics, Canadian disease modeling, economic analyses, and the feasibility and acceptability of HPV vaccination programs.¹³⁵ The resulting recommendations were then used by the CIC in the development of their recommendations.

In December of 2007, the CIC published its recommendations on an HPV immunization program.¹³⁵ The committee recommended 3 major goals for an HPV immunization program (see Box 3.3)

Box 3.3 CIC recommended goals of an HPV immunization program*

1. To reduce by 60% the CIN 2/3 caused by HPV 16/18 in Canada within 20 years of introduction of an HPV vaccination program
2. To reduce by 60% the incidence of cervical cancers (and other HPV-related cancers) caused by HPV 16/18 in Canada within 30 years of introduction of an HPV vaccination program
3. To reduce by 60% morality due to cervical cancer caused by HPV 16/18 in Canada within 35 years of introduction of an HPV vaccination program.

*The feasibility of these recommendations was based on a number of assumptions including that vaccine immunity would be lifelong, that vaccine efficacy would be at least 95% and a coverage rate of 85% for 11 year old girls, 80% for 14 year old girls and 75% for 17 year old girls.

The CIC recommendations for program implementation called for a routine immunization strategy over strategies targeting high-risk groups. Such strategies, it stated, are not efficient for HPV vaccination and may be viewed as unethical, assumedly because of the social and economic factors which define high-risk populations. The committee did, however, recommend that special efforts should be extended to reach high-risk populations within the routine program. The use of a school-based program to vaccinate one female cohort was recommended for implementation in all provinces and territories. The recommendations called for 80% of girls to be vaccinated in either grade 4, 5, 6, 7, or 8 within 2 years of program introduction with 90% of that population within 5 years. Those who wished to implement catch-up programs could proceed with the inclusion of additional female cohorts. The committee found that the grade 8 cohort was the most cost-efficient strategy so they included it in their recommendations, although they suggested that jurisdictions consider their own population characteristics, such as the age at sexual debut, when deciding on their vaccination programs. The recommendations also advised following the manufacturers' dosing schedule (0, 2, and 6 months).

In addition, the CIC recommended the development of a surveillance system to detect any possible replacement of circulating HPV types in the population and the development of

a national consensus on screening programs in the era of vaccination. Finally the recommendations noted that in parallel with the implementation of an HPV immunization program there needed to be the development of a detailed evaluation plan to monitor vaccination coverage as well as the incidence and prevalence of HPV-associated diseases and cervical cancer. The creation of a registry of HPV vaccine coverage and a registry of cervical cancer, as well as a national HPV sentinel surveillance system was suggested.

3) Jurisdiction and funding decisions

Federal government

The federal government has constitutional power to monitor infectious diseases of national significance and has certain powers to act unilaterally during a public health emergency. However, with the exception of some special populations (e.g., First Nations and Inuit Health, veterans of the Canadian Forces), the federal government has no direct jurisdiction over immunization programs. It does, however, assist the P/T in their vaccine programs by funding co-ordination and support through the Center for Immunization and Respiratory Infectious Diseases (CIRID) within PHAC. The CIRID leads and co-ordinates the implementation of the NIS and supports the infrastructure of the immunization activities of PHAC, NACI and CIC. It also manages the vaccine Bulk Procurement Program (BPP) which allows for P/T collaboration in purchasing of vaccines. Federal, provincial and territorial bodies are linked through the communicable Disease Control Expert Group (CDCEG) of the Pan-Canadian Public Health Network which aims to create an "integrated national approach" to immunization through coordination of F/P/T strategies and national recommendations.¹³⁴

The federal government has also allocated federal funds for direct support of provincial programs, in the form of an immunization trust set up within CIRID in 2004. The federal government directed \$300 million to the trust to help establish and support provincial programs for vaccination against pneumococcal disease, meningococcal disease, varicella and pertussis.

In relation to HPV immunization, the federal government made a special funding allocation, by establishing another immunization trust (the HPV Vaccine Trust). This was announced as part of the budget in March 2007 by Minister of Finance Jim Flaherty. He tabled Bill C-52 in Parliament, and a portion of the 'Payments to Provinces and Territories' section allowed for direct payments to the trust to provide the provinces and territories with funding "in support of human papillomavirus immunization".¹³⁶ \$300 million was allocated to fund three years of HPV vaccination for each province and territory. The provinces and territories were not mandated to use the funds in the trust, but they could not be used for any other programs or initiatives.

Provincial - Ontario

Immunization programs are considered preventive programs involving the delivery of routine health services; they therefore fall under the scope of provincial/territorial jurisdiction. If a new vaccine program cannot be funded from within existing Ministry of Health budgets, a new allocation needs to be made by the provincial parliament or assembly.

Due to a lack of available documentation, information on pre-federal funding decision-making at the provincial level is limited.¹³⁷ However, Ontario provides an example of the way decision-makers were thinking about HPV immunization programs. On February 22, 2007 a member of the Government of Ontario's Standing Committee on Finance and

Economic Affairs proposed a motion to establish an HPV vaccination program, with the intention of initiating it in September 2007. A vote was held and the motion was defeated. The key objections were concerns about the potential cost of the program and the desire to wait for CIC recommendations before creating a broad vaccination program.¹³⁸

Federal - P/T Jurisdiction Overlap

The creation of federal trusts to fund health services that fall within the P/T jurisdiction has led to a blurring of the line between the federal government and the provinces and territories. The reason given for the establishment of the HPV Vaccine Trust was to encourage provinces and territories to implement new vaccine technology which they had previously been reluctant or slow to fund. According to the Health Minister at the time, Tony Clement, and Chief Public Health Officer, David Butler-Jones, the decision was made based on the success of the 2004 Federal Immunization Trust which resulted in the implementation of routine vaccination of the four targeted vaccines in all 13 provinces and territories.^{127,139}

Following the establishment of the federal HPV Vaccine Fund, Ontario began an HPV vaccination program that started in September 2007, as had been originally proposed and defeated in February of that year. This occurred even though the main concerns raised at the time of the original proposal had not been addressed, including the lack of CIC recommendations.

4) Program implementation

Each province is responsible for vaccine program planning and delivery. Immunization is generally coordinated by local public health units and delivered by a range of providers including municipal/regional public health clinics and physicians working in

private practice.¹²⁷ All provinces and territories followed the CIC recommendations of a school-based program. Table 3.3 compares the way in which different jurisdictions have implemented the vaccination program and illustrates the so-called 'patchwork' of programs that have emerged.¹⁴⁰

Table 3.3 Comparison of implementation of HPV vaccination programs by jurisdiction¹⁴¹

Province/ Territory	Program start year	Cohort Vaccinated (all female)	Catch-up Cohort	Dosing Schedule ¹
NL	2007-08	Grade 6	-	Standard
PEI	2007-08	Grade 6	-	Standard
NS	2007-08	Grade 7 Grade 8 (2010-11 only)	-	Standard
ON	2007-08	Grade 8	-	Standard
NB	2008-09	Grade 7	Grade 8	Standard
PQ	2008-09	Grade 4, 9	<18 years	2 doses Grade 4, 1 dose Grade 9
MB	2008-09	Grade 6	-	Standard
SK	2008-09	Grade 6	-	Standard
AB	2008-09	Grade 5	Grade 9 (2009-2012)	Standard
BC	2008-09	Grade 6, 11	-	2 doses Grade 6, 1 dose Grade 11
YT	2009-10	Grade 6	Grade 7, 8	Standard
NT	2009-10	Grade 4, 11	Grade 9-12 (2009-2014)	Standard
NU	2010	Female, Grade 6 (≥ 9 years)	-	Standard

¹Manufacturer's recommendation ('standard'): three doses at 0, 2, 6 months

Four provinces, Ontario, Nova Scotia, Prince Edward Island and Newfoundland and Labrador, chose to implement their immunization program prior to the CIC making its recommendations. The target age for vaccination varies between Grade 4 in Quebec and the Northwest Territories to Grade 8 in Ontario. Quebec and British Columbia use an off label dosing schedule, giving two doses in grades 4 and 6 respectively and the third dose in high school. British Columbia adopted this dosing schedule in 2010 after seeing Quebec's high

rate of uptake.¹⁴² Quebec also has the most comprehensive program, funding vaccination for all females under the age of eighteen (for those in Grade 10 onwards, directly from other providers).¹⁴⁰

5) Program evaluation

In their recommendations, the CIC proposed the development of a detailed evaluation plan that would include vaccination coverage, incidence and prevalence of HPV-associated disease and cervical cancer, efficacy and duration of protection by the vaccine, psychosocial impact of vaccination and optimal cervical cancer screening approaches.¹³⁵ The CIC's three main outcome-oriented goals for HPV immunization in Canada (see Box 3.3. above), could be taken as potential indicators to review the performance of such a program at a future point.

The CIC also set uptake targets of vaccinating at least 80% of girls in the selected cohort within 2 years of program introduction, and 90% of that population within 5 years. At the time of writing, data on uptake rates across Canada are incomplete. The Atlantic provinces (excluding New Brunswick) appear to have the highest coverage with reported uptake rates between 80-85% and are meeting the CIC uptake goals. On the other hand, Ontario is reporting uptake rates of 53% and British Columbia is reporting 62% in their programs' first year (see Table 3.4).

Table 3.4 Provincial uptake rates (available data)¹⁴³

Province	2007	2008
PQ	N/A	80% (Grade 4) & 81% (Grade 9)
NL	85%	83%
NS	81%	85% (partial preliminary)
PEI	80%	80%
BC	N/A	62% (Grade 6)
ON	53%	-

SUMMARY

HPV immunization policy was created with the engagement of a large number of stakeholders. The process of program planning and implementation involved numerous policy-making bodies and representatives from a number of agencies, professional organizations and health bodies. The HPV immunization decision-making process was unique in that it provided the testing ground for a new approach to collaborative policy-making by NACI and CIC, as represented by the NACI-CIC joint working group. In addition, funding for vaccination was provided for by the federal government, differing from the standard process in which the provinces and territories determine which vaccines will be funded in their jurisdictions. Recommendations favoured a routine immunization strategy using school-based programs which followed the manufacturer's dosing schedule. Program implementation decisions did not achieve one of the major goals of the NIS, i.e. harmonization of policy. HPV immunization programs vary across the provinces and territories, and may be one of the reasons for the disparities seen in HPV uptake rates.

CHAPTER 4

MESSAGES TO THE PUBLIC

For the public, two of the most common sources of information about health programs are health education materials, and articles in newspapers, magazines and other popular media.^{21,144-146} This chapter aims to identify the main messages regarding HPV immunization which appear to have been sent to the public through these media. Two separate analyses were performed, examining 1) materials posted on the public websites of Canadian provincial ministries of health and federal public health agencies and 2) articles published in four major Canadian newspapers.

Objective D - Evaluate the public health campaign, specifically the educational materials available to the public

APPROACH

Content analysis of online educational materials produced by federal and provincial public health agencies.

BACKGROUND

The level of knowledge about HPV and cervical cancer in the general public has been found to be low.¹⁴⁷⁻¹⁵⁰ Educational materials regarding HPV immunization, therefore, can be seen as an essential part of an HPV immunization program. Educational materials may support (directly or implicitly) normalization or informed decision-making. If the message of the material serves to encourage uptake, then this can be seen as a facet of a normalization approach to the intervention. If the material however seeks to educate the individual about

their options and encourages individual decision-making then it can be seen as encouraging a preference-oriented approach to the intervention.

METHODS

Under current definitions, an 'informed decision' is one which is based on sufficient information and takes in account individual attitudes and values.¹¹ Thus, educational materials designed to promote informed decision making in their target population (females in the target age vaccination range and/or their parents/guardians) need to present information which is complete, neutral and comprehensible. The specific focus of the content analysis was therefore the informational messages on HPV immunization, their neutrality, the readability of the materials and their suitability for the target audience.

Source Selection

Although public health information relating to HPV vaccination has been conveyed through a number of media including television commercials, printed advertisements and printed and online educational material, for feasibility this analysis was restricted to online material produced by federal and provincial health agencies. Each provincial health ministry website, as well of those of PHAC and Health Canada, were searched for educational materials (hereafter referred to as 'documents' for ease of terminology) meeting the eligibility criteria (see Table 4.1). A list of the documents selected for analysis is available in Appendix G.

Table 4.1 Eligibility criteria for content analysis of HPV vaccine educational materials

Inclusion	Exclusion
Available on a provincial health ministry or federal health agency website	Available on other websites or only available in hard copy
At least 50% of the content concerned HPV vaccination	Less than 50% of the content concerned HPV vaccination
Aimed at the general public	Aimed at health professionals or teachers
Available in English	Only available in languages other than English

Assessment

Documents were assessed on four components (a) content, (b) readability, (c) suitability, and (d) themes using methodologies described in the literature.¹⁵¹⁻¹⁵⁷

Content

A content analysis tool was developed for the project, based on published tools used in similar projects.^{72, 151} Content analysis is a common tool in qualitative analysis and is often used to analyze messages conveyed by media (print and visual) as well as other written material such as interviews and textbooks. Similar to a narrative review, in that it allows for the summarizing of various data sources, content analysis differs in being more systematic than narrative review. "Content analysis is a quantitatively oriented technique by which standardized measurements are applied to metrically defined units and these are used to characterize and compare documents."⁷⁰ Content analysis typically has both qualitative and quantitative dimensions. Generally content analysis follows a number of steps: 1) Decide on the unit of analysis; 2) Decide how units are going to be sampled; 3) Determine what is to be measured and how - what is to be recorded, how are things to be classified; 4) Determine how the information is to be recorded - development of the coding instrument, independent coding by two reviewers, resolve any disagreements; 5) Determine how the information is to

be analyzed (e.g. Will computer analysis be used? How is the information going to be presented?).

A list of specific informational areas considered necessary for full education on the topic was derived from the existing literature on knowledge needs and requirements for HPV, cervical cancer and HPV vaccination.^{147, 148, 158-164} Each can be considered a discrete element of information. A total of 24 items were identified, see Table 4.2. Each item in the coding instrument was weighted equally, and one point was given for the presence of each of these items within a document. The maximum possible score was 24.

Table 4.2 Informational items included in content analysis tool

Informational Item
1. HPV is a sexually transmitted virus
2. HPV is a common virus
3. There is a link between HPV and cervical cancer
4. There is a link between HPV and genital warts
5. HPV infects men and women
6. Most HPV infections clear naturally
7. There is a significant amount of time between infection and cancer
8. Information on reducing the risk of HPV infection (besides immunization)
9. There is strong evidence that the vaccine prevents infection with targeted strains of HPV
10. The HPV vaccine protects against some, but not all strains of HPV associated with cervical cancer
11. The HPV vaccine protects against some, but not all strains of HPV associated with genital warts
12. Target age group for vaccination specified
13. Immunization should occur at a young age because vaccination is required before sexual debut
14. <i>Gardasil</i> requires 3 doses/ <i>Cervarix</i> requires 2 doses
15. The HPV vaccine is prophylactic not therapeutic
16. Boosters may be needed as the length of immunity is unknown
17. Screening has been an important tool in identifying cervical cancers
18. Vaccinated individuals will still need to participate in Pap screening
19. Vaccination has not been proven to prevent cancer, only its precursors
20. Addresses concerns about risk compensation
21. Addresses concerns about safety
22. Addresses the cost of the vaccine and who pays for it
23. Vaccination is voluntary/consent is needed
24. Provides more than one option (get the vaccine, refuse the vaccine, postpone vaccination)

Readability

Readability refers to how easy it is to understand a piece of written text. There is no universally accepted readability index. Three of the most commonly used tools were used and averaged to produce an amalgamated score, an approach used in many previous studies^{151, 157} The three tools were the Flesch-Kincaid index¹⁶⁵, the Gunning FOG index¹⁶⁶ and the Simple Measure of Gobbledygook (SMOG).¹⁶⁷ These formulas have a history of being accurate and simple tools and are widely used in the health materials literature.^{152, 157, 168} Each produces a score that reflects the grade-level needed to understand the text. For example, text with a score of 10 requires at least a grade 10 education to fully comprehend. The ideal for health educational materials is to make the reading level as low as possible without sacrificing important content.¹⁶⁹ Generally, it is suggested that educational materials should have a reading level of no higher than grade 6.¹⁵⁵

Suitability

Suitability assessments are an attempt to evaluate how the material appeals to human elements such as motivation, visual attractiveness, interest, and cultural and experiential factors.¹⁵² Suitable materials are more likely to empower the reader to learn and retain the information better.¹⁷⁰ As with readability, suitability is an important factor in a material's ability to effectively educate the reader.

Suitability was assessed with the Suitability Assessment of Materials (SAM) tool which was designed to assess the suitability qualities of health information materials.¹⁷¹ The SAM consists of six main categories: content, literacy demand, graphics, layout and typography, learning stimulation and motivation and cultural appropriateness, with a total of 22 variables included within them (see Appendix H for a full list of variables and their

criteria). The SAM tool has previously been validated,^{157, 172} and has been used in numerous assessments of health materials.^{152, 153, 155, 157, 173-178} The SAM tool produces suitability percentage scores which are grouped as follows: 0-39% (not suitable), 40%-69% (adequate) and 70%-100% (superior).

Thematic analysis

Qualitative framework analysis was used to identify the main types of discussions, i.e. the themes. Qualitative framework analysis and thematic analysis are common methods within content analysis. Framework analysis involves a systematic process of sorting, categorizing and charting material according to key issues and themes. It generally follows four steps: 1) Familiarization: the researcher becomes familiar with the materials to be analyzed (immersion in the data). 2) Identifying a thematic framework: Following familiarization with the material a set of themes present are identified, the 'thematic framework'. 3) Indexing: The materials are coded according to the thematic framework 4) Mapping and interpretation: Implications and conclusions are drawn from the results of the indexing.¹⁷⁹

Thematic analysis involves the investigation of deeper, and perhaps unintended, themes.¹⁸⁰ During the first review, notes were taken on repeating themes and discussion topics. The set was then re-reviewed based on this initial thematic framework. The presence of an identified theme was coded through colour-coding on hard copies of the materials. Text containing the themes was then collected from all the documents using electronic copies (copy and paste) and organized by theme. Themes found to have inadequate representation in the sample were excluded or combined as were themes irrelevant to the overall topic of normalization and informed decision-making and larger themes were split.

Coding validation

Following the coding of the entire sample by the primary reviewer, a secondary reviewer re-coded the sample in order to ensure agreement between two independent reviewers.

Disagreements on coding between the two reviewers were discussed and resolved.

RESULTS

In total, 17 documents produced by 12 federal and provincial agencies were assessed (see Appendix G for a detailed list). The content, readability and suitability scores are summarized in Table 4.3 (materials are presented in alphabetical order).

Table 4.3 Content, readability and suitability scores of educational materials.

Material	Content	Readability				Suitability
	Score (%)	Flesch-Kincaid Score	FOG Score	SMOG Score	Average grade level	SAM Score %
1 ¹⁸¹	9 (39)	13.64	14.84	13.25	13.90	58
2 ¹⁸²	11 (48)	8.47	10.23	10.64	9.78	41
3 ¹⁸³	14 (61)	8.26	10.34	10.80	9.80	61
4 ¹⁸⁴	18 (78)	10.50	11.94	12.29	11.58	38
5 ¹⁸⁵	18 (78)	7.47	8.73	9.25	8.48	78
6 ¹⁸⁶	15 (65)	9.28	10.59	11.18	10.35	53
7 ¹⁸⁷	17 (74)	8.34	9.60	10.41	9.45	59
8 ¹⁸⁸	13 (57)	8.39	9.40	10.02	9.27	50
9 ¹⁸⁹	12 (52)	9.84	10.64	10.97	10.48	44
10 ¹⁹⁰	13 (57)	9.48	11.04	11.58	11.31	50
11 ¹⁹¹	17 (74)	13.27	14.97	14.39	14.21	48
12 ¹⁹²	14 (61)	9.33	10.47	10.95	10.25	61
13 ¹⁹³	12 (52)	10.85	12.53	12.73	12.04	41
14 ¹⁹⁴	12 (52)	7.92	9.39	9.79	9.03	64
15 ¹⁹⁵	9 (39)	7.34	8.73	9.58	8.55	53
16 ¹⁹⁶	15 (65)	8.80	9.89	9.87	9.52	66
17 ¹⁹⁷	11 (48)	13.27	15.46	14.96	14.56	38
Average	14 (59)	9.69	11.11	11.33	10.74	53

Content

The average content score was 59% (range 39% - 78%), (see Appendix I for detailed content scores). The only informational area that was covered in all 17 documents was the safety of the vaccine (item 21). The other informational areas most commonly covered were: "HPV is a sexually transmitted virus" (item 1, 16 documents), and "there is a link between HPV and cervical cancer" (item 3, 16 documents). The four items covered least were: "vaccination has not been proven to prevent cancer, only its precursors" (item 19, 1 document), "addresses concerns about risk compensation" (item 20, 2 documents), "provides more than one option" (item 24, 3 documents) and "there is a significant amount of time between infection and cancer" (item 7, 3 documents).

Readability

The average reading grade level was 10.7. None of the documents scored within the recommended reading level and three scored beyond grade 12. The main reason for the poor readability scores was the use of complicated or medical terminology and language, e.g. the use of terms such as "adverse events" instead of "side effects".

Suitability

The average SAM score for the entire sample was 53% (range 38% - 78%) which is considered 'adequate'. Two materials scored as 'not suitable', 14 scored as 'adequate' and one scored 'superior'. The main reasons for the lower scores on suitability were: a lack of focus on behaviour and action information, a lack of summaries or reviews of the major messages, poor reading level requirements, inappropriate or lack of use of graphics and poor layouts.

Correlation between scores

There was no relationship between suitability and content scores as the Spearman correlation between the two was insignificant (see Figure 4.1), as was the correlation between content and readability (see Figure 4.2). However, there was a significant correlation between suitability and readability, with a Spearman correlation of -0.68 ($p\text{-value} = 0.0027$) (see Figure 4.3). Scoring well on all three scores was rare, but did occur. Item 5 scored the highest of the sample on suitability and content (tied) while still having the lowest average reading level.

