Distribution Agreement

In presenting this thesis or dissertation as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature:

_____ _____

Daniella Figueroa-Downing Date

Factors influencing routine verification of Human papillomavirus (HPV) vaccination status by health care professionals at public health posts in São Paulo, Brazil

By

Daniella Figueroa-Downing
Master of Public Health

Global Epidemiology

_____

Robert A. Bednarczyk, Ph.D. M.S.
Committee Chair

_____

Dabney P. Evans, Ph.D. M.P.H.
Committee Member

_____

Saad B. Omer, M.B.B.S. M.P.H. Ph.D
Committee Member

Factors influencing routine verification of Human papillomavirus (HPV) vaccination status by health care professionals at public health posts in São Paulo, Brazil

By

Daniella Figueroa-Downing

Bachelor of Arts
Middlebury College
2011

Thesis Committee Chair: Robert A. Bednarczyk, Ph.D. M.S.
Thesis Committee Member: Dabney P. Evans, Ph.D. M.P.H.
Thesis Committee Member: Saad B. Omer, M.B.B.S. M.P.H. Ph.D

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Global Epidemiology
2015

Abstract

Factors influencing routine verification of Human papillomavirus (HPV) vaccination status by health care professionals at public health posts in São Paulo, Brazil

By

Daniella Figueroa-Downing

In March 2014, Brazil began a national, school-based immunization campaign against human papillomavirus (HPV) for adolescent girls as part of its National Immunization Program. While the primary immunization site is the school, vaccination of all girls not captured on school immunization days should be conducted at public health posts in the Unified Health System (SUS). As part of their role to ensure universal coverage, health care professionals should be routinely inquiring about immunizations status for all eligible adolescent girls and vaccinating those who were previously unvaccinated. However, it is unclear how health care professionals' perception of the vaccine affects their critical role as a safety net for the school-based HPV immunization campaign.

In August 2014, we conducted a pilot study with 200 health care professionals – doctors, nurses, nurse support staff, and community health agents – at five public health posts in the municipality of São Paulo. Respondents self-administered a questionnaire to assess their personal characteristics; their knowledge about HPV infection and the vaccine; their perceptions towards vaccine benefit, safety and efficacy; and their routine verification of adolescents' immunization status.

Overall, verification of immunization status for adolescent girls in the eligible age range is low - 38.5% of providers never ask about HPV immunization status and 25.0% only occasionally ask. Doctors were the least likely to report always asking, while community health agents (CHAs) were more likely to always ask about HPV vaccination. Respondents who self-identified as being responsible for educating about the vaccine were more likely to always verify immunization status. Knowledge about HPV, the HPV vaccine and the national campaign was mixed. Perceptions of the vaccine were generally positive.

Similarly to other studies, here, knowledge and attitude may not play as central a role in HPV vaccination as other factors. In the context of the Family Health Strategy in Brazil, the CHAs are a crucial component of primary health care, including HPV vaccine promotion. Continued education and support of the CHA is essential for sustainable success of HPV immunization efforts in Brazil.

Factors influencing routine verification of Human papillomavirus (HPV) vaccination status by health care professionals at public health posts in São Paulo, Brazil

By

Daniella Figueroa-Downing

Bachelor of Arts
Middlebury College
2011

Thesis Committee Chair: Robert A. Bednarczyk, Ph.D. M.S.
Thesis Committee Member: Dabney P. Evans, Ph.D. M.P.H.
Thesis Committee Member: Saad B. Omer, M.B.B.S. M.P.H. Ph.D

A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Global Epidemiology
2015

ACKNOWLEDGEMENTS

I truly owe my success to the amazing support system that surrounded me throughout this whole process.

First and foremost, I am eternally grateful to my family for their unconditional support, patience and encouragement along this academic journey.

I would like to acknowledge my wonderful thesis advisors, Robert A. Bednarczyk, Dabney P. Evans, and Saad B. Omer for providing their expertise, insight, and mentorship to this project from conception to completion. I am grateful to all the professors and staff at Emory University's Rollins School of Public Health who provided me the skills and training needed to undertake this project.

I am especially thankful to Misha Baker, Ellen Dias de Oliveira Chiang and Jasmine Camps Claiborne for not only being great co-researchers, but also for being amazing friends. I gratefully acknowledge everyone who helped move this project along, especially Mona Saraiya, Eduardo Franco, Karen Bigatto, and all of the wonderful individuals at University of São Paulo, Instituto do Câncer do Estado de São Paulo, INCT-HPV at Santa Casa Research Institute, and Fundação Oncocentro de São Paulo.

I would like to express my deep appreciation for Iza Baggio, Luisa Villa and Jose Eluf-Neto, who not only provided professional guidance but also showed me unending kindness throughout my time in Brazil.

Finally, I would like to thank my friends, both old and new, who helped me through the most stressful times of the past two years. I am particularly grateful to Gaëlle Sabben and Katie Ragan for being my sounding board and extra set of eyes.

Funding for this project was provided by Emory University's Global Health Institute.

TABLE OF CONTENTS

ACRONYM LIST

BCG	Bacillus Calmette-Guérin (tuberculosis vaccine)
CHA	Community health agent
DALY	Disability-adjusted life year
DNA	Deoxyribose nucleic acid
ESF	Estratégia da Saúde da Familia
HPV	Human papillomavirus
MOH	Ministry of Health
PNI	Programa Nacional de Imunizações (National Immunization Program)
SBIP	School-based Immunization Program
SUS	Sistema Unico da Saúde (Unified Health System)

CHAPTER I:
BACKGROUND

Human papillomavirus

Human papillomavirus (HPV) is a deoxyribonucleic acid (DNA) virus that has specific tropism for epithelial cells, both mucosal and non-mucosal. Infection with many of the over 100 types of the virus is associated with genital warts and cancers of the cervix, vulva, vagina, anus, penis, and oropharynx. HPV infects approximately 660 million individuals around the world each year, with the majority of sexually active adults being infected at least once in their lifetime [1]. This number continues to increase as testing methods for HPV infections become more advanced. Most infections with HPV are naturally resolved by the body within a year; however, repeat or persistent infection with high-risk strains can lead to cellular dysplasia, neoplasia and, eventually, cancer.

By far the most predominant cancer caused by HPV infection is cervical cancer. Cervical cancer is the fourth most common female cancer in the world, and the second most common cancer in women 15-44 years old worldwide, responsible for over 265,000 deaths in 2012 [2]. Infection with one of the HPV types is a necessary, but not sufficient, cause of cervical cancer [3], with about 70% of cervical cancers being caused by two high-risk types: HPV-16 and -18 [2, 4].

Screening and treatment of cervical cancer are costly economic endeavors with reverberating effects. Women themselves often shoulder this cost burden, and the distribution of cervical disease is not equal throughout the global. Women in developing countries are disproportionately affected by cervical cancer, which is often compounded by poor health system structure and lack of access to screening and treatment [2, 5]. Of

the approximately 265,000 deaths from cervical cancer worldwide, over 85% occur in the developing world [2]. The economic impact of the disability-adjusted life years (DALYs) lost from cervical cancer equates to approximately $US 1.3 billion in low-income countries in 2008 alone [5].

HPV and HPV-related disease in Brazil

Estimates of HPV infection prevalence in Brazil vary significantly by region from 2.3% - 35.0% [2]. Similar to the rest of the world, the two most common strains in Brazil are the highly oncogenic HPV-16 and -18 [2]. They account for about 5% of all HPV infections in women at a given time [2]. Among Brazilian women, cervical cancer causes approximately 18,503 new cases and 8,414 deaths per year, making it the second most common cancer and the fourth most deadly cancer for women in Brazil [2, 6]. The majority of these infections occur in women between the ages of 15 and 44, which has long term implications for morbidity associated with screening and treatment, such as fertility complications [2, 7].

Cancers of the anus, vulva, vagina, penis and oropharynx caused by HPV are less common; however, the number of these cancers has been growing in recent years. This could be due to greater prevalence of HPV or improved ability to detect HPV cancers. The relationship between HPV and cancers in these sites is still being fully explored, but infection by HPV-16 has been identified as a crucial element in these cancers [2]. Crude incidence rates for males in Brazil are 0.1-0.7 per 100,000 for anal cancer, 1.3-2.1 per 100,000 for penile cancer and 4.7 per 100,000 for oropharyngeal cancers [2]. For Brazilian women, incidence rates are 0.5-1.2 per 100,000 for anal cancer, 0.5-1.7 per

100,000 for vulvar cancer, 0.5-0.9 per 100,000 for vaginal cancer and 0.9 per 100,000 for oropharyngeal cancer [2]. As mentioned previously, these rates will likely increase as a more complete understanding of the link between HPV and anogenital and oropharyngeal cancers is understood.

The impact of HPV infection rates in Brazil is compounded by complications surrounding screening and detection of cellular changes caused by the virus. The only HPV-cancer that has an effective screening test to detect early cellular changes is cervical cancer. However, there are issues with access to cervical screening using Papanicolaou tests or Pap tests. When used according to recommended guidelines, the Pap test is effective in recognizing pre-cancerous lesions in the cervix. While more women in Brazil are receiving Pap tests, a serious disparity still exists between rural and urban areas by region. Martinez-Mesa et al. found that, adjusted for age, about twice as many women ages 25-64 living in rural areas in Brazil had never been screened for cervical cancer (22%) as compared to women living in urban areas (12%) [8]. By region, the range was 10% to 17% of women never being screened, with the North and the Northeast having a higher proportion of unscreened [8].

Some women are receiving services more frequently than dictated by the national guidelines [9], while others are not receiving services [8] and, as a result, the screening program for cervical cancer is not being utilized to its full potential. These disparities are illustrated by startling difference in crude incidence rates of cervical neoplasia by state in Brazil. In São Paulo, rates are about 8.5 per 10,000 women whereas in Amazonas the number is over four-fold larger, at 35.1 per 10,000 women [6]. In light of access issues to screening tests and the burden of HPV infection, the introduction of the HPV vaccine into

the routine immunization schedule for adolescent girls is a cost-effective prevention technique [10].

HPV vaccine presents a unique opportunity for primary prevention of cancer. The ability of the vaccine to preempt infection with high-risk HPV types, as opposed to secondary detection of associated disease, is a major benefit of dedicating resources to supplying this vaccine. Through effective and appropriate implementation of a national vaccination strategy, Brazil can lower the prevalence of HPV infection and drastically impact the rates of HPV cancers in both males and females countrywide.

Demographics

Brazil is the fifth largest country in the world, based both on geography and population, with approximately 202 million residents [11, 12]. The vast majority of Brazilians live in urban areas and most are younger than 30 years old [11]. It is a racially and ethnically diverse country: in 2008, 48% of Brazilians self-identified as white, 44% as brown, 7% as black, and the rest as Asian, indigenous or other [11].

Brazil is composed of 26 states and one Federal district, often grouped by regions: Northern, Northeast, Central-West, Southeast, and Southern. The regions have very different demographics, sociocultural influences, topography, and disease profiles. São Paulo is the largest city in Brazil with more than 11 million residents, making it the seventh biggest city in the world [12]. As the largest city in Brazil, São Paulo has over 400 health posts serving its population.

Unified Health System & National Immunization Program

The right to health care is assured under the 1988 Brazilian Constitution. The constitution explicitly enshrines the rights of equal access to health services and the right to health. As part of this constitutional right, the government of Brazil resolved to establish the Unified Health System (SUS, in Portuguese), which provides health care free of cost to its citizens, including all immunizations deemed necessary by the Ministry of Health (MOH).

To ensure this access to immunization, Brazil established the National Immunization Program (PNI, in Portuguese) in 1973 to coordinate immunization efforts throughout Brazil. The MOH offers all designated vaccines free of charge through the PNI. Rates for common childhood immunizations are very high throughout Brazil, with 99% coverage of Bacillus Calmette-Guérin (BCG) vaccine and 97% coverage with polio vaccine [13]. PNI is also widely accepted by Brazilians and is seen as the primary resource for receiving immunizations, regardless of whether individuals utilize the public health system or the smaller, private health system.

In 1994, SUS underwent another reformation with renewed focus on primary care as the gatekeeper for the health care system as a whole. This led to the creation of the Family Health Strategy (ESF in Portuguese, formerly the Family Health Programme), a universal and free primary care system arranged geographically to cover all Brazilians [14]. Each ESF unit is a multidisciplinary team composed of family health or community health doctors and nurses, nurse support staff – either auxiliary or nurse technician – and community health agents (CHAs). The ESF team manages a set caseload of no more than 1,000 households from the community they serve, ensuring the patient will see the same

team each time they visit. Ideally, each team works as a cohesive unit to support and promote the general health and wellbeing of their patients as a whole.

Community Health Agents

A key component of ESF are the CHAs, individuals from the community who receive training and supervision to support the primary care efforts of the team in their designated micro-area. CHAs are non-medical personnel who are responsible for visiting a caseload of community patients to perform a wide range of tasks such as breastfeeding education and support [15], immunization reminders, chronic disease management and referrals to the health post, among others [14, 16]. Each CHA on the ESF team is assigned approximately 150 households and is responsible for conducting monthly home visits to cover the range of primary care support services designated by their health post [14].