Figure 4.1: Comparison of content and readability scores of educational materials

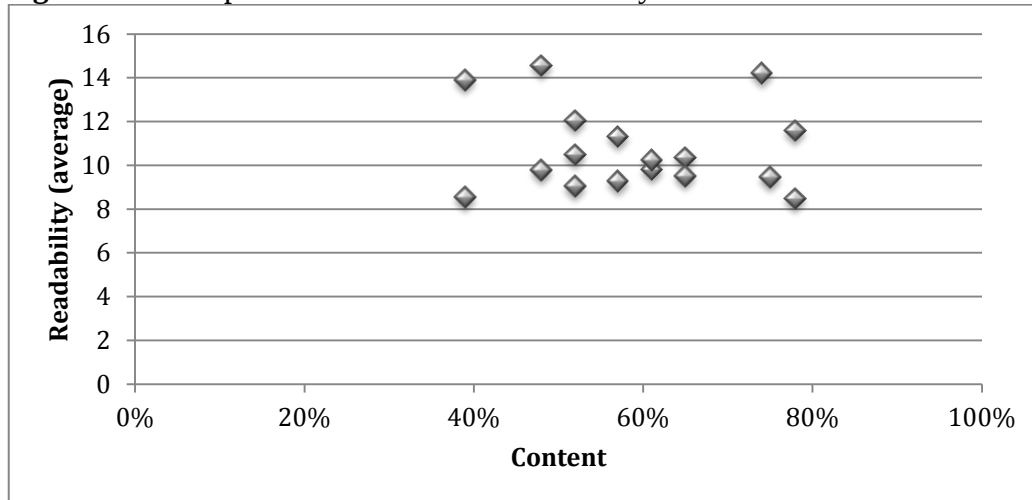


Figure 4.2: Comparison of content and suitability score of educational materials

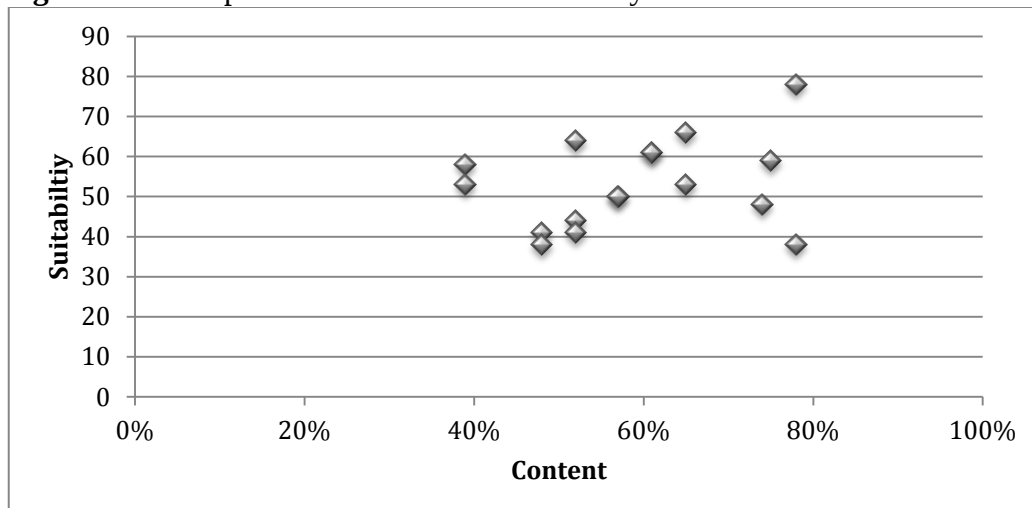
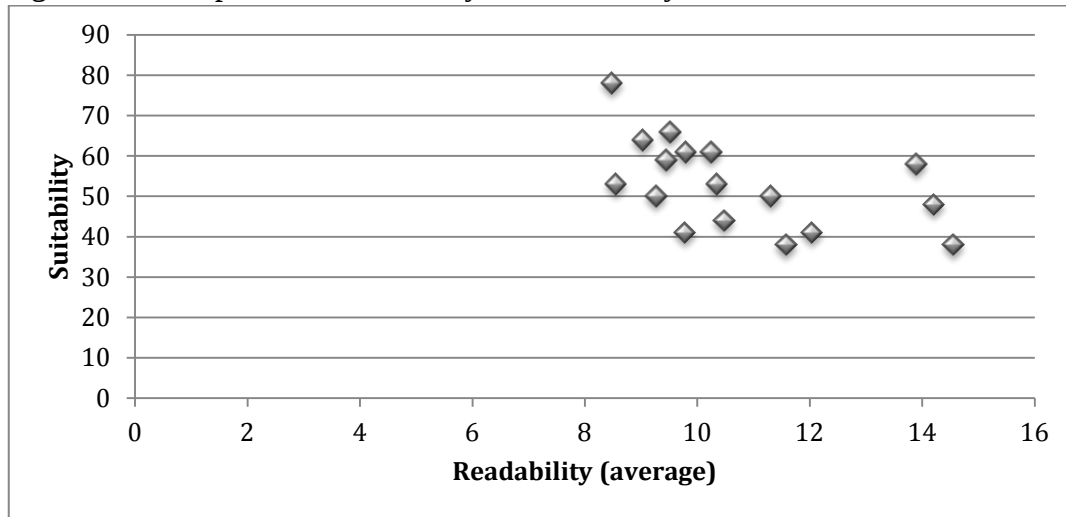


Figure 4.3: Comparison of suitability and readability scores of educational materials



Thematic analysis

A major theme in this set of documents was the presence of normalizing messages. Although not present in all documents, more than half the sample contained content that supported a normalizing approach to HPV immunization. Two documents contained normalizing messages in the titles: "Be informed: Have your daughter immunized against HPV"¹⁸¹ and "The Facts on the Safety and Efficacy of the HPV Vaccine".¹⁹⁷ Others gave girls information on how to make their parents "comfortable" with getting them immunized,¹⁹⁴ told parents to "encourage your daughter to get the HPV vaccine",¹⁸¹ provided lists of "Why should I get vaccinated"¹⁹² and told readers that the vaccine "prevents cancer".¹⁹⁰ Documents also included discussions of the fact that the vaccine was "recommended".^{195, 196}

The option of not getting vaccinated, or waiting until a later time, perhaps when the child is a few years older, was rarely presented as an option. Of the three documents that did present refusal or postponement as an option, two warned that postponement would result in the individual incurring the cost of vaccination (\$400-600).^{193, 194}

Only one document presented tools to aid in decision-making. This document, which had the highest scores in content and suitability, provided users with a decision aid that included not only facts and information but also personal narratives, and incorporated personal beliefs and feelings into the process. This document asked its users questions such as, "What matters most to you?", "How sure do you feel right now about your decision?" and "Do you understand the options available to you?"¹⁸⁵

Objective E - Evaluate the media discourse surrounding HPV vaccination

APPROACH

Content analysis of print media coverage.

BACKGROUND

A considerable body of research suggests an association between media coverage of issues and public perception of those issues.^{198, 199,200} The media has also become a primary source of information about health and wellness for both lay people and health professionals.^{21,144-146} In addition, there is evidence that the news media helps to set the public agenda, influences policy makers, affects medical and scientific research and prompts individuals to seek health care.²⁰⁰⁻²⁰⁴ However, while the media may be a source of information for many individuals, unlike educational materials, its primary goal is not to educate the public. As a result, the choice of what stories to run and how to report on events may be influenced by financial or political concerns at the expense of properly and impartially informing the public.

METHODS

The general approach to this objective was a content analysis. While analyses of these types are generally qualitative, the identification and selection of articles was approached in a systematic manner. For feasibility, the analysis focused on the print media, specifically newspapers.

Source Selection

The study was restricted to the four Canadian newspapers with the highest circulation during the search period. These were The Globe and Mail, the National Post, the Toronto Star and the Montreal Gazette.²⁰⁵

Search Strategy

The search period was July 1, 2006 to June 30, 2008 encompassing the two years following the approval of the first HPV vaccine in Canada. Relevant articles were identified using the Canadian Newsstand (Proquest) electronic database. The search terms were 'HPV' or 'human papillomavirus' or 'cervical cancer' AND 'vaccine' or '*Gardasil*' or '*Cervarix*' or 'immunization' or 'vaccination'. The low number of MeSH terms on this topic necessitated a simple search strategy. Records produced by this search were then assessed against the eligibility criteria (see table 4.4).

Table 4.4 Eligibility criteria for content analysis of print media

Inclusion	Exclusion
Articles where HPV vaccination was a major topic of the article	Articles which mentioned HPV only in passing
News articles and editorials	Letters to the editor
Articles at least 100 words in length	Articles under 100 words

Analysis

The articles were each read and coded on four areas: the general tone of the article, the content and the themes present. This approach was based on content analysis methodologies described in the literature^{72, 206-210} and the qualitative framework methodology developed by Richie and Spencer.¹⁷⁹ Content analysis is a common tool in qualitative analysis and is often used to analyze messages conveyed by media (print and visual) as well

as other written material such as interviews and textbooks. Similar to a narrative review, in that it allows for the summarizing of various data sources, content analysis differs in being more systematic than narrative review. "Content analysis is a quantitatively oriented technique by which standardized measurements are applied to metrically defined units and these are used to characterize and compare documents."⁷⁰ Content analysis typically has both qualitative and quantitative dimensions. Generally content analysis follows a number of steps: 1) Decide on the unit of analysis; 2) Decide how units are going to be sampled; 3) Determine what is to be measured and how - what is to be recorded, how are things to be classified; 4) Determine how the information is to be recorded - development of the coding instrument, independent coding by two reviewers, resolve any disagreements; 5) Determine how the information is to be analyzed (e.g. Will computer analysis be used? How is the information going to be presented?).

Tone of coverage

Tone was assessed based on each article's overall attitude toward HPV vaccination and immunization programs. As already stated, the tone of the article is more than the sum of the content discussed within it, it is a measure the impression of the vaccine left on the reader. Tone encompasses not only what is said, but how it is said, including the choice of words, phrasing of headlines and the structure of the article (i.e. which content is discussed at the beginning of the article and which is placed at the end). 'Negatively toned' articles were defined as those which expressed only, or mostly, negative views and aspects of HPV vaccination. 'Positively toned' articles were defined as those which expressed only, or mostly, positive views and aspects of vaccination. 'Mixed articles' were defined as those

which expressed balanced views, discussing both positive and negative aspects and views. 'Neutral' articles were those which appeared to express no comments or opinions regarding HPV vaccination and tended to be reporting simple facts (e.g. timelines). Special attention was given to the title and first two paragraphs of the article as these are often where the most important information is presented.²¹¹

Content

Content was assessed using a tool devised by the investigator. Initially a random sample of 25 articles was selected and examined. Based on a preliminary reading of these articles, supplemented by previous reviews of the literature, a list of content items was developed. This list was then refined through reflexive consultation with a thesis advisor. In the end, 48 discrete content items were identified. The entire set of articles was then read line-by-line and coded using this framework. The content items were grouped according to whether they were positive, negative or neutral towards HPV vaccination. Positive content items were defined as those which were supportive of vaccination. Negative content items were defined as those which were cautious and/or critical of vaccination. Neutral content items were defined as content items that were neither positive nor negative.

Thematic analysis

Qualitative framework analysis was used to identify the main types of discussions, i.e. the themes.¹⁷⁹ Qualitative framework analysis was used to identify the main types of discussions, i.e. the themes. Qualitative framework analysis and thematic analysis are common methods within content analysis. Framework analysis involves a systematic process of sorting, categorizing and charting material according to key issues and themes. It

generally follows four steps: 1) Familiarization: the researcher becomes familiar with the materials to be analyzed (immersion in the data); 2) Identifying a thematic framework: Following familiarization with the material a set of themes present are identified, the 'thematic framework'; 3) Indexing: The materials are coded according to the thematic framework; 4) Mapping and interpretation: Implications and conclusions are drawn from the results of the indexing.¹⁷⁹

Thematic analysis involves the investigation of deeper and perhaps unintended themes.¹⁸⁰ During the first review notes were taken on reoccurring themes and discussion topics. The set was then re-reviewed based on this initial thematic framework. The presence of an identified theme was coded through colour-coding on hard copies of the materials. Text containing the themes was then collected from all the documents using electronic copies (copy and paste) and organized by theme. Themes found to have inadequate representation in the sample were excluded or combined as were themes irrelevant to the overall topic of normalization and informed decision-making and larger themes were split.

Coding validation

Following the coding of the entire sample by the primary reviewer, a secondary reviewer coded a random selection of 10% of the sample in order to ensure agreement between two independent reviewers. Disagreements on coding between the two reviewers were discussed and resolved,

RESULTS

The initial search produced 162 records, with 80 removed during preliminary review or coding because they failed to meet the inclusion criteria or were duplicates (same article in the same newspaper, resulting from the use of multiple databases), leaving 82 articles in the final analysis (see Appendix J for a complete list of articles included).

Demographics of Sample

Distribution of articles over the four publications was fairly even (see Table 4.5). On two occasions the same article ran in both the Gazette and the National Post (04/16/2007 and 11/22/2007) due to common ownership of the publications. They are counted as four different articles in Table 4.5 for the purposes of establishing the number of articles that ran in each paper. For the rest of the analysis the two 'repeats' are treated single articles. Fifteen (18%) of the articles ran on the front page of the newspaper and 49 (60%) in the news section (see Table 4.5).

Table 4.5 Characteristics of included articles

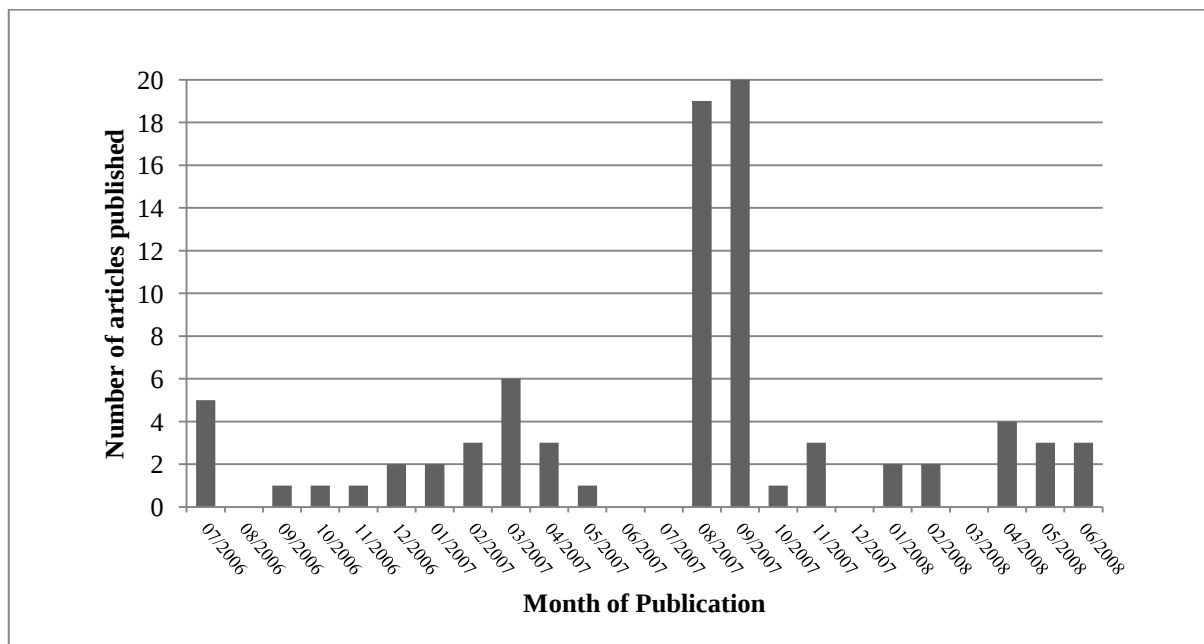
Section	The Globe and Mail	Toronto Star	National Post	Montreal Gazette	Total n(%)
News	12	12	14	13	51 (61)
Comment/Editorial/Opinion	2	2	5	2	11 (13)
Life/Focus	3	5	0	1	9 (11)
Health	5	2	0	0	7 (8)
Business	2	0	0	0	2 (2)
Provincial News	2	0	0	0	2 (2)
Saturday Extra	0	0	0	2	2 (2)
Total n(%)*	26 (31)	21 (25)	19 (23)	18 (21)	84

*n=84 for frequency of articles in each newspaper due to the publication of the same article in two newspaper on two occasions.

Coverage of the story remained fairly steady over the two years with between one and five stories being published in most months, with large peaks in August and September

of 2007 (see Figure 4.4) coinciding with the announcement of some of the first provincial vaccination programs. Smaller peaks were observed in July of 2006 following the announcement of approval of the vaccine by Health Canada and March 2007 following the federal government's announcement of the budget allocation.

Figure 4.4 Publication of articles over time (n=82)



Tone of Coverage

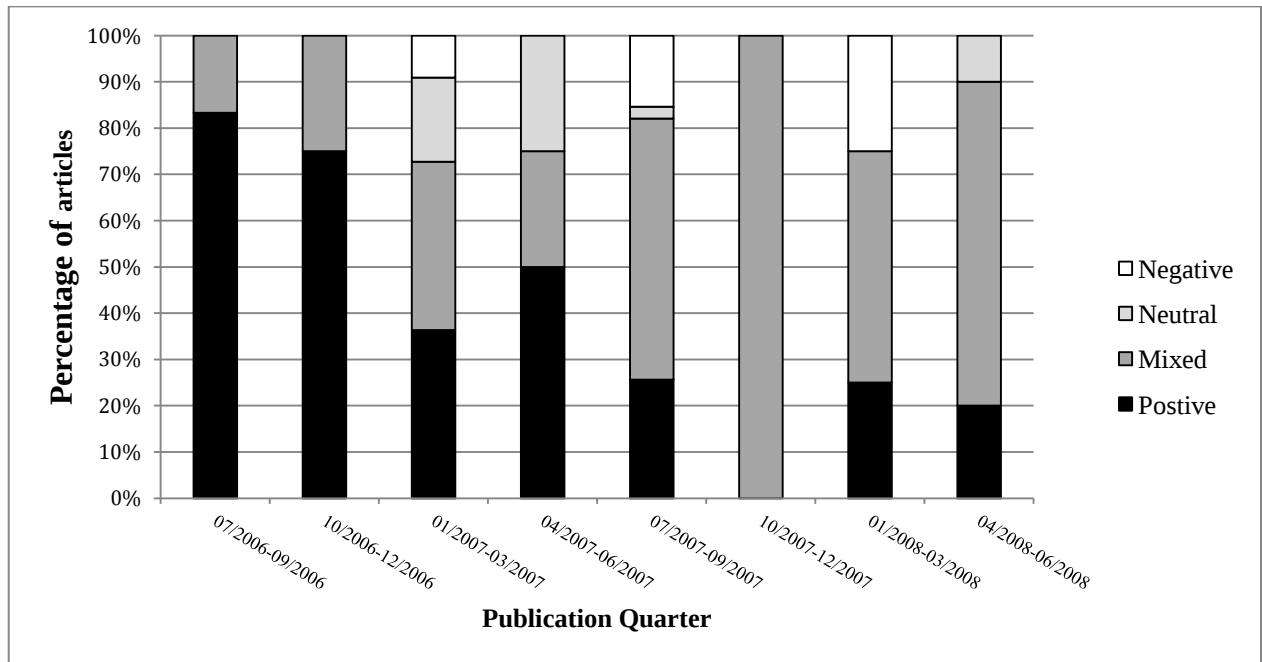
Articles with a mixed tone were the most frequent (42, 51%), followed by positively toned articles (27, 33%) (see Table 4.6).

Table 4.6 Tone of articles towards HPV vaccination

Tone towards HPV vaccination	n (%)
Mixed	42 (51)
Positive	27 (33)
Negative	8 (10)
Neutral	5 (6)

Tone appeared to change over the period of interest, being mostly positive towards the beginning and more negative or mixed towards the end (see Figure 4.5).

Figure 4.5 Publication of articles by tone (n=82)



Content

A total of 48 content items were identified (see Table 4.7). Overall, 1041 mentions of discrete content items were identified. Of these 491 (47%) were considered positive or supportive, 305 (29%) were negative or cautious and 245 (24%) were neutral.

A large number of content items dealt with information about HPV. The connection between HPV and cervical cancer was identified by all but two of the articles. Around half identified HPV as a STI, 44% discussed incidence, prevalence or mortality figures related to cervical cancer. Fewer mentioned the high rate of infection in the general population or that most infections clear naturally.