The utilization of CHAs has contributed to improvements in health outcomes across the spectrum in maternal and child health [14], promotion of immunization, education about breastfeeding [17], TB treatment adherence [18], and lower hospitalization rates [19]. CHAs are a direct connection to the community and serve as the major source of education and information about health for many of its members [20-23]. Therefore, continued support of this group of health care workers is highly important to the successful promotion of primary health care throughout Brazil.

Health care providers and HPV vaccine

Health care providers have been identified as key influencers of health care decisions, particularly related to screening and prevention of HPV cancers [24-27]. In countries such as the United States, interventions targeting health care professionals have been successful in increasing HPV vaccination rates among adolescents [28].

Provider characteristics appear to be related to HPV vaccination behaviors as well as cervical cancer screening and prevention. Different health care provider types may be more or less likely to be knowledgeable about HPV cancer, perform regular Pap tests and routinely recommend and administer the HPV vaccine [9, 29-31]. These differences in knowledge and attitudes, as well as demographic factors such as physician specialty and age, are suggested to influence the recommendation of the HPV vaccine [29, 31].

While there is a breadth of research on knowledge, attitudes and beliefs towards the HPV vaccine among parents of adolescents, women, and men, the role of the health care provider in vaccination has not been fully explored. The majority of research that has been conducted around this topic has focused more on health care provider reported barriers for parents, and has almost singularly been conducted in the US context [32, 33].

HPV vaccination campaign

In March 2014, the Brazilian MOH, through PNI, launched a national immunization campaign against HPV: all girls aged 11 to13 were eligible to receive three doses of HPV vaccine with the second and third dose being administered six months and five years after the initial dose, respectively. Brazil has chosen to adopt this extended dosing schedule due to clinical trials demonstrating non-inferior immune responses for a two-dose series

as compared to three for younger adolescents, for both the quadrivalent [34] and bivalent vaccines [35]. The MOH is now providing the quadrivalent vaccine, brand name Gardasil, which is effective in preventing genital warts, early low-grade cancers, pre-cancerous lesions, and HPV-related cancers [36].

Between March and June of 2014, more than 3 million girls received their first dose of HPV vaccine, easily surpassing the target rate of 80% coverage. Prior to the national immunization effort, HPV vaccination rates for girls 10 to 14 years old in Brazil were 1.54%, 1.31% and 0.07% for first, second, and third dose, respectively [37]. The majority of these doses were administered through the small private health system where the cost of vaccination falls on the patient. However, this rate jumped to 87% of eligible adolescent girls having received one dose of vaccine as of August 2014. In the first six months following the vaccination campaign, rates do vary considerably by state, ranging from 80.54% 98.74%[1] [37]. As of April 2015, Brazil is reporting that all eligible girls around the country have been vaccinated with one dose of HPV vaccine. The state vaccination rates range from 95% in Rio Grande do Norte to all girls in the state of Mato Grosso do Sul [37].

Since the introduction of the HPV vaccine in Brazil, there has been some media coverage of adverse events following vaccination. In the south of Brazil, vaccination was temporarily suspended due to problem with one of the vaccine lots. More recently, a television station ran a report on temporary paralysis following vaccination at a school in the city of São Paulo [38]. While these two events did not spark widespread reaction, they may present a future obstacle to continued success of the vaccination program. In

[1] These rates do not include data from Amazonas and Brasilia (DF), two states that launched individual HPV vaccine campaigns prior to 2014.

the US and the UK, for example, reports of adverse events have led to an increasing distrust of the vaccine [39] despite evidence that the vaccine does not pose any additional risk to the vaccine recipient [40, 41].

The campaign was structured as a school-based immunization program (SBIP), with vaccination of any girl missed on SBIP days being vaccinated in the primary health posts. As part of their role to ensure universal coverage, health care providers should be routinely inquiring about immunizations status for all eligible adolescent girls and vaccinating those who were previously unvaccinated.

The recent introduction of the HPV vaccine on a national scale in Brazil, coupled with the structure of SUS and PNI, has revealed a gap in the literature examining the impact of health care professional's characteristics and perceptions on their critical role as a safety net for the school-based HPV immunization campaign.

CHAPTER II:
MANUSCRIPT

Factors influencing routine verification of Human papillomavirus (HPV) vaccination status by health care professionals at public health posts in São Paulo, Brazil

Authors: *Daniella Figueroa-Downing[1], Misha L. Baker[2], Ellen Dias De Oliveira Chiang[3], Luisa Villa[4] PhD, Maria Luiza Baggio[5], Jose Eluf Neto[6] MD, Saad B. Omer MD, Robert A. Bednarczyk[8] PhD, Dabney P. Evans[9] PhD, MPH*

Author Affiliations:
[1]*Emory University, Rollins School of Public Health, Department of Behavioral Science and Health Education, Atlanta, GA, USA*
[2]*Emory University, Rollins School of Public Health, Departments of Epidemiology & Global Health, Atlanta, GA*
[3]*Emory University, Emory College, Atlanta, GA, USA*
[4]*Instituto do Câncer do Estado de São Paulo, ICESP; Department of Radiology and Oncology, School of Medicine, University of São Paulo, Brazil*
[5]*Instituto do Câncer do Estado de São Paulo, ICESP, São Paulo, Brazil;*
[6]*Department of Preventive Medicine, School of Medicine, University of São Paulo, Brazil; Fundação Oncocentro de São Paulo, FOSP, São Paulo, Brazil*
[7]*Emory University, Rollins School of Public Health, Departments of Epidemiology & Global Health; Emory Vaccine Center, Atlanta, GA*
[8]*Emory University, Rollins School of Public Health, Departments of Epidemiology & Global Health; Cancer Prevention and Control Program, Winship Cancer Institute; Emory Vaccine Center, Atlanta, GA*
[9]*Emory University, Rollins School of Public Health, Departments of Behavioral Science and Health Education & Global Health, Atlanta, GA, USA*

INTRODUCTION

Human papillomavirus (HPV) is a necessary cause of cervical cancer and a major contributor to the global burden of genital warts as well as vulvar, vaginal, penile, anal and oropharyngeal cancers [2]. Rates of diseases caused by HPV continue to shift as detection of these infections becomes more advanced. Estimates of prevalence of HPV infection in Brazil vary significantly by region from 2.3% - 32.7% [2]. The two most common types in Brazil are the highly oncogenic HPV-16 and -18, which account for approximately 70% of all cervical cancers and a large proportion of the other HPV cancers [42]. Cervical cancer is the fourth leading cause of cancer-deaths among Brazilian women, responsible for over 250,000 deaths per year [6].