Table 4.7 Frequency of content items identified in the print media articles

Content item	n (% of articles)
<i>Positive or supportive</i>	
1. There is a link between HPV and cervical cancer	80 (98)
2. The vaccine protects against HPV strains that cause cervical cancer	71 (88)
3. The federal government allocated money for the purchase of the HPV vaccine	36 (44)
4. The vaccine protects against HPV strains that cause genital warts	31 (38)
5. This is an 'anti-cancer' vaccine	25 (30)
6. The vaccine has been endorsed by a professional/medical organization	25 (30)
7. There is a high rate of HPV infection in the general population	24 (29)
8. It is important not to delay vaccination as it should occur prior to sexual debut	22 (27)
9. Parents and patients have a choice about HPV vaccination	20 (24)
10. Program implementation occurred quickly compared to other immunization programs	17 (21)
11. HPV infects men and women, it is a universal disease	15 (18)
12. The vaccine is a scientific breakthrough	15 (18)
13. There is strong clinical trial evidence that the vaccine prevents infection with HPV	15 (18)
14. There is no evidence of serious adverse events associated with the vaccine	15 (18)
15. Vaccination programs have been implemented in other countries	14 (17)
16. Vaccination of males is a possibility/benefits may be extended to males in the future	11 (13)
17. There is a link between HPV and non-cervical cancers	10 (12)
18. HPV immunization is a way of promoting women's health	9 (11)
19. There is a high emotional cost that comes with infection	8 (10)
20. Improvements are still needed to screening programs/screening not fully effective	8 (10)
21. There is a high financial cost that comes with managing infections	6 (7)
22. The vaccine has a high parental approval	6 (7)
23. HPV immunization should be a part of overall sexual health education	4 (5)
24. Many parent approve of the vaccine because their doctors approve of it	4 (5)
Total mentions of positive or supportive content items	491
<i>Negative or cautious</i>	
25. The vaccine does not protect against all strains of HPV	50 (62)
26. The vaccine is expensive for individuals	36 (44)
27. There are concerns about behavioural risk compensation	24 (29)
28. HPV vaccination does not mean that Pap screening can stop	24 (29)
29. There is a lack of knowledge about the length of immunity/ boosters may be needed	23 (28)
30. Pharmaceutical interests lobbied heavily for the vaccine	19 (23)
31. Most infections clear naturally and do not lead to cancer	18 (22)
32. Cervical cancer is not epidemic	18 (22)
33. Current screening practices detect most infections	17 (21)
34. There are some religious objections to HPV vaccination	16 (20)
35. There is a lack of knowledge about long-term safety	14 (17)
36. The HPV vaccine is "controversial"	13 (16)
37. There are concerns that vaccination may result in a false sense of protection	12 (15)
38. Political interests may have influenced policy and implementation decisions	9 (11)
39. Cervical cancer is largely preventable if larger social determinants are addressed	7 (9)
40. This vaccine has not been proven to prevent cancer/ use of surrogate outcomes	5 (6)
Total mentions of negative or cautious content items	305
<i>Neutral</i>	
41. Provincial vaccination programs have begun/will begin soon	46 (56)
42. HPV is an STI	44 (54)
43. Incidence/prevalence/mortality figures for cervical cancer	40 (49)
44. The target age group for vaccination is 9-12 years old	36 (44)
45. The target age group of a provincial vaccination program specified	34 (41)
46. The cost of a provincial vaccination program specified	16 (20)
47. Provincial insurance coverage/requirement of non-covered individuals to pay	15 (18)
48. There is a need for greater education about HPV/cervical cancer/HPV vaccination	14 (17)
Total mentions of neutral content items	245

Table 4.7 Articles in which content items were identified

Content item	Articles
1	212-241, 241-252, 253-291
2	212-218, 220-224, 226-230, 232-234, 236, 237, 239-251, 290, 291, 238, 252-254, 256-267, 269, 271-275, 278-283, 285-289, 292, 293
3	226, 228, 230, 232, 233, 236, 237, 239, 240, 243-250, 252, 253, 256, 259, 260, 263, 264, 266, 268, 269, 272, 273, 275, 277, 280-283, 290
4	212, 214, 216, 218, 220-224, 230, 236, 240-243, 245, 247, 248, 250, 252-254, 256, 257, 259, 260, 262, 265, 266, 273, 279
5	222, 225, 228, 230, 232, 237, 240-242, 244, 250-252, 255, 256, 260, 261, 263, 266, 268, 274, 275, 278, 279, 290, 293
6	216, 219, 220, 223, 224, 227, 229, 232, 236, 239-242, 244, 246, 251, 267-269, 271, 273, 275, 277, 279, 280, 291
7	213, 214, 216, 222-224, 228-230, 244, 247, 249, 250, 252, 253, 256, 271, 273, 277, 279, 282, 284, 290, 291
8	213-215, 218, 220-223, 227, 228, 230, 232, 244, 256, 259, 263, 268-270, 273, 287
9	218, 237-239, 241, 242, 245, 249, 256, 258-261, 268, 270, 273, 275, 281, 286, 292, 293
10	240, 243, 245, 247, 249-251, 256, 258, 260, 262, 271, 275, 280, 283, 285
11	212, 214, 216, 220-222, 229, 244, 253, 256, 273, 274, 277, 279, 284
12	212-215, 222, 227, 228, 230, 232, 244, 247, 260, 266, 278, 280
13	213, 216, 222, 230, 236, 248, 249, 254, 256, 259, 263, 269, 273, 277, 281
14	219, 222, 228, 233, 243, 248, 257, 262, 264, 265, 267, 272, 276, 277, 291
15	214, 216, 221, 222, 227, 229, 241, 244, 248, 249, 255, 256, 269
16	216, 220-222, 229, 255, 256, 273, 274, 279, 284
17	216, 229, 230, 252, 255, 256, 273, 278, 279, 281
18	213, 214, 233, 242, 244, 248, 257, 279
19	221, 228, 230, 232, 245, 248, 271, 280
20	223, 226, 230, 240, 254, 266, 284, 290
21	220, 224, 232, 248, 254, 266
22	218, 220, 221, 245, 248, 250
23	218, 253, 269, 284
24	218, 220, 222, 269
25	212-214, 216, 217, 220-223, 226, 230, 231, 234, 236, 237, 240-251, 254, 256-261, 264-266, 269, 271, 273, 275, 279, 280, 282, 284, 285, 287, 290, 291, 293
26	213, 216, 221-223, 227, 229, 230, 232-234, 236-238, 240-242, 244, 249-251, 256, 258, 266, 268-271, 273, 276, 277, 279, 284, 290, 291
27	223-225, 227, 228, 230, 238, 256, 258-262, 264, 266, 273, 274, 276, 281, 287, 289, 292, 293
28	212, 213, 217, 222-224, 230, 237, 240-244, 249, 250, 254, 256, 268, 271, 277, 279, 282, 284, 290
29	213, 223, 226, 230, 232, 236, 240-242, 244, 246, 249-251, 256, 260, 266, 269, 272, 273, 277, 283, 290
30	225, 228, 230, 233, 237, 238, 244, 250, 251, 253, 256, 260, 266, 274-276, 280, 284, 285
31	212, 214, 222, 223, 226, 230, 232, 236, 249, 250, 252, 253, 271-273, 284, 290
32	224, 232, 236, 237, 240, 241, 244, 245, 251, 252, 266, 269, 271-273, 275, 284, 290
33	212, 213, 226, 230, 240, 244, 246, 249, 266, 271-273, 275, 277, 286
34	238, 256, 258-264, 266, 269, 273, 274, 287-289, 293
35	224, 226, 228, 232, 236, 244, 253, 258, 260, 261, 266, 273, 275, 277
36	234, 244, 252, 256, 259-261, 266, 269, 270, 276, 280, 283
37	230, 237, 240-242, 244, 246, 249, 250, 257, 258, 290
38	232, 233, 240, 246, 250, 256, 262, 264, 281
39	219, 226, 230, 232, 240, 244, 284
40	224, 230, 244, 246, 281
41	235-247, 249-252, 256-258, 260, 261, 263-265, 267-269, 272, 273, 275-278, 280-289, 292, 293
42	212-216, 222, 224, 225, 227-230, 232, 235, 237, 238, 241, 242, 246, 247, 255, 256, 258, 262, 263, 268, 269, 273, 275-279, 282, 286, 288, 290, 291, 293
43	212-214, 216, 219, 220, 222, 223, 228-233, 236-242, 244, 246, 249, 251, 253, 256, 261, 266, 269, 271, 277, 279, 280, 283, 285, 286, 290
44	212-216, 218, 220, 222-225, 227, 229, 230, 232, 237, 238, 240, 243, 244, 247, 249, 250, 253, 256, 258, 260, 261, 270, 277-279, 282, 286, 291, 292
45	235, 237-239, 241-243, 245, 249-251, 256, 258-261, 263, 265, 267, 272, 273, 275-277, 280-283, 285-289, 292, 293
46	227, 237, 238, 241-243, 245, 256, 264, 267, 268, 272, 273, 276, 285, 288, 293
47	221, 235-237, 241, 242, 249, 258, 258, 265, 272, 277, 282, 289, 292
48	222, 229, 230, 236, 238, 249, 250, 259, 268, 271, 280, 281, 285, 287

The second large category of content items concerned the vaccine itself. The most frequent of these types of content were discussions of the vaccine's ability to protect against HPV strains associated with cervical cancer (88%), followed by the issue that the vaccine does not protect against all strains of HPV (62%). The target age groups and the cost of the vaccine were discussed in 44% of articles. A total of 31% of articles explicitly described the vaccine as "anti-cancer".

Issues relating to cervical cancer screening programs were also discussed, most prominently the need for regular screening to continue after immunization, the effectiveness of Pap testing and discourse around the idea that rates of cervical cancer are not at 'epidemic' levels. However, less than a third of the articles touched on these issues.

Consent and acceptability was another area of discussion. Frequent topics included the endorsement of the vaccine by medical and professional groups and concerns about behavioural risk compensation, i.e. perceptions that decreasing the risk of an STI would result in increased risky sexual behaviour by the immunized person. Religious objections to vaccination and concerns about a false sense of protection and safety were also present.

Finally there were content areas that dealt with program implementation. The most frequent was discussion, collectively of aspects of provincial vaccination programs, such as target populations and costs. The other most prominent issue was the federal funding allocation.

The positive content items mostly discussed issues related to the risks, prevalence and costs of HPV infection and cervical cancer, the link between HPV and cervical cancer, the efficacious clinical trial results of the HPV vaccine and the possible benefits of vaccination. Other areas of positive content were discussions of federal funding of the vaccine and the endorsements of professional and medical organizations.

The most common negative discussions concerned the fact that HPV vaccination would not protect against all HPV strains, appearing in about two thirds of articles. Apart from this, the other messages related to the limitations of the vaccine, public and parental barriers to acceptance, the influence of political and economic interests in policy creation and implementation, and a view that there is no particular need for a new approach to cervical cancer prevention.

Neutral discussions were generally facts and figures, e.g. target ages for vaccination, details about provincial vaccination programs and basic information about HPV.

Thematic analysis

Seven themes were identified.

1. The HPV vaccine is a scientific breakthrough

This was a common theme, and evident through quotes from ‘experts’, e.g. "This is the first vaccine in the history of humans to directly prevent the development of a kind of cancer",²²² "one of the most significant events of the last 100 years in the field of cancer control".²¹⁵ Elsewhere the vaccine was called "a milestone"²³² in healthcare, "groundbreaking",²⁷⁸ "revolutionary",²⁶⁶ "one of the greatest advances in immunization in recent years",²²⁷ and "a huge step forward"²⁸⁰.

2. The HPV vaccine is an anti-cancer vaccine

Despite the limitations of formal trial evidence, a number of articles characterized the vaccine as being able to prevent cervical cancer, e.g., "This vaccine prevents cancer",²³⁰ "there is no other vaccine that could be called an anti-cancer vaccine",²²² and "Cervical cancer vaccine hailed".²¹⁵ Related to this were messages about its anticipated effect: "A

vaccination campaign could end ... 1,100 new cases of cervical cancer",²⁹⁴ and "a vaccine that almost eliminates one type of cancer".²²⁸

3. Good parents immunize their daughters

This theme presented HPV vaccination as the 'normal' behaviour of a 'good' parent, therefore presetting refusing vaccination as a deviant behaviour. This example of norm creation included statements such as "I couldn't imagine who wouldn't want their daughter protected",²³⁰ "For many parents it's a no-brainer: anything that will protect their daughters from cancer, even one of the more uncommon types, is worth the risks",²⁵⁶ and "'If there is something to protect my children then I should.' How could she look them in the eye she asks, if she said no and they get cancer down the road?".²⁵⁶

4. HPV vaccination is a way to promote women's health

HPV vaccination was treated almost entirely as a women's health issue, in fact often as a significant "advance for women's health".²¹³ For example, statements such as "this vaccine is the best thing to happen to women's sexual health since the Pill"²³⁰ compared the vaccine to other widely accepted achievements in women's health.²⁹⁵ Also common were comparisons of cervical cancer with breast cancer,²¹⁴ the latter being almost synonymous with women's health, and women's health activism.^{296, 297}

5. The vaccine exists, so we must use it

The technological imperative²⁹⁸ was also evident as a theme, e.g. "'Don't we have the responsibility to protect right away when the technology is there?'"²⁹⁰ This was also often seen in a comparative context, i.e. provinces not wanting to be seen to fall behind each other: "'Health authorities don't want Quebec to fall behind on HPV vaccination. We want

Quebeckers to have access to the latest technology and medicine."²⁴⁷ Of note is how often this messaging seemed to come directly from authority figures, e.g. Ministers of Health, spokespeople for federal health agencies, etc.

6. It can happen to you

First person narratives are often used to help readers identify with the issues.^{207,299}

The 'stories' reported in the articles typically featured young women (described with terms such as "bright, graceful and articulate"²²⁸, and "at the peak of their careers, with families"²³⁶) who experienced cervical cancer. Some of these narratives told how the experience of cancer made them determined to vaccinate their own daughters.

7. Concern about vaccination is a minority opinion

Even though the content analysis showed that articles also contained 'non-normalizing' messages, there was evidence that dissenting views were presented as marginal. While 'pro-vaccination' messages seemed to come from a number of sources (e.g. 'government authorities', professional organizations, physicians and researchers), the critical viewpoint seemed to be represented almost exclusively by a small number of researchers, in particular Abby Lippman of McGill University. In those articles that presented both support and criticism of immunization, the critical comments tended to receive less space and were placed towards the end of the piece.

SUMMARY

The public receives information about health interventions from a number of varying sources, of which two of the most important are health educational materials and the mass media. The analysis of educational materials suggested they lacked complete information on aspects of HPV immunization, and were produced at too high a reading level, for fully informed decision-making. A relatively large number of explicit normalizing messages were observed.

The media analysis found that articles in the four newspapers examined were generally positive or mixed towards HPV vaccination, although the tone of the coverage shifted over the period of interest. The content analysis indicated explicit and implicit messaging which promoted HPV vaccination in positive terms, with critical messages often marginalized within the discourse.

CHAPTER 5

SYNTHESIS & DISCUSSION

This chapter is organized into two main sections. The first section presents a synthesis of the results of the analyses performed in Chapters 2-4 from the perspective of the original research questions. The second section presents a discussion of the overall results of the thesis.

SYNTHESIS

This study used HPV vaccination as a case study to explore normalization and informed decision-making in public health programs in Canada. HPV vaccination is an example of a public health intervention that appears to also contain clear elements of preference-sensitivity, for example requiring explicit individual consent and individualized cost/benefit balances. This thesis attempted to examine the many factors that impacted on whether HPV vaccination in Canada in policy formulation and actual implementation came to sit at the population or individual ends of the spectrum. We evaluated five perspectives: the clinical trial evidence, the scientific and medical communities' reaction to that evidence, the process of policy development and implementation, public education materials, and coverage in the mass media.

Research question 1: What is the epidemiological evidence on the benefits and harms of currently available HPV vaccines?

The systematic review provided evidence of a protective effect of vaccination against persistent HPV infection and low grade CIN. However, data supporting its effect on carcinoma-in-situ, cervical cancer incidence or mortality rates were lacking. There were also

evidence gaps regarding length of immunity and the effect of the suppression of only a few HPV strains. Overall, this evidence suggests a high potential for this technology, but the limitations of the effectiveness evidence present reasons for caution in considering whether and how to implement vaccination.

Research question 2: What are the broader arguments in support of and against HPV vaccination as a cervical cancer prevention intervention?

This question is addressed by considering the findings of two of the analyses, the review of scientific and medical editorials and the media analysis.

The editorials were regarded as the medical/scientific community ‘talking among itself’ about the vaccine, discussing the pros and cons of vaccination, and so forth. Scientific and medical journals are a key source of information for those involved in the implementation of a new intervention including health researchers, policy-makers and health professionals.⁶⁹ The general reaction to the evidence about vaccination expressed in the editorials could best be described as ‘cautious optimism’. Although authors and editors reacted generally positively to the potential of the technology, this was tempered with apprehension about its real-world effectiveness. The arguments in favour of widespread use of the vaccine were presented: its high efficacy in preventing infection, the possibility of ‘filling the gaps’ in screening by vaccinating women who do not get screened, and the cost savings, both financial and emotional, associated with reducing the number of infections. Negative aspects of the intervention were also extensively discussed: a possible lack of cultural acceptability, parental concerns about behavioural risk compensation, the lack of data on long term immunity, the high cost of the vaccine and the likely limited impact of single-sex vaccination on herd immunity. Many editorials discussed a number of conditions that needed to be met before an immunization program could be effective, such as increased

education of the public about HPV and cervical cancer. Some questioned whether an immunization program was needed at all, and argued that addressing the social determinants of HPV infection and cervical cancer or improving existing screening programs would be a more effective method of decreasing cervical cancer incidence.

The media analysis represented some of the more public or lay discussion about the vaccine trial results and the possibilities of vaccination programs. The mass media are both an important source of information for the public and, as it seeks to appeal to the public, can often offer a reflection of what the public might be thinking about.¹⁹⁹ The tone of newspaper articles was found to be mostly positive or mixed, but this changed over time, with mixed stories becoming more common and positively toned articles less common towards the end of the period of interest. By the end, articles that discussed both the positive and negative elements of the vaccine outnumbered the more clearly positive ones. Overall, the mass media seemed to be a reasonable source of basic information about HPV and the HPV vaccine facts, but some areas such as the cause of HPV infection, who can be infected, the rate of infection and the self-clearing nature of most HPV were underreported. Also, while articles rarely reported incorrect information, they often left out key pieces of information which could result in misinterpretation of the facts. For example only two-thirds of the sample mentioned that the vaccine would not protect against all strains of HPV.

Research question 3: What explicit policy decisions and implementation processes were made regarding HPV vaccination by Canadian jurisdictions, at the federal and provincial level?

This question was addressed through the analyses presented in chapter 3, which required piecing together ‘the story’ of how policy decisions were made by examining

different kinds of documents produced by a range of entities. In addition, the review of education materials offers insight into the implementation of the vaccine program.

As best we can tell, it appears that ‘explicit’ policy making around the HPV vaccine began in 2005, before regulatory approval, with the HPV Vaccine Priorities Workshop; this highlighted gaps in knowledge and infrastructure that participants felt needed to be addressed before administration of the vaccine could begin. *Gardasil* was approved by Health Canada in 2006 and NACI published their report in February 2007. NACI recommended use of the vaccine for females aged 9-26 years. The next month, the federal government allocated federal funding for HPV immunization and in September 2007, four provinces began school-based immunization programs. The CIC released their recommendations in December 2007. These recommendations incorporated the findings of the NACI-CIC HPV Working Group, which sought to increase coordination between NACI, and the CIC, and were designed to help the provinces and territories make decisions about the implementation of the vaccine. The CIC recommendations called for a routine, school-based immunization program of females.

In order to understand the policy decision-making process around vaccination in Canada, it is important to appreciate the efforts being made to harmonize immunization programs across provinces and territories. A new body, the Canadian Immunization Committee (CIC) was responsible for developing implementation recommendations from a pan-Canadian perspective, and the HPV vaccine was its first subject. Although the CIC recommendations for P/T implementation were designed to prevent the ‘patchwork’ of policies that had arisen with other vaccination programs, their approach was not successful. Each province and territory implemented their own programs which differed on start date,

cohort vaccinated, catch-up programs and dosing schedule. Perhaps as a result of this disharmony, varying uptake rates have been reported across the provinces.

The educational materials produced by federal and provincial ministries of health and/or public health agencies can be considered not only a major source of information for the public about health interventions, but also as a proxy for the ‘official’ perspectives on HPV vaccination. Our analysis suggested they were generally written at too high a reading level, with some informational aspects emphasized and others largely ignored. For example, issues such as the safety of the vaccine and the link between HPV and cervical cancer were highly covered while the lack of evidence regarding the vaccine’s effect on cervical cancer and concerns about behavioural risk compensation were barely discussed.

Research question 4: In terms of promoting normalization, to what extent has there been congruence between the scientific evidence, policy decision-making, practical implementation, and public discourse about HPV vaccination?

Taking the results of all of the analyses together, we suggest that an overall picture emerges. The scientific evidence, and the reaction to it by the scientific and medical communities, was generally cautious. Many issues were identified that were relevant to considering whether and when to consider developing population immunization programs. Over two thirds of the editorials reviewed had a positive tone towards HPV vaccination, however the majority of the content dealt with negative aspects of vaccination. This indicates an outlook within the scientific and medical communities that fits more with an informed decision-making approach to implementing HPV immunization rather than a normalization approach. This suggests that the scientific and medical ‘expert’ communities, while generally viewing this as a promising intervention, had important reservations about its readiness for general implementation.

Around the time of regulatory approval for the vaccine (2005 and 2006), formal policy advisory bodies were also, in fact, apparently cautious in their approach. The HPV Vaccine Priorities Workshop highlighted gaps in knowledge and infrastructure that should be addressed before considering a vaccine program and NACI tempered its positive recommendations with discussions of factors which might limit its effectiveness, the need for active monitoring of effectiveness, and the need for attention to special populations. This generally cautious approach mirrored many of the points expressed in scientific and medical editorials.

However, following the federal budget allocation of funds for the purchase of *Gardasil*, this caution in policy development seemed to be replaced by great efforts to move forward with vaccination programs. Four provinces decided to roll out their vaccination programs that summer, pre-empting recommendations from CIC, a body whose core mandate was to provide clear guidance to provinces on implementing vaccination programs. Essentially, it is hard to avoid seeing the federal funding as a 'tipping point', in which caution in planning was replaced by concerted efforts to establish population-based HPV vaccination programs. Acknowledging that vaccination programs fall under the jurisdiction of provinces and territories, the reason for the federal funding was the 'need' to 'encourage' the implementation of routine HPV immunization. Specifically, the 2004 Federal Immunization Trust, which resulted in universal P/T implementation of the four funded vaccines, was cited as a successful example which could be repeated for HPV vaccination. The availability of (non-mandatory) funding for the vaccine seemed to make it difficult for provinces and territories to resist including it in their routine vaccination schedules, and the provision of the vaccine free to the target population acts as an endorsement of its value, irrespective of whether its uptake is reinforced by other measures.

The CIC recommendations, issued four months after the first provincial programs began, called for including HPV vaccination in existing school-based programs. Every remaining province and territory but one then did so within the following two years. The final jurisdiction, Nunavut, implemented its program in 2010. It is impossible to judge to how far the recommendations were influenced by the *de facto* decisions already made by some provinces.

While school-based programs offer organizational and financial advantages for immunization compared with primary care-led approaches (e.g. minimizing vaccine wastage), they also provide strong normalizing elements. For example, the HPV vaccine becomes linked with others which have a more established evidence base and a much longer history of being accepted by parents. Also, the provision of the vaccine *literally* in school, a social institution with a high level of trust and responsibility, sends the implicit message that it is safe and useful. Finally, school-based delivery generally limits the ability of individuals in the target population (or their parents) to have a direct discussion with a health care provider as part of their decision-making. Primary care delivery is generally more conducive to individualised informed decision-making than are school-based programs.

The practical policy intent may also be inferred from other attributes of the implementation process. For example, the CIC recommended program goals in the form of targets for vaccine uptake, which we suggest (Chapter 1) are typical of a normalizing intent or approach. The apparent urgency to implement the vaccine by policy-makers, which seemed to involve bypassing established processes, sent a message that this intervention is so important it ‘cannot wait’. This phenomenon has also been observed elsewhere (e.g. Australia and the United States).³⁰⁰

The supportive educational materials were also generally written in a way which not only did not facilitate informed decision-making, but also were rather directive and sent clear normalizing messages. In many ways, the examination of education materials provided the most explicit examples of normalization found.

The discourse evident in the print media also sent a number of normalizing messages. Despite observations that negative media portrayals have harmed uptake rates,^{301, 302} we found that most of the content promoted immunization and a number of implicit themes sent highly normalizing messages, for example the story of HPV vaccine as a ‘scientific breakthrough’ and as an ‘anti-cancer’ shot, along with the idea of vaccination as the action of ‘responsible parents’ who cared about their daughters. HPV vaccination was also repeatedly presented as a way to promote women's health, and associated as an idea with key women's health issues such as contraception and breast cancer. The technological imperative, the idea that ‘we should use the HPV vaccine because it exists’, was evident, and also the argument that ‘other jurisdictions have implemented this so we must too’. The portrayal of cervical cancer as ‘a relatable disease’ was emphasized by the use of first-person narratives from cervical cancer patients and survivors: these promote a reader’s ability to identify with those with cervical cancer and therefore see themselves at risk without vaccination. Finally, critical messages about HPV vaccination tended to be marginalized, with less coverage, placement towards the end of articles, and fewer identifiable proponents.

DISCUSSION

The idea for this thesis arose from discussions about whether the culture of increasing attention to patient autonomy in health care decision making was spreading to public health activities, particularly those which have traditionally been based on more or less paternalistic models. Irrespective of whether one subscribes to the ‘welfarist’ or ‘social justice’ interpretations of the public health ‘mission’, the goal of improving health may, and usually does, demand some compromising of individual liberties, e.g. a loss of autonomy in environmental standards such as clean air legislation or occupational health and safety requirements.³⁰³ The public health approach is founded on systemic implementation of interventions, often a ‘one size fits all’ approach, and occasionally even coercion in which individual liberty is sacrificed to protect the public. This seems to sit at odds with the current trend towards individualism across many areas of public life in general, and its specific reflection in health care with its emphasis on informed decision-making in non-life-threatening situations. An informed decision is one which is based on at least an adequate grasp of the relevant information, and in which an individual’s values, attitudes, and personal preferences are respected.¹¹ If new population preventive programs are to be developed and implemented in a coherent way, it is important to consider the underlying philosophy (‘public health’ or ‘individual’); by clarifying what is to be achieved, and how, this identifies the way in which a program *should* be implemented, where resources need to be directed, and how success (performance) should be judged.

Although ‘public health’ is often linked with ‘prevention’, not all preventive interventions are, or need to be, implemented using the public health model. For example, colorectal cancer screening is generally designed in Canada as a ‘clinical preventive service’,

targeted at individuals, delivered largely through primary care services, and in which the right to decline an offer of screening is clearly communicated in the educational materials. In contrast, some preventive interventions are not only generally organized on a less individualized basis, but in fact can only be delivered at an entire population level (e.g. water fluoridation) or may require high uptake to achieve a ‘population effect’ (e.g. herd immunity through mass immunization).

Thus, conscious efforts to normalize an intervention may be desirable where it depends on individual acceptance, but needs to achieve a threshold uptake level for the population effect, and may be justified when the benefit to harm ratio is overwhelmingly in favour of the former. Conversely, efforts to normalize an intervention, and ‘impose’ a public health model, may be less appropriate where the harms and benefits are disputed, and/or where a population effect is either irrelevant or not achievable.

The thesis reviewed evidence from several angles and tried to determine the policy intent and what actually emerged as a result. Of interest specifically was the apparent promotion (or not) of a normalized approach at the policy level, and how this played out in practice when the vaccine was implemented, and whether a normalizing approach could be justified by the attributes of the intervention. In essence, we found that, while the trial evidence regarding HPV immunization was limited, and the scientific communities’ reaction to it cautious, the policy in Canada rapidly shifted from caution to a normalizing approach which followed through into how it was implemented. These findings do not necessarily point to the actions of any single actor or stakeholder. Often, in fact, normalization occurs without intent (is not consciously built into the process), and almost represents an ‘emergent attribute’. It is impossible to judge whether policy decisions, such as the public funding of the vaccine, were made more to persuade the public to accept the vaccine than to promote

equity of access across provinces and territories and the goal of a ‘harmonious’ vaccination strategy across Canada. Nevertheless, public funding and rapid implementation have the effect of signalling to the public that the government, and the public health community, thinks that they should make use of this intervention. There were certainly some explicit attempts to normalize, most notably the framing and content of the educational materials.

The analysis of HPV vaccination policy development may benefit from the use of a policy framework such as the *Kingdon Multiple Stream Model*. This framework attempts to answer the question, ‘how does an idea’s time come?’ and recognizes that policy formation is not always a linear, rational process. Kingdon’s model describes three streams running in parallel: the problem stream, the policy stream, and the political stream.

The problem stream involves the recognition of a problem. This recognition is often triggered by an event or crisis, or particularly in health policy, a change in an indicator. HPV policy’s ‘problem’ was HPV infection and cervical cancer incidence and mortality, however interestingly policy formation was not preceded by an indicator change. The policy stream is where various stakeholders propose policy solutions to the problem. The policy stream to the problem of HPV and cervical cancer included pap tests and screening and HPV vaccination. The political stream consists of factors such as the public mood, political motivations, elections and interest groups. In order for a policy to be adopted, there needs to be the political will to implement it. In the case of HPV vaccination the political stream included the political advantages of appealing to women’s health and the protection of children, elections including the federal election in February 2006 (which resulted in a change of administration) and the Ontario provincial election in October 2007 and the large amount of media attention given to the issue.

The three streams come together through the availability of a policy window, which is often triggered by a major change such as a disaster or a change of administration. During a policy window a problem is identified, a solution/policy is developed and available, and the political environment makes it the right time for policy change. In the case of HPV vaccination there were two opportunities for policy windows to emerge, one after the development of the vaccine and one after the allocation of federal funding. During the first opportunity the policy stream was still be formulated and the policy stream was not right. However during the second opportunity, all three streams came together and resulted in a policy change.

An extensive review of the literature has found no similar global analyses of normalization within the public health context. However, research has been published similar to some of the individual analyses. We found some work on the attitudes towards, and knowledge of, the HPV vaccine in physicians and other primary care givers.³⁰⁴⁻³⁰⁸ The majority of these studies focused on physicians and found that while they were knowledgeable about the vaccine, a minority lacked knowledge on key areas such as the proportion of cervical cancers and genital warts attributed to the vaccine-targeted HPV strains and whether vaccination was contra-indicated during pregnancy.^{305, 308} Overall the health professionals evaluated were generally positive towards vaccination,^{304, 307, 308} although studies found that they were more likely to vaccinate older over younger individuals^{306, 307} and girls over boys.³⁰⁷ Also female, primary care, and community and private practice physicians were more likely to vaccinate than male, subspecialty and tertiary care physicians.³⁰⁴ Cost was commonly identified by physicians as a barrier to vaccination.^{305, 305} Studies on the attitudes and knowledge of the scientific community as a

whole were lacking with the exception of one review which suggested that the Canadian scientific community was somewhat opposed to widespread HPV vaccination.³⁰⁹

Our analyses of the educational materials were consistent with similar studies on materials related to HPV and cervical cancer. These studies also found educational materials to be lacking in essential content³¹⁰ and written at too high a reading level.¹⁵¹ The lack of availability of HPV and cervical cancer prevention materials for low literacy audiences has been previously identified.^{311, 312} There was a lack of systematic assessment of educational materials which addressed HPV vaccination, possibly due to the newness of the research topic.

One area which has been well covered is the media's response to the HPV vaccine. Frequent areas of interest have been the issues of behavioural risk compensation²⁰⁹ and risk messaging in the media.²⁰⁸ Our findings that the media coverage of HPV vaccination was generally positive to mixed were consistent with previous work.^{207, 209, 210, 313} One study that focused on a similar time period as ours (2006 and 2007) and looked at Canadian and American national newspaper articles also found an increase in negative coverage over time.²⁰⁸

Interventions and implementation: Framework agreement

As discussed above, a major justification for a public health approach to immunization is the population effect, i.e. herd immunity. This means that unimmunized individuals are protected through the actions of the immunized group. In these types of intervention, high uptake is especially desirable, therefore deliberate attempts to normalize, even to the extent of mandatory vaccination, may be justified.^{314, 315}

HPV vaccination was implemented in the same manner as a standard immunization program. This has been such a successful approach to reducing and eliminating certain infectious diseases that it may have become 'hard wired' in the public health mindset, and might even be consolidated by the experience of the effect of anti-vaccination campaigns on the re-emergence of some serious childhood infections.^{21, 316} However, the goal of the HPV vaccine is to prevent cancer, rather than a life or health-threatening acute communicable disease episode. Based on these observations it appears that while HPV vaccination seems to have been treated by the public health community as if it were a traditional immunization program it may be more suited to being approached as a clinical preventive service.

In many key ways, HPV vaccination differs from traditional childhood vaccinations. First, it is not clear that herd immunity can be achieved with this vaccine given the current implementation strategies. At the time of writing, Canadian school-based programs were vaccinating females only. Even if they achieved high coverage rates, the virus will continue to circulate in the population as the entire at-risk population will not have immunity. In addition, the vaccine only targets a limited number of virus types. Other types will continue to exist, circulate and infect. Mathematical modeling has determined that even eradication of only vaccine-targeted HPV strains is not possible under current implementation programs as it would require vaccination of a proportion of the adult population.³¹⁷ Second, the HPV virus itself, unlike other childhood vaccine targeted viruses, does not usually infect children and is not a mortality risk to them. Third, the major goals of HPV vaccination programs in Canada have been clearly articulated as being not about reducing infection but to reduce the incidence and mortality of cervical cancer and its precursors.¹³⁵ Fourth, this vaccine does not possess the same high benefit/low risk profile of other childhood vaccines, because the scientific evidence is not definitive, and there are major issues with acceptability.

On the other hand, HPV vaccination appears to have attributes in common with cancer prevention strategies such as screening. HPV vaccination appears to provide primarily some level of individual benefit (no population effect), so fits more closely with a clinical preventive service model. In addition, there is clear evidence that individual, family and cultural values are very important in the acceptability of the vaccine,³¹⁸⁻³²³ which suggests that an informed decision-making approach would be a better fit. Also, an individualized approach might better promote the overall goal of reducing the incidence and mortality of cervical cancer because it would be possible to tailor important complementary messages about maintaining screening behaviour and a risk reducing approach to sexual activities.

Limitations

In terms of generalizability, this was a case study of a single policy, so its transferability to other public health interventions is unknown.

In terms of methodology, many compromises had to be made because of feasibility limitations. We were not able to use multiple reviewers for all of the content analyses. The content analysis of scientific and medical journals was used as the only method of assessing the discourse within these communities. Other approaches, such as interviews or surveys, would also have been appropriate and would have strengthened the validity of these analyses. There were also very few Canadian editorials written on the subject of HPV vaccination, so the sample was dominated by American and European authors. How far the analysis genuinely reflected the views of the Canadian scientific and medical community is therefore difficult to judge. The review of systematic reviews was restricted to published systematic reviews of randomized controlled trials. While unpublished systematic reviews might, in theory, have led to other conclusions about the efficacy of HPV vaccines, this was

not the main purpose of this section. The goal of the systematic review was to assess the epidemiological evidence *available* to stakeholders and decision-makers at a particular point in time, therefore we judged that concentrating on published reviews would provide the best insight into the evidence readily available to the public health community.

The review of policy development and implementation was severely hampered by the lack of available information. Although we sought to find all documents available in the public domain, some areas, particularly surrounding provincial decision-making, were either lacking documentation or the documents were unavailable. This lack of transparency in immunization program planning has been noted in other work.¹³⁷ We were also unable to fully examine the potential biases, conflicts and external pressures on the policy-making bodies (e.g. NACI, CIC). Another approach could have been key informant interviews with stakeholders and decision-makers. This was not feasible in the context of this project but is a possible future area of research.

The content analysis of media was constrained to the print media, but there are many other sources that influence the public such as television, magazines, advertising, and social media. Similarly, the assessment of educational materials was limited to those available online. We are aware that printed materials such as pamphlets and posters (although there was some overlap between these types and the online material), and television and radio communications, were also used as part of an overall education campaign.

The content analysis of media also only evaluated what can be termed “broadsheet” newspapers. This decision was made in part due to the limited variation in Canadian newspapers and in part to keep this analysis feasible and of a reasonable size. The inclusion of a more “tabloid” newspaper may have changed the results, as these types of papers tend to favour shorter, attention-getting articles, over longer, more nuanced reports. This may have

resulted in more negative or sensational reports (i.e. more coverage of adverse effects stories) than we found in our analysis.

In addition, this study only evaluated English-language systematic reviews, documents, articles and materials. This limited our ability to assess, in particular, discourse within the francophone media and policy development within Quebec. Given that understanding cultural differences is important in interpreting concepts of benefits and harms, acceptability and barriers, this is a major limitation.

CONCLUSIONS

The scientific evidence suggests HPV vaccination could have great potential for the reduction of HPV infection and its associated cancers. While the evidence behind its effectiveness as a cervical cancer prevention strategy is still limited, it has been embraced by public health policy-makers in Canada. It was implemented in a manner similar to other childhood vaccines, with evidence of efforts made to normalize it in order to encourage uptake. Normalizing forces also emerged from areas such as the media. Although it is early in its implementation history, there is some evidence that uptake rates are lower than hoped for, and that many individuals and communities have reservations about its appropriateness. There are also clear arguments that the vaccine could have been approached as an individualized, clinical preventive service model, and that this might have been more consistent with the nature of the intervention and would have helped address the broader issues which may limit its uptake. Policy making and implementation of public health services is complex and involves multiple stakeholders and actors. Coupled with this, the nature of the ‘contract’ between the ‘public’ and those responsible for health services has

been shifting towards a model where individual autonomy is given more prominence.

Emerging preventive technologies may challenge the traditional distinction between ‘public health services’ and ‘health care services’. An appreciation is necessary of the relationship between the core aim of a service (population or individual), the direction of resources towards achieving that aim effectively, and how success in the policy goal is defined and measured.

References

- (1) Rimal R, Real K. Understanding the influence of perceived norms on behaviors. *Communication Theory* 2003;13(2):184-203.
- (2) Foucault M. *Discipline and Punish: The Birth of the Prison*. Gallimard; 1977.
- (3) Foucault M. *Politics, philosophy, culture: Interviews and other writings of Michel Foucault, 1977-1984*. New York: Routledge; 1988.
- (4) Foucault M. *Foucault Reader*. New York: Pantheon; 1984.
- (5) Ellickson RC. The Evolution of Social Norms: A Perspective from the Legal Academy. In: Hechter M, Opps K-D, editors. *Social Norms*. New York: Russell Sage Foundation Press; 2006.
- (6) Nettleton S, Gustafsson U. *The Sociology of Health and Illness*. Cambridge: Polity Press; 2002.
- (7) Walters K. Stigma, shame and blame experienced by patients with lung cancer: non-smoker status should also be declared. *Br Med J* 2009;329(7462):403.
- (8) Feuchtbaum L, Cunningham G, Sciortino S. Questioning the need for informed consent: A case study of California's experience with a pilot newborn screening research project. *J Empir Res Hum Res Ethics* 2007;2(3):3-14.
- (9) Gostin LO, Gostin LO. A broader liberty: J.S. Mill, paternalism and the public's health. *Public Health* 2009;123(3):214-221.
- (10) O'Connor AM, Stacey D, Entwistle V, Llewellyn-Thomas H, Royner D. Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev* 2003;2(CD001431).
- (11) Bekker H, Thornton J. Informed decision making: an annotated bibliography and systematic review. *Health Technology Assessment* 1999;3(1).
- (12) Wilson JMG, Jungner G. Principles and practice of screening for disease. *Public Health Paper Number 34*. Geneva: WHO; 1968.
- (13) UK National Screening Committee. Criteria for appraising the viability, effectiveness and appropriateness of a screening programme. <http://www.screening.nhs.uk/criteria> 2010.
- (14) Kenny N. Value (s) for money? Assessing Romanow and Kirby. *Healthc Pap* 2004;4(4):28-34.
- (15) Canada Health Action: Building on the Legacy. *National Forum on Health* 2007.

- (16) Giacomini M, Hurley J, Gold I, et al. The policy analysis of 'values talk': lessons from Canadian health reform. *Health Policy* 2004;67:15-24.
- (17) Coulter A. Paternalism or partnership? Patients have grown up - and there's no going back. *BMJ* 1999;319:719-720.
- (18) Giddens A. *Modernity and Self Identity: Self and Society in the Late Modern Age*. Cambridge: Polity Press; 1991.
- (19) Lupton D. 'Your life in their hands': Trust in the Medical Encounter. In: Gabe J, James V, editors. *Health and the Sociology of Emotion, Sociology of Health and Illness Monograph Series*. Oxford: Blackwell; 1996.
- (20) Cunningham-Burley S. Public knowledge and public trust. *Community Genet* 2006;9:204-210.
- (21) Boyce T. *Health, Risk and News: The MMR vaccine and the media*. New York: Peter Lang; 2007.
- (22) Giacomini M, Baylis F, Robert J. Banking on it: Public policy and the ethics of stem cell research and development. *Soc Sci Med* 2007;65(7):1490-1500.
- (23) Kluge EW. Comparing healthcare systems outcomes, ethical principles and social values. *MedGenMed* 2007;9(4):29.
- (24) Giacomini M, Kenny N, DeJean D. Ethics frameworks in Canadian health policies: Foundation, scaffolding or window dressing? *Health Policy* 2009;89(1):58-71.
- (25) Kenny N, Sherwin S, Baylis F. Re-visioning public health ethics: a relational perspective. *Can J Public Health* 2010;101(1):9-11.
- (26) Ontario Seniors Secretariat. A Guide to Advance Care Planning. <https://www.culture.gov.on/seniors/english/programs/advancedcare/> 2010.
- (27) Ontario Newborn Screening Program. Frequently Asked Questions. http://www.newbornscreening.on.ca/bins/content_page.asp?cid=6-16#question%203 2010.
- (28) Haydon J. Genetics: uphold the rights of all clients to informed decision-making and voluntary action. *Nurs Stand* 2005;20(3):48-51.
- (29) Aston R. Genetic counselling must be non-directive. *BMJ* 1998;317(7150):82.
- (30) Oduncu FU. The role of non-directiveness in genetic counselling. *Med Health Care Philos* 2008;5(1):53-63.
- (31) Clarke A. Is non-directive genetic counselling possible? *Lancet* 1991;338:908-1001.
- (32) Michie S, Bron F, Bobrow M, Martineau TM. Nondirectiveness in genetic counseling: an empirical study. *Am J Human Gen* 1997;60(1):40-47.

- (33) Rentmeester. Value neutrality in genetic counselling: An unattained ideal. *Med Health Care Philos* 2001;41:47-51.
- (34) Williams C, Alderson P, Farisides B. Is nondirectiveness possible within the context of antenatal screening and testing? *Soc Sci Med* 2002;54:339-347.
- (35) Raffle AE. Information about screening - is it to achieve high uptake or to ensure informed choice? *Health Expect* 2001;4(2):92-98.
- (36) Trottier H, Franco EL. The epidemiology of genital human papillomavirus infection. *Vaccine* 2006;24(Suppl 1):S1-S15.
- (37) Morris SR. HPV vaccine strategies: The cost of HPV and the choice of vaccine. *Sex Transm Infect* 2009;85(5):315-316.
- (38) Miller M, Wilson J, Waldrop J. Current acceptance of the HPV vaccine. *The Nurse Practitioner* 2008;33(4):19-22.
- (39) Kahn J. Vaccination as a prevention strategy for human papillomavirus-related diseases. *J Adolesc Health* 2005;37(68):S10-S16.
- (40) Wheeler CM. Natural history of human papillomavirus infections, cytological and histological abnormalities and cancer. *Obstet Gynecol* 2008;35:519-536.
- (41) Castellsague X. Natural history and epidemiology of HPV infection and cervical cancer. *Gynaecologic Oncology* 2008;110:S4-S7.
- (42) Morris SK, Nguyen CK. The human papillomavirus vaccine in Canada. *Canadian Journal of Public Health* 2008;99(2):114-116.
- (43) Public Health Agency of Canada. National Cancer Institute of Canada. *Canadian Cancer Statistics* 2010.
- (44) Lippman A, Melnychuk R, Shimmin BJ. Human papillomavirus, vaccines and women's health. *Canadian Medical Association Journal* 2007;177(5):484-487.
- (45) Elfgrén K, Kalantri M, Moberger B. A population-based five-year follow-up study of cervical human papillomavirus infection. *Am J Obstet Gynecol* 2000;183:561-567.
- (46) James PD, Wilkins R, Detsky AS. Avoidable mortality by neighbourhood income in Canada: 25 years after the establishment of universal health insurance. *Journal of Epidemiology and Community Medicine* 2007;61(287):296.
- (47) World Health Organization. *Cervical Cancer, human papillomavirus (HPV), and HPV vaccines: Key points for policy makers and health professionals*. 2007.
- (48) Schlecht NF, Kuluga S, Robitaille J. Persistent human papillomavirus infection as a predictor of cervical intraepithelial neoplasia. *JAMA* 2001;286:2106-2114.