In March 2014, the Brazil Ministry of Health (MOH) launched a national immunization campaign against HPV; all girls aged 11 to 13 were eligible to receive three doses of HPV vaccine at 0, 6 months and 5 years as part of the National Immunization Program (PNI, in Portuguese) [43]. The campaign was structured as a school-based immunization program, with catch-up vaccination conducted in primary health posts by health care professionals. As part of their role to ensure universal coverage, health care professionals should be routinely inquiring about immunizations status for all eligible adolescent girls and vaccinating those who were previously unvaccinated. In this capacity, they serve as a safety net for girls who were not reached through routine immunization efforts.

Within the context of the historically successful PNI, Brazil was able to surpass its target of 80% coverage for first dose; however it is unclear how health care professionals' perception of the vaccine affects their critical role as a safety net for the

school-based HPV immunization campaign. In a pre-campaign study by Stormo et al. (2013), health care professionals reported being supportive of HPV vaccination, especially for girls older than 13 years of age [9], but there have not been any studies since the launch of the HPV vaccine in Brazil examining health care professionals' knowledge and perceptions of the vaccine. There is evidence that different provider types have different recommendation and promotion behaviors surrounding HPV vaccine and cervical cancer screening [9, 29].

This pilot study used quantitative research methods to evaluate the role of demographic characteristics, knowledge about HPV, and perceptions of the HPV vaccine in mediating routine immunization verification by health care providers. This study examined whether different provider types – doctors, nurses, nurse support staff, and community health agents – had different verification patterns based on influencing factors.

METHODS

Study Sample

A convenience sample of health professionals was selected from five public health posts in the Western region of São Paulo, Brazil. For this study, eligible health care professions included physicians, nurses, auxiliary nurses, nurse technicians, laboratory technicians, and community health agents (CHAs). Administrative staff, front desk staff, and other staff not directly involved in patient medical care were not eligible for this survey and were not approached for recruitment. A complete list of all eligible health care professionals at each post was obtained and served as the sampling frame.

Two recruitment visits were made at each site. All health care professionals present in the health post on either of those visits were approached and provided information about the study. Refusal rate was recorded. Individuals who expressed interest in the study were given a copy of the informed consent to review. The interviewer and participant then reviewed the research objective, methods, and rights of the participant to ensure understanding and informed consent. Participants who signed the informed consent form were considered enrolled in the study and were assigned a unique numerical identifier.

Survey

Data were collected using a self-administered written survey. There were a total of three site visits: two recruiting days and one final visit to collect any remaining surveys. Participants were given a copy of the survey to fill out at their convenience and return prior to the interview team's last site visit. Participants who did not return the

surveys within those two site visits were considered lost to follow up. The survey was classified exempt by Emory University's Institutional Review Board and was subsequently approved by both University of São Paulo's Ethical Review Board and the Prefeitura of São Paulo Review Board.

The instrument consisted of 32 quantitative and three open-ended questions. This report only details the findings from the quantitative portion of the survey. The survey was front and back translated in Brazilian Portuguese by fluent Portuguese speakers. The instrument was then verified by partners at University of São Paulo for linguistic and cultural appropriateness. The instrument was divided into four sections: demographics, knowledge, perceptions, and practices.

The demographic section included questions about participant's age, sex, profession, specialty, number of years since graduation, number of years working in SUS; and questions about demographics of clinic such as number of patients, percentage of adolescent patients and number of pap smear screenings at clinic. The knowledge section contained questions about the correct number of HPV types, whether HPV was sexually transmitted, the areas of the body that HPV can infect, the infections and diseases that the quadrivalent vaccine protects against, and the dosing schedule and target population for the MOH immunization campaign.

The perceptions section contained questions related to perceived risk, perceived severity and perceived safety of the HPV vaccine. Participants were asked to mark if they agreed with, were neutral about, or disagree with seven statements about HPV and HPV vaccine, such as "it is important to prevent HPV infections in adolescent girls in this

community" and "The Garadasil vaccine is effective at preventing infection with HPV types -6, -11, -16 and -18" (Table 4).

The final section asked about immunization practice. Respondents were queried on the following: identify the person primarily responsible for education about HPV vaccine in the clinic; identify the person primarily responsible for administration of the HPV vaccine in the clinic; their recent history of immunizations; and willingness to vaccinate girls outside of the eligible age range. This section contained the outcome variable of interest: "In this clinic, do you regularly ask girls ages 11 to 13 years old of they have been vaccinated against HPV?" The sections were labeled for internal organization, but labels were not provided on the surveys to avoid influencing participants' responses.

Data Analysis

Data were double entered in EpiInfo 3.5 (U.S. Centers for Disease Control and Prevention, Atlanta, GA); all statistical analyses were performed using SAS 9.2 (The SAS Institute, Cary, NC). Data were verified and reviewed for improbable, implausible, and missing values. Descriptive statistics were computed and are reported in frequencies and percentages.

A summary score of the perception questions was calculated with low perception scores defined as being in concordance with 0 to 2 of the perception questions, medium scores defined as being in concordance with 3 or 4 of the perception questions, and high scores defined as being in concordance with 5 to 7 of the perception questions. The

outcome of interest, routine verification, was categorized into three levels: always, sometimes, and never asking whether the patient had received HPV vaccine.

The outcome was examined by demographic, knowledge, and perception variables using prevalence ratios with 95% confidence intervals. Routine verification (always or sometimes asking, relative to never asking) was modeled using Poisson regression to assess the impact of demographics, knowledge, and perceptions on health care professional actions, while controlling for other factors through estimation of adjusted prevalence ratios with 95% confidence intervals.

RESULTS

Within the five health posts, a total of 280 health care professionals were approached for this study. Of those, 212 healthcare professionals agreed to participate (75.7%), and 201 completed the survey. The overall response rate was 72%. Health post specific response rates ranged from 64% to 82%. One survey was excluded from analysis because it was the participant's first day employed in a health care setting and the participant did not fill out any relevant information. A total of 200 surveys were analyzed for this report.

Participants were predominantly female (83.5%) and between the ages of 30 and 45 years, with 52 participants under the age of 30 (26.0%) and 37 participants 45 years and older (18.5%) (Table 1). The health care professional types represented were 62 CHAs (31.0%), 59 nurse support staff (29.5%), 40 doctors (20.0%), and 33 nurses (16.5%). Four participants self-identified as another profession type: administrative assistant, pharmacy staff and social worker. The majority of the respondents had been employed in SUS for less than 5 years (n=108, 54.0%) (Table 1).

Health care professional type

Respondents were most likely to never ask about vaccination status (n=74, 38.5%), with only 36.5% reporting that they always verify (n=70) and one-quarter reporting that they do not regularly verify (n=48, 25.0%). Nurse technicians and community health agents (CHAs) were most likely to report always verifying HPV vaccination status (n=6, 66.7%; n=32, 53.3%, respectively) whereas doctors were the least likely (n=5, 12.8%). Doctors were significantly less likely to always verify HPV

vaccination status than CHAs in bivariate analyses (PR 0.23, 95% CI 0.1, 0.53); this remained significant in multivariate analyses controlling for all other variables (aPR 0.24, 95% CI 0.07, 0.87) (Table 2).

Knowledge

Participant knowledge about HPV and HPV vaccine was varied. While almost all participants knew that HPV was sexually transmitted (n=194, 98.5%), only 50.0% were able to identify that there are over 100 types of HPV (n=100) (Table 3). The majority of participants knew that HPV infects at least the anogenital region (n=169, 84.5%) (Table 3). Knowledge of the protective benefits of the vaccine, beyond the HPV types, was low with very few respondents recognizing the vaccine indications for anal and penile cancer (Table 3).

Almost all health care professionals knew the correct target population for the 2014 campaign: girls only between the ages of 11 and 13 years (n=170, 85.0%). However, a little under two-thirds of respondents knew the correct dosing schedule: second and third doses at 6 months and 5 years after the initial dose, respectively (n=118, 59.0%) (Table 3). Correct knowledge of dosing schedule was a significant predictor of always verifying vaccination status in bivariate analysis (PR 1.61, 95% CI 1.07, 2.42) (Table 2). After controlling for all other variables in the model, individuals who knew the correct dosing schedule were twice as likely to always verify HPV vaccination receipt (aPR 2.31, 95% CI 1.01, 5.29) (Table 2).

Perceptions

Overall, respondents had positive perceptions towards the HPV vaccine with 36.5% having medium summary scores (n=73) and 42.0% having high summary scores (n=84) (Table 4). A majority of respondents said the vaccine was safe for the population and effective for preventing HPV infection. At least 60% of respondents perceived the adolescent population as being at risk for infection and agreed that it was important to prevent HPV infections (Table 4).

Less than half of health care professionals agreed that the vaccine prevented genital warts, cervical cancer and pre-cancerous lesions or other anogenital cancers (n=92, 48.7%; n=89, 46.1%; n=47, 24.9%, respectively) (Table 4). These responses are consistent with the responses on the knowledge portion about HPV vaccine protection.

Responsibility for education about and administration of HPV vaccine

Nurses and nursing support staff (nurse technicians and auxiliary nurses), respectively, were identified as being primarily responsible for educating about HPV vaccine (Table 1). However, only 25.4% of all respondents mentioned CHAs as responsible for education (n=49) and less than half of CHAs identified themselves as being responsible for education (n=26, 44.1%) (Table 6). The members of the nursing team – nurses, nurse technicians, and auxiliary nurses – were identified as the primary vaccine providers, with auxiliary nurses being identified by 76.4% of respondents (n=149) (Table 7).

DISCUSSION

This pilot study reinforces the importance of augmenting the capacity of the Community Health Agent (CHA) as the connection between the community and preventive care in the public health care system. While knowledge about and perceptions towards HPV vaccine are mixed, these factors do not seem to be the primary determinants of routine verification of HPV immunization status by health care professionals in public health posts in the Western region of São Paulo, Brazil.

Previous studies on cervical cancer prevention and HPV in Brazil found that health care professionals tend to support vaccination of adolescents, regardless of their knowledge about HPV [9]. This is reflected by Brazil's ability to successfully reach their target coverage rates, especially in the city of São Paulo, which has reached nearly 100% coverage for the first dose [44]. However, knowledge of the protective benefits of the vaccine was generally low across health care professional type. For the long-term success of the program, it is important to provide additional training and education to ensure that they can adequately respond to questions and concerns that may arise as HPV vaccination becomes more established.

Some recent international studies have found that knowledge may not be strongly linked to vaccination as was conventionally thought [45, 46], and the data from this study seem to suggest this holds true in Brazil as well. This finding may reflect the role of the community health agent (CHA) in the public health Family Health Strategy (ESF, in Portuguese). CHAs are members of the community who receive brief training to provide essential primary cares support such as chronic disease management, immunization reminders and medical referrals to the health post, among others [14, 16].

In this context, CHAs represent the operationalization the natural helper model of health promotion [47]. CHAs are generally individuals recruited from the community who serve as liaisons between the patients and the public health post, as well as health promoters. Their effectiveness stems from the combination of being part of the community they serve and having a role as part of the ESF team. Their ability to access the population outside of health posts reinforces the importance of their role as routine vaccine verifiers.

The utilization of CHAs in Brazil has contributed to improvements in health outcomes across in maternal and child health [14], breastfeeding education and support [17], TB treatment adherence [18], and decreased unnecessary hospitalization rates [19]. In this pilot study, CHAs self-reported as more likely to always or sometimes verify vaccination status than never. However, they were not identified as being primarily responsible for education about HPV vaccine by either themselves or by the other members of the ESF team. This may reflect a lack of understanding of the full value of the CHA as the primary health contact for the community.

CHAs should continue to receive the necessary support and education needed to successfully complete their role as immunization verifiers. In their capacity as the link between the community and the health care system, they can serve as a driver for the sustainability of the HPV immunization program as the campaign moves forward.

The strengths of this study were the novelty of the topic: a study to understand the role health care professionals' knowledge and perceptions play in HPV immunizations; as well as the high response rates in the health posts. This is the first study attempting to understand how school-based immunization programs and the public health system fit

together in Brazil. This pilot study was conducted shortly after the first dose was administered, providing baseline data for comparison in future studies. This study identified some trends that merit further exploration.

A limitation of this study is that it is a cross-sectional, pilot study with a small number of participants, making it difficult to discern any statistically significant differences between the subgroups though analysis. These data were collected from five health posts grouped in the Western region of the city of São Paulo so the respondents were not representative of all health care professionals in São Paulo or Brazil; however, this study provided the preliminary data to serve as a scale-up point for future studies. Responses were self-reported and may have been subject to recall and desirability bias. The research team was able to test out the self-administered questionnaire and identify improvements for a larger forthcoming study.

While there may be gaps in knowledge about HPV and the vaccine among health care professionals, they are generally accepting of the vaccine. Increased emphasis on routine verification of immunization status by all members of the family health team should be prioritized as the campaign progresses. The Brazilian Ministry of Health should continue to support the CHAs efforts as the source of information from the community level. This study points to the need more information on the role of CHAs in the HPV immunization campaign specifically and a deeper understanding of their training and support needs related to HPV immunization.