- (49) Castellsague K, Bosch FX, Gongalez CA. Environmental co-factors in HPV carcinogenesis. *Virus Research* 2005;89:191-199.
- (50) Garcia-Closas T, Bosch FX, Gongalez CA. The role of diet and nutrition in cervical carcinogenesis: A review of recent evidence. *International Journal of Cancer* 2005;117(4):629-637.
- (51) Cohen J. High hopes and dilemmas for cervical cancer vaccine. *Science* 2005;308:618-621.
- (52) Whitlock EP, Lin J, Chou R, Shekelle P, Robinson KA. Using existing systematic reviews in complex systematic reviews. *Annals of Internal Medicine* 2008;148(10):776-782.
- (53) White CM, Ip S, McPheeters M. Using existing systematic reviews to replace de novo processes in conducting Comparative Effectiveness Reviews. *Agency for Healthcare Research and Quality: Methods Guide for Comparative Effectiveness Reviews*. Rockville, MD: 2009.
- (54) Shea BJ, Grimshaw HM, Wells GA, Wells. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. *BMC Med Res Meth* 2007;7:7-10.
- (55) Koutsky LA, Ault KA, Wheeler CM. A controlled trial of a human papillomavirus types 16 vaccine. *N Engl J Med* 2002;347:1645-1651.
- (56) Harper DM, Franco EL, Wheeler C, Wheeler CM. Efficacy of a bivalent L1 virus-like particle vaccine in prevention of infection with human papillomavirus types 16 and 18 in young women: a randomized controlled trial. *Lancet* 2004;361:1757-1765.
- (57) Paavonen J, Jenkins D, Bosch FX, Bosch FX. Efficacy of prophylactic adjuvanted bivalent L1 virus-like particle vaccine against infection with human papillomavirus types 16 and 18 in young women: an interim analysis of a phase III double-blind, randomized controlled trial. *Lancet* 2007;369:2161-2170.
- (58) Rambout L, Hopkins L, Hutton B, Fergusson D. Prophylactic vaccination against human papillomavirus infection and disease in women: a systematic review of randomized controlled trials. *CMAJ* 2007;177(5):469-479.
- (59) Medeiros L, Rosa DD, de Rosea MI, Bozzetti MC, Zanini RR. Efficacy in human papillomavirus vaccines. *International Journal of Gynecological Cancer* 2009;19(7):1166-1176.
- (60) La Torre G, de Waure C, Chiaradia C, Mannocci A, Ricciardi W. HPV vaccine efficacy in preventing persistent cervical HPV infection: A systematic review and meta-analysis. *Vaccine* 2007;25:8354-8358.

- (61) Brown DR, Fife KH, Wheeler CM, Koutsky. Early assesement of the efficacy of a human pappilomavirus type 16 L1 virus-like particle vaccine. *Vaccine* 2004;22(21-22):2936-2942.
- (62) Harper DM, Franco EL, Wheeler CM, et al. Sustained efficacy up to 4,5 years of a bivalent Li virus-like particle vaccine against human papillomavirus types 16 and 18: a follow-up from a randomized control trial/. *Lancet* 2006;367(9518):1247-1255.
- (63) Hildesheim A, Herrero R, Wacholder S, Waldrop J. Effects of human papillomavirus 16/18 L1 viruslike particle vaccine among women with preexisting infection. *JAMA* 2007;15:743-753.
- (64) Villa LL, Costa RL, Petta CA, Petta C. Prophylactic quadrivalent human papillomavrisu (types 6, 11, 16 and 18) L1 virus-like particle vaccine in young women: a randomized double-blind placebo-controlled multicentre phase II efficacy trial. *Lancet Oncol* 2005;6:272-278.
- (65) Mao C, Koutsky LA, Ault KA, et al. Efficacy of human papillomavirus-16 vaccine to prevent cervical intraepithelial neoplasia: a randomized controlled trial. *Obstet Gynecol* 2006;107(1):18-27.
- (66) Garland SM HAMWC, Wheeler C. Females United to Tnilaterally Reduce Endo/Ectocervical Disease (FUTURE) I Investigators. Quadrivalent vaccine against human papilloamvirs to prevent anogential diseases. *N Engl J Med* 2007;356:1928-1943.
- (67) Villa LL, Costa RL, Petta CA, Paavonen J. High sustained efficacy of a prophyactic quadrivalent human papillomavirus types 6/11/16/18 L1 virus-like particle vaccine through 5 years of follow up. *Br J Cancer* 2006;95(11):1459-1466.
- (68) FUTURE II Study Group. Quadrivalent vaccine against human papillomavirus to prevent high-grade cervical lesions. *N Engl J Med* 2007;356:1915-1927.
- (69) Smith R. *The trouble with medical journals*. London: The Royal Society of Medicine Press; 2006.
- (70) Denzin NK, Yvonna SL. *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage Publications; 1994.
- (71) Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts procedures and measures to achieve trustworthiness. *Nurse Educ Today* 2004;24(2):105-112.
- (72) Roland K, Larkins TK, Benard VB, Berkowitz Z, Saraiya M. Content analysis of continuing medical education for cervical cancer screening. *J Women's Health* 2010;13(4):651-655.

- (73) Porta M. The improbable plunge. What facts refute reasons to expect that the effectiveness of HPV vaccination programs to prevent cervical cancer could be low? *Prev Med* 2009;48(5):407-410.
- (74) Forman SF, Woods ER. Human papilloma virus vaccine: a new frontier or political controversy? *Current Opinion in Pediatrics* 2007;19(4):387-388.
- (75) de Melo-Martin I. The promise of the Human Papillomavirus vaccine does not confer immunity against ethical reflection. *The Oncologist* 2006;11:393-396.
- (76) Hoops K, Twigg L. Human papillomavirus vaccination: The policy debate over the prevention of cervical cancer - A commentary. *American Soc for Colposcopy and Cervical Pathology* 2008;12(3):181-184.
- (77) Lo B. HPV vaccine and adolescents' sexual activity. *Br Med J* 2006;332(7550):1106-1107.
- (78) Lo B. Human papillomavirus vaccination programs. *BMJ* 2007;335(7616):357-358.
- (79) Waller J, Wardle J. HPV vaccination in the UK. *BMJ* 2008;336(7652):1028-1029.
- (80) Cameron JC, Wallace LA, Ahmed S, Duff R, Donaghy M, Goldberg DJ. HPV vaccine: Positive insights from universal adolescent HepB vaccination. *J Epidemiol Community Health* 2007;61(12):1018-1019.
- (81) Hoffner B. Vaccination against the Human Papillomavirus: the lessons we have not learned. *Vaccine* 2009;27(16):2195-2198.
- (82) Markman M. HPV vaccination and the prevention of cervical cancer: The long road ahead. *J Women's Health* 2007;16(9):1366-1367.
- (83) MacDonald N, Stanbrook MB, Hebert PC. Human papillomavirus vaccine risk and reality.[comment]. *CMAJ Canadian Medical Association Journal* 2008;179(6):503.
- (84) McGee G, Johnson S. Has the spread of HPV vaccine marketing conveyed immunity to common sense? *Am J Bioethics* 2007;7(7):1-2.
- (85) Outtersen K. Foreword--Will HPV vaccines prevent cervical cancers among poor women of color?: global health policy at the intersection of human rights and intellectual property law. *Am J Law Med* 2009;35(2-3):247-252.
- (86) Kahn JA. Maximizing the Potential Public Health Impact of HPV Vaccines: A Focus on Parents. *J Adolesc Health* 2007;40(2):101-103.
- (87) Gostin LO, DeAngelis CD. Mandatory HPV vaccination: Public health vs private wealth. *Journal of the American Medical Association* 2007;297(17):1921-1923.

- (88) Hawks JH. Cancer prevention or parents' rights? *Urologic Nursing* 2007;27(2):110-111.
- (89) Colgrove J. The ethics and politics of compulsory HPV vaccination. *The New England Journal of Medicine* 2006;355(23):2389-2391.
- (90) Meyers ER. HPV vaccine: Now that they're here, how do we maximize their benefit? *Contraception* 2006;74(4):277-279.
- (91) Szarenwki A. Prophylactic vaccines for human papillomavirus: a bright future for cervical cancer prevention. *J Med Screen* 2005;12(4):165-163.
- (92) Haber G, Malow RM, Zimet GD. The HPV Vaccine Mandate Controversy. *J Pediatr Adolesc Gynecol* 2007;20(6):325-331.
- (93) Rolling out HPV vaccines worldwide. *Lancet* 2006;367(9528):2034.
- (94) Somasundaram K. HPV vaccine: End to women's major health problem? *Indian J Med Res* 2008;127(6):511-513.
- (95) Arya N. Canada's not ready for universal HPV immunization. *National Review of Medicine* 2007;4(16).
- (96) Wynia M. Public health. public trust and lobbying. *The American Journal of Bioethics* 2007;7(6):4-7.
- (97) Flogging Gardasil. *Nature Biotechnology* 2007;25(3):261.
- (98) De Soto J. Should HPV vaccination be mandatory? *J Fam Pract* 2007;56(4):267-268.
- (99) Hammoud M. HPV vaccine: Not immune to controversy. *Int J Gynecol Obstet* 2008;101(2):123-124.
- (100) Mariani L, Pagliusi S. Vaccination and screening programs: harmonizing prevention strategies for HPV-related diseases. *Journal of Experimental & Clinical Cancer Research* 2008;27:84.
- (101) Bosch FX. Broad-spectrum human papillomavirus vaccines: new horizons but one step at a time. *J Natl Cancer Inst* 2009;101(11):771-773.
- (102) Should HPV vaccines be mandatory for all adolescents? *Lancet* 2006;368(9543):1212.
- (103) Lippman A. Human papillomavirus (HPV) vaccination and the development of public policies. *J Epidemiol Community Health* 2008;62(7):570-571.
- (104) MacDonald N, Hebert PC. Human papillomavirus vaccine: waiting for a miracle. *CMAJ* 2007;177(5):433.

- (105) Lowndes CM, Gill ON. Cervical cancer, human papillomavirus, and vaccination. *BMJ* 2005;331(7522):915-916.
- (106) Haug C. Human papillomavirus vaccination - Reasons for caution. *N Eng J Med* 2008;359(8):861-862.
- (107) Frazer IH. HPV immunisation: A significant advance in cancer control. *Gynecol Oncol* 2007;107(2 SUPPL.).
- (108) Kiviat NB, Hawes SE, Feng Q. Screening for cervical cancer in the era of the HPV vaccine - The urgent need for both new screening guidelines and new biomarkers. *J Natl Cancer Inst* 2008;100(5):290-291.
- (109) Lippman A, Boscoe M, Scurfield C. Do you approve of spending \$300 million on HPV vaccination?: no.[comment]. *Canadian Family Physician* 2008;54(2):175.
- (110) Baden LR, Curfman GD, Morrissey S, Drazen JM. Human papillomavirus vaccine--opportunity and challenge. *New Engl J Med* 2007;356(19):1990-1991.
- (111) Haug C. The risks and benefits of HPV vaccination. *J Am Med Assoc* 2009;302(7):795-796.
- (112) Smith-McCune KK. Human papillomavirus vaccine efficacy: aligning expectations with reality.[comment]. *Gynecol Oncol* 2008;111(1):1-2.
- (113) Noller KL. HPV vaccination: More questions than answers. *Obstet Gynecol* 2006;107(1):4-5.
- (114) Lippman A. Rebuttal: Do you approve of spending \$300 million on HPV vaccination. No. *Can Fam Physician* 2008;54(3):343.
- (115) Sawaya GF, Smith-McCune K. HPV vaccination - More answers, more questions. *New Engl J Med* 2007;356(19):1991-1993.
- (116) Pfleiderer M. Introducing human papillomavirus (HPV) vaccination - a challenge for European Vaccine Advisory Committees and Public Health Services. *Euro Surveill* 2008;13(33).
- (117) Meyers ER. The economic impact of HPV vaccines: not just cervical cancer. *Am J Obstet Gynecol* 2008;198(5):487-488.
- (118) Parsons J. Preventing cervical cancer. *Aust Fam Physician* 2007;36(3):101.
- (119) O'Connor K. Herd immunity. *Aust Fam Physician* 2007;36(9):677.
- (120) Steben M. Do you approve of spending \$300 million on HPV vaccination? Yes. *Canadian Family Physician* 2008;54(2):174.

- (121) Steben M. Rebuttal: Do you approve of spending \$300 million on HPV vaccination. Yes. *Can Fam Physician* 2008;54(3):342.
- (122) Erickson LJ, De Wals PD, Farand L. An analytical framework for immunization programs in Canada. *Vaccine* 2005;23:2470-2476.
- (123) Halperin S, Pianosi K. Immunization in Canada: A 6 year update. *Journal of the Canadian Chiropractic Association* 2010;54(2):85-91.
- (124) Dobson S. How does the National Advisory Committee on Immunization operate. <http://www.inspq.qc.ca/aspx/docs/jasp/presentations/2006/JASP2006-Immunisation-SDeeks2-9 PDF> 201.
- (125) Evidence-based recommendations for immunization - Methods of the National Advisory Committee on Immunization. *CCDR* 2009;35(ACS-1).
- (126) Public Health Agency of Canada. Federal Role in Immunization. <http://www.phac-aspc.gc.ca/cnic-ccni/2010/fed-role-eng.php> 2011.
- (127) Keelan JE. Concurrency in public health governance: The case of the National Immunization Strategy. *The Role of Federalism in Protecting the Public's Health*. Kingston: Queens University; 2008.
- (128) Keelan J, Lazar H, Wilson K. The National Immunization Strategy - A model for resolving jurisdictional disputes in public health. *Canadian Journal of Public Health* 2008;99(5):376-379.
- (129) Pan-Canadian Public Health Network. The role of expert groups. http://www.phn-rsp.ca/Groups_e.html 2011.
- (130) Canadian Institutes of Health Research. Proceedings of the Influenza Research Priorities Workshop. <http://www.cihr-irsc.gc.ca/e/30967.html> 2011.
- (131) Public Health Agency of Canada. Canadian Human Papillomavirus Vaccine Research Priorities Workshop - Final report. *CCDR* 2005;32S1(66).
- (132) Health Canada: Health Products and Food Branch. Gardasil, Quadrivalent Human Papillomavirus (6,11,16,18) Recombinant Vaccine. *Summary Basis of Decision* 2007.
- (133) National Advisory Committee on Immunization. Statement on Human Papillomavirus Vaccine. *Canada Communicable Disease Report* 2007;33(ACS-2).
- (134) Building on the legacy of vaccines in Canada: Value, opportunities and challenges. http://www.biotech.ca/uploads/vic/vaccines_5_2010.pdf 2011.

- (135) Canadian Immunization Committee. Recommendations on a Human Papillomavirus Immunization Program. 2007.
- (136) Parliament of Canada. Bill C-52. http://www2.parl.gc.ca/HousePublications/Publication.aspx?Language=E&Parl=39&Ses=1&Mode=1&Pub=Bill&Doc=C-52_3&File=185#52 2007.
- (137) Hammond G. The ABCs ... of new vaccine program development in Canada. *Canadian Immunization Conference* 2008.
- (138) Legislative Assembly of Ontario. Committee Transcripts: Standing Committee on Finance and Economic Affairs. http://www.ontla.on.ca/web/committee-proceedings/committee_transcripts_details.do?DocumentID21978 2007.
- (139) Parliament of Canada. 39th Parliament, 1st Session: Standing Committee on Health. <http://www2.parl.gc.ca/HousePublications/Publication.aspx?DocId=2912923&Language=E&Mode=1&Parl=39&Ses=1> 2007.
- (140) A patchwork policy: vaccination in Canada. *CMAJ* 2003;168(5):533.
- (141) Public Health Agency of Canada. Publicly funded immunization programs in Canada - Routine schedule for infants and children including special programs and catch-up programs. <http://www.phac-aspc.gc.ca/im/ptimprog-progimpt/table-1-eng.php> 2011.
- (142) Healthlink BC. HPV Health Care Professional Q and A. http://www.immunizebc.ca/NR/rdonlyres/3131AD44-793D-4E2E-8838-6DF163A56AFC/46952/HPVprofessionalQA_Sept2_final.pdf 2011.
- (143) Pasut G. An HPV Dialogue: Advancing research and policy in Ontario. *Cancer Care Ontario* 2009.
- (144) Johnson S. *Cancer-related information seeking*. Cresskill, NJ: Hampton Press; 1997.
- (145) James C, James N, Davies D, Hawes SE. Preferences for different sources of information about cancer. *Patient Education and Counseling* 1999;37:273-282.
- (146) Messiner HI, Potosky AL, Convisser R. How sources of health information related to knowledge and use of cancer screening exams. *J Community Health* 1992;17:153-165.
- (147) Baer H, Allen S, Braun L. Knowledge of human papillomavirus infection among young adult men and women: implications for health education and research. *J Community Health* 2000;25(1):67-78.
- (148) Klug SJ, Hukelmann J, Blettner M. Knowledge about infection with human papillomavirus: a systematic review. *Prev Med* 2008;46(2):87-98.

- (149) Holcomb B, Bailey JM, Crawford K, Crad. Adults' knowledge and behaviours related to human papillomavirus infection. *J Am Board Fam Pract* 2004;17:26-31.
- (150) Waller J, McCaffery K, Wardle J. Beliefs about the risk factors for cervical cancer in a British population sample. *Prev Med* 2004;38:745-753.
- (151) Brandt HM, McCree DH, Lindley LL, Sharpe PA, Hutto BE. An evaluation of printed HPV educational materials. *Cancer Control* 2005;Cancer, Culture and Literacy Supplement:103-106.
- (152) Shieh C, Hosei B. Printed health information materials: Evaluation of readability and suitability. *Journal of Community Health Nursing* 2008;25:73-90.
- (153) Weintraub D, Maliski SL, Fink A, Choe S, Litwin MS. Suitability of prostate cancer education materials: Applying a standardized assessment tool to currently available materials. *Patient Education and Counseling* 2004;55(2):275-280.
- (154) Graber MA, Roller CM, Kaebler B. Readability levels of patient education material on the world wide web. *J Fam Pract* 1999;48(1):58-61.
- (155) Menghini KG. Designing and evaluating parent educational materials. *Advances in Neonatal Care* 2005;5(5):273-283.
- (156) Wallace LS, Turner LW, Ballard JE, Keenum AJ, Weiss BD. Evaluation of web-based osteoporosis educational materials. *J Women's Health* 2005;14(10):936-942.
- (157) Makosky DC, Cowan P, Nollen NL, Greiner KA, Choi WS. Assessing the scientific accuracy, readability, and cultural appropriateness of a culturally targeted smoking cessation program for American Indians. *Health promotion practice* 2009;10(3):386-393.
- (158) Kollar LM, Kahn JA. Education about human papillomavirus and human papillomavirus vaccines in adolescents. *Current Opinion in Obstetrics and Gynecology* 2008;20(5):479-483.
- (159) Marlow LAV, Wardle J, Grant N, Waller J. Human papillomavirus (HPV) information needs: A theoretical framework. *J Fam Plann Reprod Health Care* 2009;35(1):29-33.
- (160) Wong LP. Preventing cervical cancer through human papillomavirus vaccination: perspective from focus groups. *J Low Genit Tract Dis* 2009;13(2):85-93.
- (161) Goldsmith MR, Bankhead CR, Kehoe ST, Marsh G, Austoker J. Information and cervical screening: a qualitative study of women's awareness, understanding and information needs about HPV. *J Med Screen* 2007;14(1):29-33.

- (162) Waller J, Marlow LA, Wardle J. Mother's attitudes towards preventing cervical cancer through human papillomavirus vaccination: a qualitative study. *Cancer Epidemiol Biomarkers Prev* 2006;15(7):1257-61.
- (163) Zimet GD. Improving adolescent health: focus on HPV vaccine acceptance. *J Adolesc Health* 2005;37(6 Suppl):S17-23.
- (164) Zimet GD. Understanding and overcoming barriers to human papillomavirus vaccine acceptance. *Curr Opin Obstet Gynecol* 2006;18(Suppl 1):S23-28.
- (165) Flesch R. A new readability yardstick. *Journal of Applied Psychology* 1948;32:221-223.
- (166) Gunning R. *The technique of clear writing*. New York: McGraw-Hill International Book Co.; 1952.
- (167) McLaughlin G. SMOG grading: A new readability formula. *Journal of Reading* 1969;12:639-646.
- (168) Meade C, Smith CF. Readability formulas: Cautions and criteria. *Patient Education and Counseling* 1991;17:153-158.
- (169) Giorgianni SJ. Responding to the challenge of health literacy. *Pfizer J* 1998;2:23-31.
- (170) Kagawa-Singer. Improving the validity and generalizability of studies with underserved US populations: expanding the research paradigm. *Ann Epidemiol* 2000;10:92-103.
- (171) Doak CG, Doak LG, Root JH. Suitability assessment of materials (SAM). Washington D.C 1994.
- (172) Doak CG, Doak LG, Root JH. *Teaching patients with low literacy skills*. Philadelphia: JB Lippincott Company; 1996.
- (173) Smith PT, Cason CL. Suitability of patient education materials for cardiac catheterization. *Clinical Nurse Specialist* 1998;12(4):140-144.
- (174) Murphy PW, Chesson AL, Berman SA, Arnold CL, Galloway G. Neurology patient education materials: Do our educational aids fit our patients' needs? *Journal of Neuroscience Nursing* 2001;33(2):99-104.
- (175) Wallace LS, Turner LW, Ballard JE, Keenum AJ, Weiss BD. Evaluation of web-based osteoporosis educational materials. *J Women's Health* 2005;14(10):936-942.
- (176) Wilson FL. The suitability of United States pharmacopoeia dispensary information psychotropic drug leaflets for urban patients with limited reading skills. *Archives of Psychiatric Nursing* 1999;13(4):204-211.

- (177) Chesson AL, Murphy PW, Arnold CL, Davis TC. Presentation and reading level of sleep brochures: Are they appropriate for sleep disorders patients? *SLEEP* 1998;156:625-626.
- (178) Rees C, Ford JE, Sherad CE. Patient information leaflets for prostate cancer: Which leaflets should healthcare professionals recommend? *Patient Education and Counseling* 2003;49:263-272.
- (179) Richie J, Spencer L. Qualitative data analysis for applied policy research. In: Bryman A, Burgess RG, editors. *Analyzing Qualitative Data*. 1994. 305.
- (180) Clarke J, Everest M. Cancer in the mass print media: Fear, uncertainty and the medical model. *Social Science & Medicine* 2006;62:2591-2600.
- (181) New Brunswick Health. Be informed: Have your daughter immunized against HPV. <http://www.gnb.ca/0053/hpv/pdf/5428e.pdf> 2010.
- (182) Prince Edward Island Department of Health. Fact Sheet: Human papillomavirus (HPV) Vaccine. <http://www.gov.pe.ca/publications/getpublication.php3?number=1403> 2010.
- (183) Ministère de la Santé et des Services Sociaux. Free Vaccination Programs in Grade 4, Elementary School: Human Papillomavirus (HPV) for girls only. <http://publications.msss.gouv.qc.ca/acrobat/f/documentation/2010/10-291-01A.pdf> 2010.
- (184) Manitoba Health. HPV Questions and Answers for the General Public. <http://www.gov.mb.ca/health/publichealth/cdc/sti/hpvfaq.html> 2010.
- (185) Health Link BC. HPV: Should my daughter get the vaccine. <http://www.healthlinkbc.ca/kb/inc/custom/suppressed.asp?r=/kb/content/decisionpoint/uz2098.html#bo1048> 2010.
- (186) Public Health Agency of Canada. Human papillomavirus (HPV) prevention and HPV vaccine: Questions and Answers. <http://www.phac-aspc.gc.ca/std-mts/hpv-vph/hpv-vph-vaccine-eng.php> 2010.
- (187) Ontario Ministry of Health and Long-Term Care. Human Papillomavirus (HPV) Vaccination Program for Grade 8 Females: What you need to know. http://www.health.gov.on.ca/en/ms/hpv/docs/fact_sheets/HPV_Fact_Sheet_English.pdf 2010.
- (188) Health Link BC. Human Papillomavirus (HPV) vaccine. <http://www.healthlinkbc.ca/healthfiles/hfile101b.stm> 2010.
- (189) Saskatchewan Ministry of Health. Human Papillomavirus Vaccine. <http://www.health.gov.sk.ca/adx.aspx/adxGetMedia.aspx?DocID=2765,94,88,Documents&MediaID=4856&Filename=hpv-vaccine-aug-2010.pdf&l=English> 2010.