TABLES

Table 1. Demographic characteristics, knowledge, attitudes and practice by routine asking about HPV vaccination status in primary health posts in São Paulo, Brazil. 2014.

Characteristic		Overall	Always ask N (%[d])	Sometimes ask N (%[d])	Never ask N (%[d])	Missing N
		200	70 (36.5)	48 (25.0)	74 (38.5)	8
Age	Less than 30	52	18 (35)	12 (23)	22 (42)	0
	30-34	46	15 (34)	10 (23)	19 (43)	2
	35-39	44	17 (43)	8 (20)	15 (38)	4
	40-44	19	8 (47)	4 (24)	5 (29)	2
	45 or older	37	11 (30)	14 (38)	12 (32)	0
Gender	Female	167	61 (38)	41 (26)	59 (37)	6
	Male	28	8 (31)	5 (19)	13 (50)	2
Health care professional type	Doctor	40	5 (13)	8 (21)	26 (67)	1
	Nurse	33	11 (38)	5 (17)	13 (45)	4
	Nurse Technician	9	6 (67)	1 (11)	2 (22)	0
	Auxiliary Nurse	50	14 (29)	20 (41)	15 (31)	1
	Community Health Agent	62	32 (53)	14 (23)	14 (23)	2
Time working in Unified Health System	Less than 5 years	108	41 (39)	27 (26)	36 (35)	4
	More than 5 years	82	23 (29)	20 (26)	35 (45)	4
Number of HPV types	Correct	100	26 (27)	26 (27)	43 (45)	5
	Incorrect	80	35 (45)	18 (23)	25 (32)	2
Areas that HPV infects	All three regions[a]	56	11 (21)	10 (19)	31 (60)	4
	At least anogenital region	113	47 (42)	32 (29)	31 (29)	2
	Region other than anogenital	19	4 (25)	5 (31)	7 (44)	2
Campaign target population	Correct	170	56 (34)	44 (27)	64 (39)	6
	Incorrect	27	13 (52)	4 (16)	8 (32)	2
Campaign dosing schedule	Correct	118	47 (41)	32 (28)	36 (31)	3
	Incorrect	73	19 (28)	14 (21)	35 (51)	5
Perceptions score[b]	High	84	31 (40)	24 (31)	23 (29)	6
	Medium	73	23 (32)	15 (21)	34 (47)	1
	Low	43	16 (38)	9 (21)	17 (40)	1
Responsible for vaccine education[c]	Yes	96	38 (41)	23 (25)	31 (34)	4
	No	91	30 (34)	22 (25)	37 (42)	2
Responsible for vaccine administration[c]	Yes	58	21 (37)	19 (33)	17 (30)	1
	No	131	47 (37)	28 (22)	51 (40)	5

[a] Anogenital region, oral mucosa and skin

[b] Composite score from seven perception questions fell into ranking as high, medium or low perception of HPV vaccine

[c] Self-identified

[d] Percentages calculated using total respondents to question about routine verification of HPV vaccianation

Table 2. Bivariate and Multivariate predictors of always and sometimes verifying human papillomavirus vaccination status at public health posts in São Paulo, Brazil, 2014.

		Bivariate Analysis PR (95% CI)[a]		Multivariate Analysis[b] aPR (95% CI)[c]	
		(Always: Never)	(Sometimes: Never)	(Always: Never)	(Sometimes: Never)
Age	Less than 30	0.94 (0.54, 1.63)	0.66 (0.38, 1.17)	1.14 (0.36, 3.59)	0.64 (0.20, 2.02)
	30-34	0.92 (0.52, 1.63)	0.64 (0.35, 1.18)	1.21 (0.46, 3.16)	0.44 (0.15, 1.32)
	35-39	1.11 (0.64, 1.90)	0.65 (0.33, 1.25)	1.20 (0.45, 3.17)	0.58 (0.20, 1.65)
	40-44	1.29 (0.70, 2.36)	0.82 (0.37, 1.86)	1.41 (0.43, 4.66)	0.69 (0.20, 2.41)
	45 or older	Referent	Referent	Referent	Referent
Gender	Female	1.32 (0.75, 2.35)	1.48 (0.68, 3.22)	0.65 (0.21, 2.04)	0.72 (0.22, 2.37)
	Male	Referent	Referent	Referent	Referent
Health care professional type	Doctor	0.23 (0.10, 0.53)	0.47 (0.23, 0.96)	0.24 (0.07, 0.87)	1.31 (0.38, 4.53)
	Nurse	0.66 (0.41, 1.06)	0.56 (0.24, 1.28)	0.35 (0.11, 1.14)	1.09 (0.30, 3.99)
	Nurse Technician	1.08 (0.69, 1.68)	0.67 (0.13, 3.45)	0.58 (0.15, 2.25)	0.78 (0.09, 6.57)
	Auxiliary Nurse	0.69 (0.45, 1.06)	1.14 (0.72, 1.83)	0.24 (0.05, 1.12)	8.49 (1.26, 57.04)
	Community Health Agent	Referent	Referent	Referent	Referent
Time working in Unified Health System	Less than 5 years	1.34 (0.92, 1.96)	1.18 (0.75, 1.85)	0.82 (0.35, 1.96)	1.28 (0.51, 3.22)
	More than 5 years	Referent	Referent	Referent	Referent
Number of HPV types	Correct	0.67 (0.45, 0.94)	0.90 (0.57, 1.43)	0.73 (0.33, 1.59)	1.05 (0.40, 2.73)
	Incorrect	Referent	Referent	Referent	Referent
Areas that HPV infects	All three regions[d]	0.62 (0.27, 1.46)	0.58 (0.25, 1.38)	1.43 (0.32, 6.41)	0.31 (0.07, 1.35)
	At least anogenital region	1.42 (0.71, 2.86)	1.20 (0.59, 2.45)	1.69 (0.46, 6.13)	0.50 (0.15, 1.69)
	Region other than anogenital	Referent	Referent	Referent	Referent
Campaign target population	Correct	0.75 (0.51, 1.11)	1.22 (0.53, 2.81)	0.40 (0.15, 1.05)	1.35 (0.30, 6.12)
	Incorrect	Referent	Referent	Referent	Referent
Campaign dosing schedule	Correct	1.61 (1.07, 2.42)	1.65 (0.99, 2.74)	2.31 (1.01, 5.29)	1.69 (0.61, 4.70)
	Incorrect	Referent	Referent	Referent	Referent
Perceptions score[e]	High	1.18 (0.78, 1.80)	1.48 (0.81, 2.68)	0.74 (0.32, 1.70)	1.23 (0.48, 3.12)
	Medium	0.83 (0.52, 1.34)	0.88 (0.45, 1.74)	0.57 (0.24, 1.37)	0.53 (0.18, 1.54)
	Low	Referent	Referent	Referent	Referent
Responsible for vaccine education[e]	Yes	1.23 (0.87, 1.73)	1.14 (0.73, 1.80)	1.35 (0.70, 2.60)	1.15 (0.55, 2.41)
	No	Referent	Referent	Referent	Referent
Responsible for vaccine administration[f]	Yes	1.15 (0.81, 1.64)	1.49 (0.97, 2.29)	1.36 (0.37, 5.05)	0.14 (0.02, 1.00)
	No	Referent	Referent	Referent	Referent

[a]Prevalence ratio (95% confidence interval)
[b]Adjusted for all other factors presented in the table
[c]Adjusted prevalence ratio (95% confidence interval)
[d]Anogenital region, oral mucosa and skin
[e]Composite score from seven perception questions ranked as high, medium or low perception of HPV vaccine
[f]Self-identified

Table 3. Knowledge about human papillomavirus, human papillomavirus vaccine and Brazil's national immunization campaign among public health care professionals in São Paulo, Brazil, 2014.

		N (%)
Number of HPV types	4 types	17 (8.5)
	10 types	9 (4.5)
	20 types	11 (5.5)
	More than 100 types	100 (50.0)
	Don't know	43 (21.5)
HPV is sexually transmitted	Yes	194 (98.5)
	No	0 (0.0)
	Don't know	3 (1.5)
Areas HPV infects[1]	Anogenital region	169 (84.5)
	Oral mucosa	103 (51.5)
	Skin	63 (31.5)
	Don't know	11 (5.5)
Vaccine protection[1]	HPV-6, -11, -16, -18	146 (73.0)
	Anal cancer	24 (12.0)
	HIV	5 (2.5)
	Genital warts	50 (25.0)
	Colon cancers	14 (7.0)
	Cervical cancer	69 (34.5)
	Penile cancer	21 (10.5)
	Don't know	21 (10.5)
Campaign target population	Girls only, 11-26 years	5 (2.5)
	Girls only, 11-13 years*	170 (85.0)
	Girls and boys, 11-26 years	4 (2.0)
	Girls and boys, 11-13 years	8 (4.0)
	Other	7 (3.5)
	Don't know	3 (1.5)
Campaign dosing schedule	Initial, 6 months, 5 years*	118 (59.0)
	Initial, 1 month, 6 months	24 (12.0)
	Initial, 2 months, 6 months	11 (5.5)
	Other	1 (0.5)
	Don't know	37 (18.5)

[1]Respondent had option to choose multiple answers, so percentages may not add up to 100%

*Denotes correct answers as per Brazil's national HPV immunization campaign

Table 4. Perceptions about the human papillomavirus vaccine among public health care professionals in São Paulo, Brazil, 2014.				
	Agree	Neutral	Disagree	Don't know
Adolescent girls are not likely to be infected with HPV (n=197)	20 (10.2)	24 (12.2)	146 (74.1)	7 (3.6)
Important to prevent HPV infections in adolescent girls (n=199)	182 (91.5)	14 (7.0)	3 (1.5)	0 (0.0)
Vaccine effective at preventing HPV infection (n=197)	137 (69.5)	36 (18.3)	5 (2.5)	19 (9.6)
Vaccine not effective at preventing cervical cancer and pre-cancerous lesions (n=193)	21 (10.9)	42 (21.8)	89 (46.1)	41 (21.2)
Vaccine not effective at preventing other anogenital cancers (n=189)	55 (29.1)	35 (18.5)	47 (24.9)	52 (27.5)
Vaccine is effective at preventing genital warts (n=189)	92 (48.7)	26 (13.8)	31 (16.4)	40 (21.2)
Vaccine is safe to administer to adolescent girls (n=195)	117 (60.0)	38 (19.5)	9 (4.6)	31 (15.9)

Table 5. Common answers to knowledge question about human papillomavirus vaccine protection by public health care professionals in São Paulo, Brazil. 2014 (n=193)

	N (%)
HPV-6, -11, -16, -18 only	89 (46.1)
Cervical cancer only	17 (8.81)
HPV-6, -11, -16, -18 and cervical cancer	11 (5.70)
HPV-6, -11, -16, -18 and genital warts	10 (5.18)
HPV-6, -11, -16, -18, cervical cancer, anal cancer, genital warts, penile cancer	9 (4.66)
HPV-6, -11, -16, -18, genital warts and cervical cancer	8 (4.15)
Other combinations	28 (14.5)
Don't Know	21 (10.9)

CHAPTER III:
PUBLIC HEALTH IMPLICATIONS

The results from this study provide baseline data upon which a generalizable research project can be formulated. With proper support and planning, this project could be scaled up to the national level. An improved version of the survey used in this study could be administered to a representative sample of health care professionals at primary health units around Brazil that could provide information on the differences by region, state and municipality. A larger sample size would allow for the effects of health care professional type, knowledge and perceptions to be explored in more depth. This study would carry important implications for Brazil moving forward: the data would inform future decisions for both the HPV campaign and for other national immunization campaigns.

The Community Health Agent (CHA) plays an integral role in reaching out to the community and ensuring appropriate and timely utilization of the public health system. This continued role will be increasingly important in the context of Brazil's national HPV immunization campaign. There are two major possible events that may challenge the successful future the program, both which can be addressed by this key population.

Over the next two years, Brazil plans to shift to routine immunization with HPV vaccine of all nine-year-old girls. This vaccine is the first to be administered in a national school-based immunization campaign in Brazil and it is unclear whether or not Brazil will continue with school-based immunizations or eventually shift this responsibility to the primary health post. If the focus is redirected at the family health unit to administer vaccine, the role of the community health worker will only gain importance. If this shift

does occur, CHAs will become the primary vaccine advocates in the community so they should be appropriately trained and supported to complete this role. The Ministry of Health in collaboration with state and municipality health officials can begin to lay the groundwork now by providing educational sessions and answering key questions for CHAs at this initial point.

In many other countries the benefit and utility of the HPV vaccine has been challenged, often times to the detriment of achieving optimal coverage. In Brazil, this was not a significant barrier to the initial roll out of the program; however, there have been some stories picked up by both social and traditional media that may have raised an alarm. Many of these stories use fear as a primary motivator against the HPV vaccine. Time will tell whether these stories gain traction, but if they do they have the potential to impact acceptability of the vaccine among key decision makers, mainly parents. This would be a place where the CHA could provide insight about, as well as influence perceptions at, the community level. Again, appropriate training and education would be crucial to this effort.