- (190) Healthlink Alberta. Human Papillomavirus Vaccine: Important information about this vaccine. <http://www.health.alberta.ca/documents/immunize-HPV-vaccine.pdf> 2010.
- (191) Health Canada. It's your health: Human Papillomavirus (HPV). <http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/diseases-maladies/hpv-vph-eng.php> 2010.
- (192) Ministère de la Santé et des Services Sociaux. I've heard about HPV: Vaccination against human papillomavirus (HPV). <http://publications.msss.gouv.qc.ca/acrobat/f/documentation/2010/10-291-02A.pdf> 2010.
- (193) Ontario Ministry of Health and Long-Term Care. Ontario's Grade 8 HPV Vaccination Program: Frequently Asked Questions. http://www.health.gov.on.ca/en/ms/hpv/expert_qa.aspx 2010.
- (194) Ontario Ministry of Health and Long-Term Care. Ontario's Grade 8 HPV Vaccination Program: Girl Talk FAQ. http://www.health.gov.on.ca/en/ms/hpv/docs/hpv_girltalk_faq.pdf 2010.
- (195) Newfoundland and Labrador Department of Health and Community Services. Protection from Human Papillomavirus. http://www.health.gov.nl.ca/health/publichealth/cdc/Protect_against_HPVPDF.pdf 2010.
- (196) Nova Scotia Health Promotion and Protection. The FACTS about Human Papillomavirus (HPV) and the HPV vaccine. http://www.gov.ns.ca/hpp/publications/13122_HPVPFacts_Jun08_En.pdf 2010.
- (197) Public Health Agency of Canada. The FACTS on the Safety and Effectiveness of HPV Vaccine. <http://www.phac-aspc.gc.ca/std-mts/hpv-vph/fact-faits-vacc-eng.php> 2010.
- (198) Priess RW, Gayle B, Burell N, Allen M, Jennings B. *Mass Media Effects Research: Advances Through Meta-Analysis*. Mahwah, New Jersey: Lawrence Erlbaum Associates; 2007.
- (199) McCombs M. *Setting the Agenda: The Mass Media and Public Opinion*. Cambridge: Polity Press; 2004.
- (200) Hornik R. Public health education and communication as policy instruments for bringing about change in behaviour. In: Goldberg ME, Fishbein M, Middlestadt SE, editors. *Social marketing: theoretical and practical perspectives*. Mahwah, NJ: Lawrence Erlbaum Associates; 1997. 45-58.
- (201) Phillips DP, Kanter EJ, Bednarczyk B, Tostad PL. Importance of the lay press in the transmission of medical knowledge to the scientific community. *N Eng J Med* 1991;325:1180-1183.
- (202) Jordan D. Newspaper effects on policy preferences. *Public Opin Q* 1993;57:191-204.

- (203) McCombs M, Shaw DL. The agenda-setting function of the mass media. *Public Opin Q* 1972;36:176-187.
- (204) Yanovitzky I, Blitz CL. Effect of media coverage and physician advice on utilization of breast cancer screening by women 40 years and older. *J Health Commun* 2000;5:117-134.
- (205) Canadian Newspaper Association. Daily newspaper circulation data. <http://www.cna-acj.ca/en/daily-newspaper-paid-circulation-data> 2010.
- (206) Anhang R, Stryker JE, Wright TC, Goldie SJ. News media coverage of human papillomavirus. *Cancer* 2003;100(2):308-314.
- (207) Hilton S, Hunt K, Langan M, Bedford H, Petticrew M. Newsprint media representations of the introduction of the HPV vaccination programme for cervical cancer prevention in the UK. *Social Science & Medicine* 2010;70:942-950.
- (208) Abdelmutti N, Hoffman-Goetz L. Risk messages about HPV, cervical cancer, and the HPV vaccine Gardasil: A content analysis of Canadian and U.S. National Newspaper Articles. *Women & Health* 2009;49:422-440.
- (209) Forester A, Wardle J, Stephenson J, Waller J. Passport to promiscuity or lifesaver: Press coverage of HPV vaccination and risky sexual behaviour. *J Health Commun* 2010;15:205-217.
- (210) Kelly BJ, Leader AE, Mittermaier DJ, Hornik R. The HPV vaccine and the media: How has the topic been covered and what are the effects on knowledge about the virus and cervical cancer? *Patient Education and Counseling* 2009;77(2):308-313.
- (211) Reuters. Handbook of Journalism. http://handbook.reuters.com/index.php/Reporting_and_Writing_Basics 2010.
- (212) Shaprio M. Too many women still going without regular Pap screening. *The Globe and Mail* 2006 Jul 4;A.13.
- (213) Picard A. Vaccine against cervical cancer approved. *The Globe and Mail* 2006 Jul 19;A.13.
- (214) Lampert A. Cervical-cancer vaccine okayed for next month. *The Gazette* 2006 Jul 19;A.1.
- (215) Sutcliffe S. Cervical cancer vaccine hailed. *National Post* 2006 Jul 19;A.6.
- (216) Ubelacker S. Ottawa okays cervical cancer vaccine; Women to have access in weeks
Virus transmitted by sexual contact. *Toronto Star* 2006 Jul 21;D.4.

- (217) Cervical cancer vaccine may cut deaths by 76%. The Gazette 2006 Sep 4;A.11.
- (218) HPV vaccine challenges parents. Toronto Star 2006 Oct 20;E.12.
- (219) Fide C. Priority: detecting cervical cancer: Call for testing program ignored, professor says. The Gazette 2006 Nov 29;A.10.
- (220) Ubelacker S. Parents, teens support vaccine against virus spread through sex. The Globe and Mail 2006 Dec 4;A.7.
- (221) Campaign to end cervical cancer. The Gazette 2006 Jul 19;A.30.
- (222) Cherry T. Vaccine fights cancer virus; Sexually transmitted disease thought to cause 70% of cervical cancers. Toronto Star 2007 Jan 18;J.4.
- (223) Kirkey S. Young girls require HPV vaccine, panel says. National Post 2007 Jan 31;A.1.
- (224) Cosh C. Curing cervical cancer - but at what cost? National Post 2007 Feb 2;A.10.
- (225) Texas orders anti-cancer vaccines for girls; Shots protect against sexually transmitted virus that causes cancer. Toronto Star 2007 Feb 3;A.21.
- (226) Lippman A. Cancer vaccine untried. Toronto Star 2007 Mar 21;A.23.
- (227) Blackwell T. Provinces take a pass on cancer vaccine. National Post 2007 Mar 9;A.6.
- (228) Buckman R. A \$300-million shot in the arm. The Globe and Mail 2007 Mar 24;F.7.
- (229) Picard A. Should HPV vaccinations be extended to young men? The Globe and Mail 2007 Mar 27;A.21.
- (230) Picard A. Scientific breakthrough or unproven fix? The Globe and Mail 2007 Mar 26;A.11.
- (231) Glaxo seeks U.S. approval for cervical cancer vaccine. The Globe and Mail 2007 Mar 30;B.7.
- (232) Kirkey S. MDs to endorse vaccination of little girls, but critics question rush to inoculate. The Gazette 2007 Apr 16;A.1.
- (233) Whittington L. Not all lobbying is 'bad,' Flaherty declares; Ex-aide to PM lobbied for firm producing vaccine. Toronto Star 2007 Apr 17;A.6.
- (234) Health officer supports controversial HPV vaccine. The Globe and Mail 2007 Apr 18;S.3.
- (235) New Brunswick. HPV vaccine plan. The Gazette 2007 Jun 21;A.14.

- (236) Talaga T. Should province pay for vaccine?; There's no doubt it works but some think more long-term study is needed. Toronto Star 2007 Aug 2;A.18.
- (237) Gillespie K. Girls to get cancer vaccine; McGuinty to announce cervical cancer program for up to 84,000 Grade 8 students across Ontario. Toronto Star 2007 Aug 2;A.1.
- (238) Gillespie K. Ads for HPV vaccine yanked; Advertisements will run after election, health ministry says; Auditor decides they contravene rules about government advertising in an election campaign. Toronto Star 2007 Sep 18;A.1.
- (239) Campbell M. Ontario to provide teenage girls with HPV vaccine. The Globe and Mail 2007 Aug 2;A.7.
- (240) Ubelacker S. Don't rush HPV inoculations, group says. The Globe and Mail 2007 Aug 2;L.4.
- (241) Laucius J. Ontario to pay for HPV vaccine; All Grade 8 Girls Will Have Option This School Year. National Post 2007 Aug 3;A.6.
- (242) Laucius J. Ontario to provide HPV vaccine; Grade 8 girls will be offered free treatment. The Gazette 2007 Aug 3;A.12.
- (243) N.L. will offer HPV vaccine to schoolgirls. The Gazette 2007 Aug 7;A.9.
- (244) Downton DR. A cancer vaccine with political will; Controversy over HPV inoculations will not go away. National Post 2007 Aug 7;A.1.
- (245) Drake L. HPV vaccinations could be routine for B.C. girls. The Globe and Mail 2007 Aug 8;S.3.
- (246) Is the HPV vaccine worth it? National Post 2007 Aug 8;A.14.
- (247) Couvrette P. Decision soon on HPV vaccine; Quebec speeds studies. Program's launch in autumn if experts give go-ahead. The Gazette 2007 Aug 9;A.12.
- (248) Bertrand F. The value of Gardasil. National Post 2007 Aug 10;A.11.
- (249) Fumento M. Do the Math. National Post 2007 Aug 10;A.11.
- (250) Picard A. How politics pushed the HPV vaccine. The Globe and Mail 2007 Aug 11;A.1.
- (251) Talaga T. Lobbyists boosted vaccine program; Ex-government advisers worked on drug firm's campaign to push immunization program. Toronto Star 2007 Aug 16;A.17.
- (252) Derf A. Quebec City researcher backs controversial HPV vaccine; Effective in preventing genital warts, cervical cancer. The Gazette 2007 Aug 22;A.10.

- (253) Zerbisias A. Vaccine hype aside, Pap smears are first line of defence. Toronto Star 2007 Aug 23;L.2.
- (254) Fung M, Rosen B, Murphy J. HPV vaccine: a new era in cervical cancer prevention. The Globe and Mail 2007 Sep 11;A.21.
- (255) Zimm A. Girls' cervical cancer vaccine may benefit boys too Study. Toronto Star 2007 Aug 28;A.20.
- (256) Anderssen E. Should your daughter get the needle? The Globe and Mail 2007 Sep 15;A.1.
- (257) Adamson R. The politics of women's health. Toronto Star 2007 Sep 19;A.8.
- (258) Ogilvie M. Catholic schools debating moral issue of HPV shot. Toronto Star 2007 Sep 19;A.11.
- (259) Alphonso C, Gandhi U. HPV vaccine not a threat, Catholic board deems. The Globe and Mail 2007 Sep 19;A.1.
- (260) Blackwell T, Rook K. Catholic schools debate vaccine; To administer it is to 'presume girls going to have sex'. National Post 2007 Sep 19;A.1.
- (261) Ogilvie M. Toronto Catholic trustees approve cancer vaccine for female students. Toronto Star 2007 Sep 20;A.6.
- (262) Coyle J. HPV furor a pain for politicians. Toronto Star 2007 Sep 20;A.6.
- (263) Unnati G. Catholic trustees vote to allow HPV vaccine in schools. The Globe and Mail 2007 Sep 20;A.7.
- (264) Picard A. Saving women's lives. The Globe and Mail 2007 Sep 21;A.20.
- (265) B.C. joins provinces offering HPV vaccine. The Globe and Mail 2007 Sep 21;A.5.
- (266) Blackwell T. For one mother, there is no doubt; Controversial cancer vaccine stirs difficult debate. National Post 2007 Sep 24;A.1.
- (267) Picard A. Quebec to vaccinate girls against HPV virus. The Globe and Mail 2007 Sep 25;A.8.
- (268) Harrold M. Quebec voluntary program to target girls as young as 9. The Gazette 2007 Sep 25;A.1.
- (269) Kubacki M. Canadian doctors back HPV vaccine for young girls; 'Very Safe'; Paediatric Society endorses drug to fight cervical cancer. National Post 2007 Sep 25;A.8.
- (270) Vaccine program the right move. The Gazette 2007 Sep 26;A.20.

- (271) Avery R. Risk of cervical cancer distorted, causes alarm; Virus that causes cervical cancer 'an epidemic'; Virus that can cause it is common, but Pap tests and women's immune systems are effective. Toronto Star 2007 Sep 27;U.3.
- (272) Derf A. Women's health group seeks ban on HPV immunization; Says studies haven't looked at long-term effects of the vaccine and booster shots. The Gazette 2007 Sep 27;A.2.
- (273) Faguy S. The Bluffer's Guide: The HPV vaccine. The Gazette 2007 Sep 29;B.5.
- (274) Cullen A. Merck may have bestselling vaccine. The Globe and Mail 2007 Oct 5;B.1.
- (275) Fide C. Vaccination push failing in Ontario; Fears have put parents off program. Lesson for Quebec to learn, conference told. The Gazette 2007 Nov 22;A.8.
- (276) Gerstel J. Controversy still surrounds HPV shot for girls; Officials happy 60 per cent taking part in Toronto; blame misinformation for lower rates elsewhere. Toronto Star 2007 Nov 23;A.2.
- (277) Levy ET, Lang E. The HPV vaccine series: Healthwatch. The Gazette 2007 Nov 26;D.1.
- (278) Stobbe M. Gardasil shots have earned a painful reputation; Girls report trio of needles hurt more than other vaccines. Toronto Star 2008 Jan 10;L.2.
- (279) Blatchford C. U of T logic on HPV vaccine boggles the mind. The Globe and Mail 2008 Jan 30;A.5.
- (280) Blackwell T. Breakthrough vaccine victim of bad publicity; HPV Controversy; Tepid reaction to treatment in Ontario. National Post 2008 Feb 19;A.5.
- (281) Picard A. Why politics and public health don't mix. The Globe and Mail 2008 Feb 21;L.2.
- (282) Magder J. Quebec explains immunization plan against HPV. The Gazette 2008 Apr 12;A.6.
- (283) Blackwell T. Vaccine could end most cervical cancer: study; HPV shots urged for older women. National Post 2008 Apr 21;A.1.
- (284) Luft A. Justify your existence. The Gazette 2008 Apr 26;B.2.
- (285) Puxley C. Half of eligible Grade 8 girls declining free HPV vaccine, ministry finds. The Globe and Mail 2008 Apr 18;A.12.
- (286) B.C. offers vaccine to guard against cervical cancer. The Globe and Mail 2008 May 6;A.5.
- (287) Crawford T. Giving it another shot. Toronto Star 2008 May 27;L.1.

- (288) Premier at odds with Catholic board decision to block HPV vaccines. *National Post* 2008 Jun 5;A.12.
- (289) Halton board revives debate on vaccine. *Toronto Star* 2008 Jun 2;A.8.
- (290) Laucius J. Medical journal critical of HPV vaccine; Federal Initiative. *National Post* 2007 Aug 2;A.1.
- (291) Hazelle PA. Anti-HPV vaccine for all. *National Post* 2007 Feb 9;A.12.
- (292) Alberta last province to pay for HPV vaccine. *The Globe and Mail* 2008 Jun 13;A.9.
- (293) Macdonald J. Bishops urge caution over HPV vaccination. *The Globe and Mail* 2008 Jun 24;A.10.
- (294) Campaign to end cervical cancer. *The Gazette* 2006 Dec 11;A.
- (295) Goldin C, Katz LF. The power of the pill: Oral contraceptives and women's career and marriage decisions. *Journal of Political Economy* 2002;110(4):730-770.
- (296) Klawiter M. *The biopolitics of breast cancer: changing cultures of disease and activism*. Minneapolis MN: University of Minnesota Press; 2008.
- (297) Lerner BH. No shrinking violet: Rose Kushner and the rise of American breast cancer activism. *West J Med* 2001;174(5):362-365.
- (298) McCoyd JL. Authoritative knowledge, the technological imperative and women's responses to prenatal diagnostic technologies. *Cult Med Psychiatry* 2010;34(4):590-614.
- (299) Deen SR, Mangurian C, Cabaniss DL. Points of contact: Using first-person narratives to help foster empathy in psychiatric residents. *Acad Psychiatry* 2010;34(6):438-441.
- (300) Haas M, Aston T, Blum K, Conis E, Lim MK. Drugs, sex, money and power: An HPV vaccine case study. *Health Policy* 2009;92(2):228-295.
- (301) Dobson S. HPV Vaccine Program Introduction. http://www.onehealth.ca/r_alberta_nwt/video_conferences/R080415A-HO.pdf 2008.
- (302) Pasut G. An HPV Dialogue: Advancing Research and Policy in Ontario. http://www.oahpp.ca/resources/documents/presentations/2009oct30/G_Pasut%20HPV%20Dialogue%202009%2010%2030%20rsvd%20FINAL.pdf 2009.
- (303) Faden R, Sirine S. Public Health Ethics, *The Stanford Encyclopedia of Philosophy*. <http://plato.stanford.edu/archives/sum2010/entries/public-health-ethics/> 2010.

- (304) Ko EM, Missmer S, Johnson NR. Physician attitudes and practice toward human papillomavirus vaccination. *J Low Genti Tract Dis* 2010;14(4):339-345.
- (305) Leddy MA, Anderson BL, Gail S, Schulkin J. Obstetrician-gynecologists and the HPV vaccine: practice patterns, beliefs and knowledge. *J Pediatr Adolesc Gynecol* 2009;22(4):239-246.
- (306) Raley JC, Followwill KA, Zimet GD, Ault K. Gynecologists' attitudes regarding human papilloma virus vaccination: a survey of Fellows of the American College of Obstetricians and Gynecologists. *Infect Dis Obstet Gynecol* 2004;12(3):127-133.
- (307) Kahn JA, Zimet GD, Bernstein DI, Ruedessek JM. Pediatricians' intention to administer human papillomavirus vaccine: the role of practice characteristics, knowledge, and attitudes. *J Adolesc Health* 2005;37(6):502-510.
- (308) Duval B, Gilca V, McNeil S, Dobson S, Money D. Vaccination against human papillomavirus: a baseline survey of Canadian clinicians' knowledge, attitudes and beliefs. *Vaccine* 2007;25(45):7841-7847.
- (309) Torgerson R, MacAdam M. HPV vaccine funded in Canada. *Health Policy Monitor* 2007.
- (310) Hall B, Howard K, McCaffery K. Do cervical cancer screening patient information leaflets meet the HPV information needs of women? *Patient Education and Counseling* 2008;72(1):78-87.
- (311) Sherris J, Friedman A, Willet S, Davies P, Steben M. Education, training, and communication for HPV vaccines. *Vaccine* 2006;24(S3):210-218.
- (312) Hunter JL. Cervical cancer educational pamphlets: do they miss the mark for Mexican immigrant women's needs? *Cancer Control* 2005;12(Suppl. 2):42-50.
- (313) Quilliam S. Cervical cancer and the human papillomavirus vaccine. *J Fam Plann Reprod Health Care* 2006;32:119-120.
- (314) Ottenberg AL, Wu JT, Poland GA, Jacobson RM, Koenig BA. Vaccinating health care workers against influenza: the ethical and legal rationale for a mandate. *Am J Public Health* 2011;101(2):212-216.
- (315) Colgrove J, Bayer R. Manifold restraints: liberty, public health, and the legacy of Jacobson v Massachusetts. *Am J Public Health* 2005;95(4):571-576.
- (316) Friedrichs V, Cameron JC, Robertson C. Impact of adverse publicity on MMR vaccine uptake: a population based analysis of vaccine uptake records for one million children born 1987-2004. *Arch Dis Child* 2006;91(6):465-468.

- (317) Llamazares M, Smith RJ. Evaluating human papillomavirus vaccination programs in Canada: should provincial healthcare pay for voluntary adult vaccination? *BMC Public Health* 2008;8(114).
- (318) Kumar VM, Whynes DK. Explaining variation in the uptake of HPV vaccination in England. *BMC Public Health* 2011;11:172.
- (319) Lechuga J, Swain GR, Weinhardt LS. The cross-cultural variation of predictors of human papillomavirus vaccination intentions. *J Womens Health* 2011;20(2):225-230.
- (320) Stupainsky NW, Rosenthal SL, Wiehe SE, Zimet GD. Human papillomavirus vaccine acceptability among a national sample of adult women in the USA. *Sex Health* 2010;7(3):304-309.
- (321) Downs LS, Scarinci E, Einstein MH, Collins Y, Flowers L. Overcoming the barriers to HPV vaccination in high-risk populations in the US. *Gynecol Oncol* 2010;117(3):486-490.
- (322) Marlow LA, Wardel J, Forester AS, Waller J. Ethnic differences in human papillomavirus awareness and vaccine acceptability. *J Epidemiol Community Health* 2009;63(12):1010-1015.
- (323) Reiter PL, Brewer NT, Gottlieb SL, McRee AL. Parents' health beliefs and HPV vaccination of their adolescent daughters. *Soc Sci Med* 2009;69(3):475-480.

APPENDICIES

APPENDIX A: Systematic review synthesis search strategy

Databases: OVID Medline (R) Daily Update (Week 38), OVID Medline (R) In Process & Other Non-Indexed Citations (Week 38), Ovid Medline (R) (1950- Week 38 2010), Embase (1980 - 2010 Week 38), Cochrane Library Database of Systematic Reviews

1. systematic review.ti.ab.
2. HPV.mp
3. exp papillomavirus
4. vaccin\$. ti.ab.
5. Gardasil.mp
6. Cervarix.mp
7. 1 and 2 and 4
8. 1 and 3 and 4
9. exp papilloma virus
10. 1 and 4 and 9
11. 1 and 5
12. 1 and 6
13. exp papillomavirus infections
14. 1 and 4 and 13
15. exp uterine cervical neoplasms
16. 1 and 4 and 15
17. exp cervical cancer
18. 1 and 4 and 17
19. meta-analysis. ti.ab.
20. 2 and 4 and 19
21. 5 and 19
22. 6 and 19
23. 4 and 9 and 19
24. 5 and 19
25. 6 and 19
26. 4 and 13 and 19
27. 4 and 15 and 19
28. 4 and 17 and 19

APPENDIX B: Excluded systematic reviews

Allen JD, Coronado GD, Williams RS, et al. A systematic review of measures used in studies of human papillomavirus (HPV) vaccine acceptability. *Vaccine*. 2010; 28 (24): 4027-37.

Reason for exclusion: Focused on vaccine acceptability not efficacy

Backes DM, Kurman RJ, Pimeta JM, et al. Systematic review of human papillomavirus prevalence in invasive penile cancer. *Cancer Causes & Control*. 2009; 20(4): 449-57.

Reason for exclusion: Outcome of interest was prevalence of penile cancer not cervical cancer.

Bleeker MS, Heideman DA, Snijders PJ, et al. Penile cancer: epidemiology, pathogenesis and prevention. *World J Urology*. 2009; 27(2): 141-50.

Reason for exclusion: Outcome of interest was penile cancer, did not evaluate HPV vaccine.

Brewer NT, Fazekas KI. Predictors of HPV vaccine acceptability: a theory-informed, systematic review. *Prevent Med*. 2007; 45(2-3): 107-14.

Reason for exclusion: Focused on vaccine acceptability not efficacy.

Castro FA, Hamilia K, Pasanen K et al. Geographic distribution of cervical cancer-associated human leukocyte antigens and cervical cancer incidence in Finland. *Int J STD AIDS*. 2007; 18(10): 672-9.

Reason for exclusion: Outcome of interest was incidence of cervical cancer.

Dunne EF, Nielson CM, Stone KM, et al. Prevalence of HPV infection among men: A systematic review of the literature. *J Infect Dis*. 2006; 194(8): 1044-57.

Reason for exclusion: Outcome of interest was prevalence of HPV infection, studies included men.

Hoots BE, Palefsky JM, Pimeta JM, et al. Human papillomavirus type distribution in anal cancer and anal intraepithelial lesions. *Int J Can*. 2009; 124(10): 2375-83.

Reason for exclusion: Outcome of interest was anal cancer not cervical cancer.

Jeurissen S, Makar A. Epidemiological and economic impact of human papillomavirus vaccines. *Inter J Gyne Can*. 2009; 19(4): 761-71.

Reason for exclusion: Included assessment of economic variables.

Katz IT, Ware NC, Gray G, et al. Scaling up human papillomavirus vaccination: a conceptual framework adherence. *Sexual Health*. 2010; 7(3): 279-86.

Reason for exclusion: This review focused on implementation issues as opposed to efficacy.

Klug SJ, Huklemann M, Blettner M. Knowledge about infection with human papillomavirus: a systematic review. *Prevent Med*. 2008; 46(2): 87-98.

Reason for exclusion: Outcome of interest was knowledge about HPV.

Lehtinen M, Luukkaala T, Wallin KL, et al. Human papillomavirus infection, risk for subsequent development of cervical neoplasia and associated population attributable fraction. *J Clin Viro*. 2001; 22(1): 117-24.

Reason for exclusion: Did not evaluate HPV vaccine.

Marra F, Cloutier K, Oteng B, et al. Effectiveness and cost effectiveness of human papillomavirus vaccine: a systematic review. *Pharmacoeconomics*. 2009; 27 (2): 127-47.

Reason for exclusion: Included cost effectiveness variables.

Miksis S. A review of the evidence comparing the human papillomavirus vaccine versus condoms in the prevention of human papillomavirus infections. *J Obstet Gynecol Neonatal Nurs*. 2008; 37 (3): 329-37.

Reason for exclusion: Used condoms as the comparison group not placebo or no intervention.

Ortega-Sanchez IR, Lee GM, Jacobs RJ, et al. Projected cost-effectiveness of new vaccines for adolescents in the United States. *Pediatrics*. 2008; 121(Sup 1): S63-78.

Reason for exclusion: Focused on cost-effectiveness.

Tachekeakji W, Feldman RD. Cost-effectiveness of the HPV vaccination compared with Pap smear screening on a national scale: a literature review. *Vaccine*. 2008; 26(49); 6258-65.

Reason for exclusion: Focused on cost-effectiveness, comparison group was pap smear screening.

Wacholder S, Chen BE, Wilcox A, et al. Risk of miscarriage with bivalent vaccine against human papillomavirus (HPV) types 16 and 18: pooled analysis of two randomized controlled trials. *BMJ*. 2010; 340: c712

Reason for exclusion: Evaluated one specific adverse event only.

APPENDIX C: AMSTAR quality assessment

AMSTAR systematic review quality assessment scoring criteria

1. Was an ‘a priori’ design provided? The research question and inclusion criteria should be established before the conduct of the review.	☐ Yes ☐ No ☐ Can’t answer ☐ Not applicable
2. Was there duplicate study selection and data extraction? There should be at least two independent data extractors and a consensus procedure for disagreements should be in place.	☐ Yes ☐ No ☐ Can’t answer ☐ Not applicable
3. Was a comprehensive literature search performed? At least two electronic sources should be searched. The report must include years and databases used (e.g. Central, EMBASE, and MEDLINE). Key words and/or MESH terms must be stated and where feasible the search strategy should be provided. All searches should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study, and by reviewing the references in the studies found.	☐ Yes ☐ No ☐ Can’t answer ☐ Not applicable
4. Was the status of publication (i.e. grey literature) used as an inclusion criterion? The authors should state that they searched for reports regardless of their publication type. The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language etc.	☐ Yes ☐ No ☐ Can’t answer ☐ Not applicable
5. Was a list of studies (included and excluded) provided? A list of included and excluded studies should be provided.	☐ Yes ☐ No ☐ Can’t answer ☐ Not applicable

6. Were the characteristics of the included studies provided? In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions and outcomes. The ranges of characteristics in all the studies analyzed e.g. age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases should be reported.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
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7. Was the scientific quality of the included studies assessed and documented? 'A priori' methods of assessment should be provided (e.g., for effectiveness studies if the author(s) chose to include only randomized, double-blind, placebo controlled studies, or allocation concealment as inclusion criteria); for other types of studies alternative items will be relevant.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
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8. Was the scientific quality of the included studies used appropriately in formulating conclusions? The results of the methodological rigor and scientific quality should be considered in the analysis and the conclusions of the review, and explicitly stated in formulating recommendations.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
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9. Were the methods used to combine the findings of studies appropriate? For the pooled results, a test should be done to ensure the studies were combinable, to assess their homogeneity (i.e. Chi-squared test for homogeneity, I^2). If heterogeneity exists a random effects model should be used and/or the clinical appropriateness of combining should be taken into consideration (i.e. is it sensible to combine?).	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
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10. Was the likelihood of publication bias assessed? An assessment of publication bias should include a combination of graphical aids (e.g., funnel plot, other available tests) and/or statistical tests (e.g., Egger regression test).	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
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11. Was the conflict of interest stated? Potential sources of support should be clearly acknowledged in both the systematic review and the included studies.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
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AMSTAR evaluation results

Review	Rambout (2007)	La Torre (2007)	Medeiros (2009)
A priori design	Yes	Yes	Yes
Duplicate study selection and data extraction	Yes	No	Yes
Literature Review	Yes	No	Yes
Status of publication used as inclusion criterion	Yes	No	No
List of excluded studies provided	No	No	No
Characteristics of included studies provided	Yes	Yes	Yes
Scientific quality of the studies assessed and documented	Yes	Yes	Yes
Scientific quality used in formulating conclusions	Yes	Yes	Yes
Methods used to combine findings appropriate	Yes	Yes	Yes
Publication bias assessed	No	Yes	No
Conflict of interest stated	Yes	No	No
Total Score	9	6	7

APPENDIX D: Articles included in the review of editorial comment

Flogging Gardasil. *Nat Biotechnol* 2007; 25(3):261.

Rolling out HPV vaccines worldwide. *Lancet* 2006;367(9528):2034.

Should HPV vaccines be mandatory for all adolescents? *Lancet* 2006;368(9543):1212.

Arya N. Canada's not ready for universal HPV immunization. *Nat Rev Med* 2007;4(16).

Baden LR, Curfman GD, Morrissey S, Drazen JM. Human papillomavirus vaccine - opportunity and challenge. *New Engl J Med* 2007;356(19):1990-1991.

Bosch FX. Broad-spectrum human papillomavirus vaccines: new horizons but one step at a time. *J Natl Cancer Inst* 2009;101(11):771-773.

Cameron JC, Wallace LA, Ahmed S, et al. HPV vaccine: Positive insights from universal adolescent HepB vaccination. *J Epidemiol Community Health* 2007;61(12):1018-1019.

Colgrove J. The ethics and politics of compulsory HPV vaccination. *New Engl J Med* 2006;355(23):2389-2391.

de Melo-Martin I. The promise of the Human Papillomavirus vaccine does not confer immunity against ethical reflection. *The Oncologist* 2006;11:393-396.

de Soto J. Should HPV vaccination be mandatory? *J Fam Pract* 2007;56(4):267-268.

Forman SF, Woods ER. Human papilloma virus vaccine: a new frontier or political controversy? *Current Opinion in Pediatrics* 2007;19(4):387-388.

Frazer IH. HPV immunisation: A significant advance in cancer control. *Gynecol Oncol* 2007;107(2 SUPPL).

Gostin LO, DeAngelis CD. Mandatory HPV vaccination: Public health vs private wealth. *Journal of the American Medical Association* 2007;297(17):1921-1923.

Haber G, Malow RM, Zimet GD. The HPV vaccine mandate controversy. *J Pediatr Adolesc Gynecol* 2007;20(6):325-331.

Hammoud M. HPV vaccine: Not immune to controversy. *Int J Gynecol Obstet* 2008;101(2):123-124.

Haug C. The risks and benefits of HPV vaccination. *JAMA* 2009;302(7):795-796.

Haug C. Human papillomavirus vaccination - reasons for caution. *N Engl J Med* 2008;359(8):861-862.

Hawks JH. Cancer prevention or parents rights? *Uro Nurs* 2007; 27(2):110-111.

Hoffner B. Vaccination against the Human Papillomavirus: the lessons we have not learned. *Vaccine* 2009;27(16):2195-2198.

Hoops K, Twiggs L. Human papillomavirus vaccination: The policy debate over the prevention of cervical cancer - A commentary. *American Soc for Colposcopy and Cervical Pathology* 2008;12(3):181-184.

Kahn JA. Maximizing the Potential Public Health Impact of HPV Vaccines: A Focus on Parents. *J Adolesc Health* 2007;40(2):101-103.

Kiviat NB, Hawes SE, Feng Q. Screening for cervical cancer in the era of the HPV vaccine - The urgent need for both new screening guidelines and new biomarkers. *J Natl Cancer Inst* 2008;100(5):290-291.

Lippman A, Melnychuk R, Shimmin BJ. Human papillomavirus, vaccines and women's health. *Canadian Medical Association Journal* 2007;177(5):484-487.

Lippman A. Rebuttal: Do you approve of spending \$300 million on HPV vaccination? No. *Can Fam Physician* 2008;54(3):343.

Lippman A. Human papillomavirus (HPV) vaccination and the development of public policies. *J Epid Comm Health* 2008;62(7):570-571.

Lippman A, Boscoe M, Scurfield C. Do you approve of spending \$300 million on HPV vaccination?: no *Canadian Family Physician* 2008;54(2):175.

Lo B. HPV vaccine and adolescents' sexual activity. *Br Med J* 2006;332(7550):1106-1107.

Lo B. Human papillomavirus vaccination programs. *BMJ* 2007;335(7616):357-358.

Lowndes CM, Gill ON. Cervical cancer, human papillomavirus, and vaccination. *BMJ* 2005;331(7522):915-916.

MacDonald N, Hebert PC. Human papillomavirus vaccine: waiting for a miracle. *CMAJ* 2007;177(5):433.

MacDonald N, Stanbrook MB, Hebert PC. Human papillomavirus vaccine risk and reality. *CMAJ Canadian Medical Association Journal* 2008;179(6):503.

Mariani L, Pagliusi S. Vaccination and screening programs: harmonizing prevention strategies for HPV-related diseases. *Journal of Experimental & Clinical Cancer Research* 2008;27:84.

- Markman M. HPV vaccination and the prevention of cervical cancer: The long road ahead. *J Women's Health* 2007;16(9):1366-1367.
- McGee G, Johnson S. Has the spread of HPV vaccine marketing conveyed immunity to common sense? *Am J Bioethics* 2007;7(7):1-2.
- Meyers ER. The economic impact of HPV vaccines: not just cervical cancer. *Am J Obstet Gynecol* 2008;198(5):487-488.
- Meyers ER. HPV vaccine: Now that they're here, how to we maximize their benefit? *Contraception* 2006;74(4):277-279.
- Morris S. HPV vaccine strategies: The cost of HPV and the choice of vaccine. *Sex Transm Infect* 2009;85(5):315-316.
- Morris S, Nguyen CK. The human papillomavirus vaccine in Canada. *Canadian Journal of Public Health* 2008;99(2):114-116.
- Noller KL. HPV vaccination: More questions than answers. *Obstet Gynecol* 2006;107(1):4-5.
- O'Connor K. Herd immunity. *Aust Fam Physician* 2007;36(9):677.
- Outtersson K. Foreword--Will HPV vaccines prevent cervical cancers among poor women of color?: global health policy at the intersection of human rights and intellectual property law. *Am J Law Med* 2009;35(2-3):247-252.
- Parsons J. Preventing cervical cancer. *Aust Fam Physician* 2007;36(3):101.
- Pfleiderer M. Introducing human papillomavirus (HPV) vaccination - a challenge for European Vaccine Advisory Committees and Public Health Services. *Euro Surveill* 2008;13(33).
- Porta M. The improbable plunge. What facts refute reasons to expect that the effectiveness of HPV vaccination programs to prevent cervical cancer could be low? *Prev Med* 2009;48(5):407-410.
- Sawaya GF, Smith-McCune K. HPV vaccination - More answers, more questions. *New Engl J Med* 2007;356(19):1991-1993.
- Smith-McCune KK. Human papillomavirus efficacy: aligning expectations with reality. *Gyne Oncol* 2008; 111(1):1-2.
- Somasundaram K. HPV vaccine: End to women's major health problem? *Indian J Med Res* 2008;127(6):511-513.
- Steben M. Do you approve of spending \$300 million on HPV vaccination?: yes.[see comment]. *Canadian Family Physician* 176;54(2):174.

Steben M. Rebuttal: Do you approve of spending \$300 million on HPV vaccination. Yes. *Can Fam Physician* 2008;54(3):342.

Szarenwki A. Prophylactic vaccines for human papillomavirus: a bright future for cervical cancer prevention. *J Med Screen* 2005;12(4):165-163.

Waller J, Wardle J. HPV vaccination in the UK. *BMJ* 2008;336(7652):1028-1029.

Wynia M. Public health, public trust and lobbying. *The Am J Bioethics* 2007;7(6):4-7.

APPENDIX E: Membership of key immunization policy-making bodies

National Advisory Committee on Immunization (NACI)

Representatives from:

Advisory Committee on Causality Assessment
Canadian Association for Immunization Research and Evaluation
The Association of Medical Microbiology and Infectious Disease Canada
Canadian Nursing Coalition for Immunization
Canadian Pediatric Society
Canadian Public Health Association
Center for Disease Control and Prevention
College of Family Physicians of Canada
Committee to Advise of Tropical Medicine & Travel
Community and Hospital Infection and Control Association
Council of Chief Medical Officers of Health
Society of Obstetrics and Gynecologists
Canadian Forces Health Services Group Headquarters
Centre for Evaluation of Radiopharmaceuticals and Biotherapeutics
Centre for Immunization and Respiratory Infectious Diseases
First Nations and Inuit Health Branch
National Defence Medical Center

Canadian Immunization Committee (CIC)¹

Members

- Federal co-chair
- P/T co-chair
- Representatives from: First Nations and Inuit Health Branch (FNIHB) - Health Canada
Each province and territory

Liaison representatives

- NACI
- Immunization and Respiratory Infections Division (IRID)² - PHAC
- National Vaccine Program Office - Health and Human Services (USA)

Ex-officio representatives

- Biologics and Genetic Therapies Directorate (BGTD) - Health Canada
- PHAC communications

Committee support

- IRID

¹ Membership at the time of the creation of its HPV immunization recommendations (December 2007)

² IRID is currently known as the Center for Immunization and Respiratory Infections Division (CIRID).

NACI-CIC HPV Working Group

Members

- Representative from NACI and CIC

Liaison representatives

- Cervical Cancer Prevention and Control Network (CCPCN)
- Society of Obstetrician and Gynaecologists of Canada (SOGC)
- College of Family Physicians of Canada (CFPC)

Ex-officio representatives

- IRID
- Community and Acquired Infections Division (CAID)
- Chronic Disease Prevention Division (CDCP)
- Biologics and Genetic Therapies Directorate (BGTD) - Health Canada
- Canadian Science Center for Human and Animal Health
- First Nations and Inuit Health Branch (FNIHB) - Health Canada

APPENDIX F: BDTD listed limitations of *Gardasil*

1. The vaccine offers no protection against other HPV types that can also cause cervical cancer.
2. It is unknown whether the vaccine's protection against oncogenic HPV 16 & 18 is long-lasting.
3. The vaccine does not prevent HPV 16 & 18 infection already present at the time of vaccination from progressing to cancer.
4. The efficacy data obtained in female subjects 16 to 23 years of age were bridged to subjects 9 to 15 years by demonstrating non-inferiority of immunogenic data obtained in the younger group compared with the older group.
5. The vaccine has not been studied in pregnant women in randomized, placebo-controlled studies.
6. A proportion of HPV-infected women will clear an HPV infection without any intervention. HPV infection is not close in the temporal sequence of disease progression to cervical cancer, and HPV infection itself is asymptomatic and does not require treatment.
7. Definitive, confirmatory efficacy and safety data will not be available until ongoing and future trials are completed. The submission provided data establishing that the vaccine has an effect on a surrogate endpoint.
8. The claimed 100% efficacy was proven in the PPE population. This was a very selective population that was obtained by applying a number of exclusion criteria.
9. The primary objectives of the clinical studies were studied only in a naive population.

APPENDIX G: Educational materials included in the evaluation

- (1) Be informed: Have your daughter immunized against HPV - New Brunswick Health
- (2) Fact Sheet: Human Papillomavirus (HPV) Vaccine - Prince Edward Island Department of Health
- (3) Free Vaccination Programs in Grade 4, Elementary School: Human Papillomavirus (HPV) for girls only - Ministère de la Santé et des Services Sociaux
- (4) HPV Questions and Answers for the General Public - Manitoba Health
- (5) HPV: Should My Daughter Get the Vaccine - Health Link BC
- (6) Human papillomavirus (HPV) Prevention and HPV Vaccine: Questions and Answers - Public Health Agency of Canada
- (7) Human Papillomavirus (HPV) Vaccination Program for Grade 8 Females: What you need to know - Ontario Ministry of Health and Long-Term Care
- (8) Human Papillomavirus (HPV) Vaccine - Health Link BC
- (9) Human Papillomavirus Vaccine - Saskatchewan Ministry of Health
- (10) Human Papillomavirus Vaccine: Important information about this vaccine - Healthlink Alberta
- (11) It's Your Health: Human Papillomavirus (HPV) - Health Canada
- (12) I've heard about HPV: Vaccination against human papillomavirus (HPV) - Ministère de la Santé et des Services Sociaux
- (13) Ontario's Grade 8 HPV Vaccination Program: Frequently Asked Questions - Ontario Ministry of Health and Long-Term Care
- (14) Ontario's Grade 8 HPV Vaccination Program: Girl Talk FAQ - Ontario Ministry of Health and Long-Term Care
- (15) Protection from Human Papillomavirus - Newfoundland and Labrador - Department of Health and Community Services
- (16) The FACTS about Human Papillomavirus (HPV) and the HPV vaccine - Nova Scotia Health Promotion and Protection
- (17) The FACTS on the Safety and Effectiveness of HPV Vaccine - Public Health Agency of Canada

APPENDIX H: Suitability Assessment of Materials (SAM) scoring criteria

CONTENT

Purpose: It is important that readers readily understand the purpose of the materials. If they don't clearly perceive the purpose, they may miss main points.

- | | | |
|------------|---|--|
| Check one: | ☐ Superior | Purpose is explicitly stated in the title, cover illustration or interlocation |
| | ☐ Adequate | Purpose is not explicit. It is implied or multiple purposes are stated |
| | ☐ Not Suitable | No purpose is stated in the title, illustration or introduction |
| | ☐ Not Applicable | |

Content Topics: Adult learners usually want to solve their immediate health problem, rather than learn medical facts. The content of most interest and use to readers is behaviour information that helps solve problems.

- | | | |
|------------|---|---|
| Check one: | ☐ Superior | Thrust of the material is application of knowledge aimed at desirable reader behaviour. |
| | ☐ Adequate | At least 40% of content topics focus on desirable behaviours or actions. |
| | ☐ Not Suitable | Nearly all topics focus on non-behaviour facts. |
| | ☐ Not Applicable | |

Summary & Review: A review offers readers a chance to see the key points in other words, examples or visuals and increases comprehension.

- | | | |
|------------|---|--|
| Check one: | ☐ Superior | Summaries are included and retell key messages in different words or examples. |
| | ☐ Adequate | Some key topics are reviewed. |
| | ☐ Not Suitable | No summary or review is included. |
| | ☐ Not Applicable | |

LITERACY DEMAND

Reading Grade Level: Text reading level is a critical factor in comprehension. Readability formulas provide a reasonably accurate measure of reading difficulty.

- Check one:
- | | |
|---|--------------------------|
| ☐ Superior | 5th grade level or lower |
| ☐ Adequate | 6th to 8th grade |
| ☐ Not Suitable | 9th grade level or above |
| ☐ Not Applicable | |

Writing Style: Conversational style and active voice are easy to understand. Passive voice, embedded information and long or multiple phrases slow reading and reduce comprehension. Example: *Take your vitamin every day* is easier to understand than *Patients are advised to take their vitamin daily*.

- Check one:
- | | |
|---|---|
| ☐ Superior | 1) Conversational style and active voice are used throughout.
2) Simple sentences are used extensively. |
| ☐ Adequate | 1) About half the text uses conversational style, active voice. 2) Less than half of sentences are complex with long phrases. |
| ☐ Not Suitable | 1) Passive voice throughout.
2) Over half of sentence have long or multiple phrases. |
| ☐ Not Applicable | |

Sentence Construction: The context is given before new information. We learn new facts/behaviours more quickly when told the context first. Example: *To relieve pain* (context), *put heat on the sore spot* (new information).

- Check one:
- | | |
|---|--|
| ☐ Superior | Consistently provides context before presenting new information. |
| ☐ Adequate | Provides context first about half the time. |
| ☐ Not Suitable | Context is provided first or not at all. |
| ☐ Not Applicable | |

Vocabulary: Common explicit words are used. (Example: Use *doctor* instead of *physician*). Few or no words express general terms such as categories (Example: Use *milk* instead of *dairy products*) or value judgments (Example: Use *pain that does not go away in 5 minutes* instead of *excessive pain*). Imagery words are used because these are words that people can “see”. (Example: Use *runny nose* instead of *excess mucus*).

- | | | |
|------------|---|---|
| Check one: | ☐ Superior | All three factors: 1) common words are used all the time. 2) Technical, concept, category, value judgment words (CCVJ) are explained. 3) Appropriate imagery words are used. |
| | ☐ Adequate | 1) Common words are used frequently. 2) Technical CCVJ words are explained sometimes. 3) Some jargon is used. |
| | ☐ Not Suitable | 1) Two or more factors: 1) Uncommon words are used frequently instead of common words. 2) No explanation or examples are given for technical and CCVJ words. 3) Extensive jargon. |
| | ☐ Not Applicable | |

Learning Enhanced by Advance Organizers (Road Signs): Headers or topic captions tell very briefly what is coming next. These “road signs” make the text look less intimidating and prepare the reader’s thought process to expect the announced topic.

- | | | |
|------------|---|---|
| Check one: | ☐ Superior | Nearly all topics are preceded by an advance organizer (a statement that tells what is next). |
| | ☐ Adequate | About 50% of topics are preceded by advance organizers. |
| | ☐ Not Suitable | Few or no advance organizers are used. |
| | ☐ Not Applicable | |

GRAPHICS ILLUSTRATIONS, LISTS, TABLES, CHARTS

Cover Graphic: People *do* judge a book by its cover. The cover image often is the deciding factor in a reader’s attitude toward, and interest in, the materials.

- | | | |
|------------|---|---|
| Check one: | ☐ Superior | The cover graphic: 1) Is friendly 2) Attracts attention. 3) Clearly portrays the purpose of the materials |
| | ☐ Adequate | The cover graphic has one or two of the superior criteria. |
| | ☐ Not Suitable | The cover graphic has none of the superior criteria. |
| | ☐ Not Applicable | |

Type of Illustrations: Simple line drawings can promote realism without distracting details. Visuals are accepted and remembered better when they portray what is familiar and easily recognized. Viewers may not recognize the meaning of medical drawings or abstract symbols.

- | | | |
|------------|---|--|
| Check one: | ☐ Superior | Both factors: 1) Simple adult-appropriate line drawings/sketches are used. 2) Illustrations are likely to be familiar to readers |
| | ☐ Adequate | One of the superior factors is missing. |
| | ☐ Not Suitable | None of the superior factors is present. |
| | ☐ Not Applicable | |

Relevance of Illustrations: Nonessential details such as room backgrounds, elaborate borders, unneeded colour can distract the viewer. The viewer's eyes may be "captured" by these details. Illustrations should tell key points visibly.

- | | | |
|------------|---|--|
| Check one: | ☐ Superior | Illustrations present key messages visually so the reader can grasp the key ideas from illustrations alone. No distractions. |
| | ☐ Adequate | 1) Illustrations include some distractions.
2) Insufficient use of illustrations. |
| | ☐ Not Suitable | No illustrations or an overload of illustrations. |
| | ☐ Not Applicable | |

Graphics: Lists, tables, charts, forms: Many readers do not understand the purpose of lists and charts. Explanations or directions are essential.

- | | | |
|------------|---|---|
| Check one: | ☐ Superior | Provides step-by-step directions with an example that will build self-efficacy (confidence). |
| | ☐ Adequate | "How to" directions are too brief for readers to understand and use the graphic without help. |
| | ☐ Not Suitable | Graphics are presented without explanation. |
| | ☐ Not Applicable | |

Captions are used to “announce” or explain graphics: Captions can quickly tell the reader what the graphic is about and where to focus within the graphic. A graphic without a caption is usually an inferior instruction and missed learning opportunity.

- Check one:
- | | |
|---|---|
| ☐ Superior | Explanatory captions with all or nearly all illustrations and graphics. |
| ☐ Adequate | Brief captions are used for some graphics. |
| ☐ Not Suitable | Captions are not used. |
| ☐ Not Applicable | |

LAYOUT AND TYPOGRAPHY

Typography: Type size and fonts can make text easy or difficult for readers at all skill levels. For example, type in ALL CAPS slows everyone’s reading comprehension. When too many (6+) type fonts and sizes are used on a page, the appearance becomes confusing and the focus uncertain.

- Check one:
- | | |
|---|---|
| ☐ Superior | At least 3 of the following 4 factors are present:
1) Text type is in uppercase and lowercase.
2) Type size is at least 12 point (This is 12 point type).
3) Typographic cues (bold type, color, size of type).
4) No ALL CAPS for long headlines and running text. |
| ☐ Adequate | Two of the superior factors are present. |
| ☐ Not Suitable | One or none of the superior factors are present. |
| ☐ Not Applicable | Or 6 or more type styles/sizes are used on one page. |

Layout: Layout has a substantial influence on the suitability of materials.

- Check one:
- | | |
|---|--|
| ☐ Superior | At least 5 of the following 8 factors are present:
1) Illustrations are adjacent to the related text.
2) Layout and sequence of information are consistent, making it easy to predict the flow of information.
3) Visual cueing devices (boxes, arrows, shading) are used to direct attention to key content.
4) pages do not appear cluttered.
5) Use of color supports and is not distracting to the message. Readers need not learn color codes to understand and use the message.
6) Line length is 30 to 50 characters and spaces.
7) There is high contrast between type and paper.
8) Paper has a non-gloss or low-gloss surface. |
| ☐ Adequate | At least 3 of the superior factors are present. |
| ☐ Not Suitable | 1) Two or fewer of the superior factors are present.
2) Looks uninviting or hard to read. |
| ☐ Not Applicable | |

Subheadings and “chunking”: Few people can remember more than 7 independent items. For those with low literacy skills the limit may be 3 or 5 items. Longer lists need to be partitioned into smaller chunks.

- Check one:
- | | |
|---|--|
| ☐ Superior | 1) Lists are grouped under descriptive subheadings.
2) No more than 5 items are presented without a subheading. |
| ☐ Adequate | No more than 7 items are presented without a subheading. |
| ☐ Not Suitable | More than 7 items are presented without a subheading. |
| ☐ Not Applicable | |

LEARNING STIMULATION & MOTIVATION

Interaction included in text and /or graphics: When a reader does something to reply to a question or problem, chemical changes take place in the brain that enhance retention in long-term memory. Readers should be asked to solve problems, make choices, demonstrate.

- Check one:
- | | |
|---|---|
| ☐ Superior | Problems or questions are presented for reader response. |
| ☐ Adequate | Question & Answer format is used to discuss problems and solutions (passive interaction). |
| ☐ Not Suitable | No interactive learning or stimulation is provided. |
| ☐ Not Applicable | |

Desired behaviour patterns are modeled or shown in specific terms: People often learn more readily when specific, familiar instances are used rather than abstract or general concepts.

- Check one:
- | | |
|---|--|
| ☐ Superior | Instruction models specific behaviour and skills.
Example: nutrition information emphasizes changing eating patterns, shopping, cooking. |
| ☐ Adequate | Information is a mix of technical and common language the reader may not easily interpret in terms of daily living. Example: <i>High sugar, low nutrient value foods</i> instead of <i>No fuel foods</i> |
| ☐ Not Suitable | Information is presented in non-specific or category items such as food groups. |
| ☐ Not Applicable | |

Motivation: People are motivated to learn when they believe tasks and behaviours are doable.

- Check one:
- | | |
|---|--|
| ☐ Superior | Complex topics are subdivided so that readers may experience small successes in understanding or problem solving, leading to self-efficacy (confidence). |
| ☐ Adequate | Some topics are subdivided to improve readers' confidence. |
| ☐ Not Suitable | No partitioning is provided. |
| ☐ Not Applicable | |

CULTURAL APPROPRIATENESS

Cultural Match — Logic, Language, Experience (LLE): A valid measure of the cultural appropriateness of material is how well its logic, language and experience (inherent in the instruction) match the LLE *of the intended audience* (not the reviewer). Example: Nutrition instruction is a poor cultural match if it tells readers to eat vegetables that are rarely eaten by people in that culture and not sold in the reader's neighbourhood.

- Check one:
- | | |
|---|--|
| ☐ Superior | Central concepts of the material appear to be culturally similar to the LLE of the target culture. |
| ☐ Adequate | Significant match in LLE for 50% of central concepts. |
| ☐ Not Suitable | Clearly a cultural mismatch in LLE. |
| ☐ Not Applicable | |

Cultural Image and Examples: To be accepted, an instruction must present cultural images and examples in realistic and positive ways.

- Check one:
- | | |
|---|--|
| ☐ Superior | Images and examples present culture in positive ways. |
| ☐ Adequate | Neutral presentation of cultural images and foods. |
| ☐ Not Suitable | Negative images such as exaggerated or caricatured cultural characteristics, actions, or examples. |
| ☐ Not Applicable | |

APPENDIX I: Content scores for educational materials

Informational Area	n	(%)
1. HPV is a sexually transmitted virus	16	(94)
2. HPV is a common virus	15	(88)
3. There is a link between HPV and cervical cancer	16	(94)
4. There is a link between HPV and genital warts	13	(76)
5. HPV infects men and women	5	(29)
6. Most HPV infections clear naturally	10	(59)
7. There is a significant amount of time between infection and cancer	3	(18)
8. Information on reducing the risk of HPV infection (besides immunization)	11	(65)
9. There is strong evidence that the vaccine prevents infection with targeted strains of HPV	7	(41)
10. The HPV vaccine protects against some, but not all strains of HPV associated with cervical cancer	12	(71)
11. The HPV vaccine protects against some, but not all strains of HPV associated with genital warts	9	(53)
12. Target age group for vaccination specified	13	(76)
13. Immunization should occur at a young age because vaccination is required before sexual debut	10	(59)
14. Gardasil requires 3 doses/Cervarix requires 2 doses	13	(76)
15. The HPV vaccine is prophylactic not therapeutic	8	(47)
16. Boosters may be needed as the length of immunity is unknown	9	(53)
17. Screening has been an important tool in identifying cervical cancers	8	(47)
18. Vaccinated individuals will still need to participate in Pap screening	13	(76)
19. Vaccination has not been proven to prevent cancer, only its precursors	1	(6)
20. Addresses concerns about risk compensation	2	(12)
21. Addresses concerns about safety	17	(100)
22. Addresses the cost of the vaccine and who pays for it	10	(59)
23. Vaccination is voluntary/consent is needed	6	(35)
24. Provides more than one option (get the vaccine, refuse the vaccine, postpone vaccination)	3	(18)

APPENDIX J: Articles included in the analysis of print media

Alberta last province to pay for HPV vaccine. *The Globe and Mail* 2008 Jun 13;A.9.

B.C. joins provinces offering HPV vaccine. *The Globe and Mail* 2007 Sep 21;A.5.

B.C. offers vaccine to guard against cervical cancer. *The Globe and Mail* 2008 May 6;A.5.

Cervical cancer vaccine may cut deaths by 76%. *The Gazette* 2006 Sep 4;A.11.

Campaign to end cervical cancer. *The Gazette* 2006 Jul 19;A.30.

Glaxo seeks U.S. approval for cervical cancer vaccine. *The Globe and Mail* 2007 Mar 30;B.7.

Halton board revives debate on vaccine. *Toronto Star* 2008 Jun 2;A.8.

Health officer supports controversial HPV vaccine. *The Globe and Mail* 2007 Apr 18;S.3.

HPV vaccine challenges parents. *Toronto Star* 2006 Oct 20;E.12.

Is the HPV vaccine worth it? *National Post* 2007 Aug 8;A.14.

New Brunswick. HPV vaccine plan. *The Gazette* 2007 Jun 21;A.14.

N.L. will offer HPV vaccine to schoolgirls. *The Gazette* 2007 Aug 7;A.9.

Premier at odds with Catholic board decision to block HPV vaccines. *National Post* 2008 Jun 5;A.12.

Texas orders anti-cancer vaccines for girls; Shots protect against sexually transmitted virus that causes cancer. *Toronto Star* 2007 Feb 3;A.21.

Vaccine program the right move. *The Gazette* 2007 Sep 26;A.20.

Adamson R. The politics of women's health. *Toronto Star* 2007 Sep 19;A.8.

Alphonso C, Gandhi U. HPV vaccine not a threat, Catholic board deems. *The Globe and Mail* 2007 Sep 19;A.1.

Anderssen E. Should your daughter get the needle? *The Globe and Mail* 2007 Sep 15;A.1.

Avery R. Risk of cervical cancer distorted, causes alarm; Virus that causes cervical cancer 'an epidemic. *Toronto Star* 2007 Sep 27;U.3.

Bertrand F. The value of Gardasil. *National Post* 2007 Aug 10;A.11.

Blackwell T. Vaccine could end most cervical cancer: study; HPV shots urged for older women. *National Post* 2008 Apr 21;A.1.

Blackwell T. For one mother, there is no doubt; Controversial cancer vaccine stirs difficult debate. *National Post* 2007 Sep 24;A.1.

Blackwell T. Provinces take a pass on cancer vaccine. *National Post* 2007 Mar 9;A.6.

Blackwell T. Breakthrough vaccine victim of bad publicity; HPV Controversy; Tepid reaction to treatment in Ontario. *National Post* 2008 Feb 19;A.5.

Blackwell T, Rook K. Catholic schools debate vaccine; To administer it is to 'presume girls going to have sex'. *National Post* 2007 Sep 19;A.1.

Blatchford C. U of T logic on HPV vaccine boggles the mind. *The Globe and Mail* 2008 Jan 30;A.5.

Buckman R. A \$300-million shot in the arm. *The Globe and Mail* 2007 Mar 24;F.7.

Campbell M. Ontario to provide teenage girls with HPV vaccine. *The Globe and Mail* 2007 Aug 2;A.7.

Cherry T. Vaccine fights cancer virus; Sexually transmitted disease thought to cause 70% of cervical cancers. *Toronto Star* 2007 Jan 18;J.4.

Cosh C. Curing cervical cancer - but at what cost? *National Post* 2007 Feb 2;A.10.

Couvrette P. Decision soon on HPV vaccine; Quebec speeds studies. Program's launch in autumn if experts give go-ahead. *The Gazette* 2007 Aug 9;A.12.

Coyle J. HPV furor a pain for politicians. *Toronto Star* 2007 Sep 20;A.6.

Crawford T. Giving it another shot. *Toronto Star* 2008 May 27;L.1.

Cullen A. Merck may have bestselling vaccine. *The Globe and Mail* 2007 Oct 5;B.1.

Darf A. Women's health group seeks ban on HPV immunization; Says studies haven't looked at long-term effects of the vaccine and booster shots. *The Gazette* 2007 Sep 27;A.2.

Darf A. Quebec City researcher backs controversial HPV vaccine; Effective in preventing genital warts, cervical cancer. *The Gazette* 2007 Aug 22;A.10.

Downton DR. A cancer vaccine with political will; Controversy over HPV inoculations will not go away. *National Post* 2007 Aug 7;A.1.

Drake L. HPV vaccinations could be routine for B.C. girls. *The Globe and Mail* 2007 Aug 8;S.3.

Faguy S. The Bluffer's Guide: The HPV vaccine. *The Gazette* 2007 Sep 29;B.5.

Fide C. Priority: detecting cervical cancer: Call for testing program ignored, professor says. *The Gazette* 2006 Nov 29;A.10.

Fide C. Vaccination push failing in Ontario; Fears have put parents off program. Lesson for Quebec to learn, conference told. *The Gazette* 2007 Nov 22;A.8.

Fumento M. Do the Math. *National Post* 2007 Aug 10;A.11.

Fung M, Rosen B, Murphy J. HPV vaccine: a new era in cervical cancer prevention. *The Globe and Mail* 2007 Sep 11;A.21.

Gerstel J. Controversy still surrounds HPV shot for girls; Officials happy 60 per cent taking part in Toronto; blame misinformation for lower rates elsewhere. *Toronto Star* 2007 Nov 23;A.2.

Gillespie K. Ads for HPV vaccine yanked; Advertisements will run after election, health ministry says; Auditor decides they contravene rules about government advertising in an election campaign. *Toronto Star* 2007 Sep 18;A.1.

Gillespie K. Girls to get cancer vaccine; McGuinty to announce cervical cancer program for up to 84,000 Grade 8 students across Ontario. *Toronto Star* 2007 Aug 2;A.1.

Harrold M. Quebec voluntary program to target girls as young as 9. *The Gazette* 2007 Sep 25;A.1.

Hazelle PA. Anti-HPV vaccine for all. *National Post* 2007 Feb 9;A.12.

Kirkey S. Young girls require HPV vaccine, panel says. *National Post* 2007 Jan 31;A.1.

Kirkey S. MDs to endorse vaccination of little girls, but critics question rush to inoculate. *The Gazette* 2007 Apr 16;A.1.

Kubacki M. Canadian doctors back HPV vaccine for young girls; 'Very Safe'; Paediatric Society endorses drug to fight cervical cancer. *National Post* 2007 Sep 25;A.8.

Lampert A. Cervical-cancer vaccine okayed for next month. *The Gazette* 2006 Jul 19;A.1.

Laucius J. Ontario to provide HPV vaccine; Grade 8 girls will be offered free treatment. *The Gazette* 2007 Aug 3;A.12.

Laucius J. Medical journal critical of HPV vaccine; Federal Initiative. *National Post* 2007 Aug 2;A.1.

Laucius J. Ontario to pay for HPV vaccine; All Grade 8 Girls Will Have Option This School Year. *National Post* 2007 Aug 3;A.6.

Lippman A. Cancer vaccine untried. *Toronto Star* 2007 Mar 21;A.23.

Levy ET, Lange E. The HPV vaccine series: Healthwatch. *The Gazette* 2007 Nov 26:D.1.

Luft A. Justify your existence. *The Gazette* 2008 Apr 26;B.2.

Macdonald J. Bishops urge caution over HPV vaccination. *The Globe and Mail* 2008 Jun 24;A.10.

Magder J. Quebec explains immunization plan against HPV. *The Gazette* 2008 Apr 12;A.6.

Ogilvie M. Toronto Catholic trustees approve cancer vaccine for female students. *Toronto Star* 2007 Sep 20;A.6.

Ogilvie M. Catholic schools debating moral issue of HPV shot. *Toronto Star* 2007 Sep 19;A.11.

Picard A. How politics pushed the HPV vaccine. *The Globe and Mail* 2007 Aug 11;A.1.

Picard A. Quebec to vaccinate girls against HPV virus. *The Globe and Mail* 2007 Sep 25;A.8.

Picard A. Saving women's lives. *The Globe and Mail* 2007 Sep 21;A.20.

Picard A. Scientific breakthrough or unproven fix? *The Globe and Mail* 2007 Mar 26;A.11.

Picard A. Should HPV vaccinations be extended to young men. *The Globe and Mail* 2007; Mar 27;A.21.

Picard A. Vaccine against cervical cancer approved. *The Globe and Mail* 2006 Jul 19;A.13.

Picard A. Why politics and public health don't mix. *The Globe and Mail* 2008 Feb 21;L.2.

Puxley C. Half of eligible Grade 8 girls declining free HPV vaccine, ministry finds. *The Globe and Mail* 2008 Apr 18;A.12.

Shaprio M. Too many women still going without regular Pap screening. *The Globe and Mail* 2006 Jul 4;A.13.

Stobbe M. Gardasil shots have earned a painful reputation; Girls report trio of needles hurt more than other vaccines. *Toronto Star* 2008 Jan 10;L.2.

Sutcliffe S. Cervical cancer vaccine hailed. *National Post* 2006 Jul 19;A.6.

Talaga T. Should province pay for vaccine?; There's no doubt it works but some think more long-term study is needed. *Toronto Star* 2007 Aug 2;A.18.

Talaga T. Lobbyists boosted vaccine program; Ex-government advisers worked on drug firm's campaign to push immunization program. *Toronto Star* 2007 Aug 16;A.17.

Ubelacker S. Ottawa okays cervical cancer vaccine; Women to have access in weeks Virus transmitted by sexual contact. *Toronto Star* 2006 Jul 21;D.4.

Ubelacker S. Parents, teens support vaccine against virus spread through sex. *The Globe and Mail* 2006 Dec 4;A.7.

Ubelacker S. Don't rush HPV inoculations, group says. *The Globe and Mail* 2007 Aug 2;L.4.

Unnati G. Catholic trustees vote to allow HPV vaccine in schools. *The Globe and Mail* 2007 Sep 20;A.7.

Whittington L. Not all lobbying is 'bad,' Flaherty declares; Ex-aide to PM lobbied for firm producing vaccine. *Toronto Star* 2007 Apr 17;A.6.

Zerbisias A. Vaccine hype aside, Pap smears are the first line of defence. *Toronto Star* 2007; Aug 23:L.2

Zimm A. Girls' cervical cancer vaccine may benefit boys too Study. *Toronto Star* 2007 Aug 28;A.20.