The Ministry of Health supplied informational booklets and practice guidelines to health care professionals immediately prior to the campaign, but additional training may be required for all employees of the health posts. While CHAs play a key role at the community level, every health care professional in the health post has a responsibility to be able to educate and inform a patient about HPV vaccine. While this may not greatly impact immunization rates due to SBIP approach, being able to competently answer patient questions will help reaffirm trust and acceptability of the program and the vaccine.

This study highlights the strength of Brazil's National Immunization Program in general. HPV is the first major campaign that focused on adolescent immunization in Brazil, but it may be setting the stage for future programs targeting this population. Previous campaigns were geared towards immunization of younger children whereas the current campaign targets adolescents. The adolescent population is often much harder to access and retain and can prove to be difficult to vaccinate. The success of the current campaign, irrespective of knowledge and perceptions of the vaccine, illustrates the strength of this national program and provides a continuing model for reference.

This may provide a solution to current ongoing *Neisseria meningitidis* group C outbreaks in Brazil [48]. Meningococcal vaccine in Brazil is currently given before two years old while in United States, for example, it is given along with HPV vaccine to adolescents. Countries that administer the vaccine to adolescents have seen a greater burden of disease reduction [49]. This is likely associated with waning immunity. In light of this information, researchers in Brazil are working on scaling-up production of the MenC vaccine in country [48]. Building on the wide-reaching HPV vaccination campaign, Brazil may now consider introducing the meningococcal vaccine, or at least a booster dose, in adolescents. Moving forward, it will be interesting to see if and how disparities among vaccination will be addressed and the plan for long-term adolescent immunizations.

The data show that, as previously believed, the CHA is a key component of the Family Health Strategy in Brazil. They understand and complete their role as health advocate, facilitator and promoter within the context of immunization uptake. With the continued support of the Ministry of Health, they can ensure a successful and sustainable

HPV vaccination program that will impact the burden of HPV-associated illnesses and protect both girls and boys into the future.

CHAPTER IV:
REFERENCES

1. World Health Organization, *WHO HPV LabNet - Newsletter 08*, in *World Health Organization's Global Human Papillomavirus (HPV) Laboratory Network*. 2011, World Health Organization.
2. Bruni L., et al., *Human Papillomavirus and Related Disease in the World. Summary Report 2014*. ICO Information Centre on HPV and Cancer (HPV Information Centre).
3. Walboomers, J.M., et al., *Human papillomavirus is a necessary cause of invasive cervical cancer worldwide.* J Pathol, 1999. **189**(1): p. 12-9.
4. Clifford, G., et al., *Chapter 3: HPV type-distribution in women with and without cervical neoplastic diseases.* Vaccine, 2006. **24 Suppl 3**: p. S3/26-34.
5. American Cancer Society, *The Global Economic Cost of Cancer*. 2010.
6. National Institute of Cancer (Instituto Nacional de Câncer). Available from: http://www2.inca.gov.br/.
7. Forman, D., et al., *Global burden of human papillomavirus and related diseases.* Vaccine, 2012. **30 Suppl 5**: p. F12-23.
8. Martinez-Mesa, J., et al., *Inequalities in Pap smear screening for cervical cancer in Brazil.* Prev Med, 2013. **57**(4): p. 366-71.
9. Stormo, A.R., L. de Moura, and M. Saraiya, *Cervical cancer-related knowledge, attitudes, and practices of health professionals working in brazil's network of primary care units.* Oncologist, 2014. **19**(4): p. 375-82.
10. Fonseca, A.J. and L.C. de Lima Ferreira, *Systematic review of the cost-effectiveness of the vaccination against HPV in Brazil.* Hum Vaccin Immunother, 2014. **10**(12): p. 3484-90.
11. IBGE. *PNAD: 2001-2013*. 03-19-2015]; Available from: www.sidra.ibge.gov.br/pnad/.
12. IBGE, *Estimativas populacionais para os municípios brasileiros*. 2014.
13. UNICEF, *Brazil: Statistics*. 2013.
14. Cufino Svitone, E., et al., *Primary health care lessons from the northeast of Brazil: the Agentes de Saude Program.* Rev Panam Salud Publica, 2000. **7**(5): p. 293-302.
15. Coutinho, S.B., et al., *Promotion of exclusive breast-feeding at scale within routine health services: impact of breast-feeding counselling training for community health workers in Recife, Brazil.* Public Health Nutr, 2014. **17**(4): p. 948-55.
16. Johnson, C.D., et al., *Learning from the Brazilian community health worker model in North Wales.* Global Health, 2013. **9**: p. 25.
17. Caetano, M.E., et al., *Sexual behavior and knowledge of sexually transmitted infections among university students in Sao Paulo, Brazil.* Int J Gynaecol Obstet, 2010. **110**(1): p. 43-6.
18. Soares, E.C., et al., *Tuberculosis control in a socially vulnerable area: a community intervention beyond DOT in a Brazilian favela.* Int J Tuberc Lung Dis, 2013. **17**(12): p. 1581-6.
19. Macinko, J., et al., *Major expansion of primary care in Brazil linked to decline in unnecessary hospitalization.* Health Aff (Millwood), 2010. **29**(12): p. 2149-60.
20. de Melo Costa, S., et al., *[Community health worker: a core element of health actions]*. Cien Saude Colet, 2013. **18**(7): p. 2147-56.
21. Perez, L.G., et al., *Professional and community satisfaction with the Brazilian family health strategy.* Rev Saude Publica, 2013. **47**(2): p. 403-13.
22. Baralhas, M. and M.A. Pereira, *[Daily practice of community health agents: difficulties and limitations of care]*. Rev Bras Enferm, 2013. **66**(3): p. 358-65.

23. Sakata, K.N. and S.M. Mishima, *[Cooperative interventions and the Interaction of Community Health agents within the family health team]*. Rev Esc Enferm USP, 2012. **46**(3): p. 665-72.
24. Zimet, G.D., *Health care professionals and adolescent vaccination. A call for intervention research.* Hum Vaccin Immunother, 2014. **10**(9): p. 2629-30.
25. Rahman, M., et al., *Provider Recommendation Mediates the Relationship Between Parental Human Papillomavirus (HPV) Vaccine Awareness and HPV Vaccine Initiation and Completion Among 13- to 17-Year-Old US Adolescent Children.* Clin Pediatr (Phila), 2015. **54**(4): p. 371-5.
26. Munro, A., et al., *The role of general practitioners in the continued success of the National Cervical Screening Program.* Aust Fam Physician, 2014. **43**(5): p. 293-6.
27. Bertaut, A., et al., *HPV vaccination coverage in French girls attending middle and high schools: a declarative cross sectional study in the department of Cote d'Or.* Eur J Obstet Gynecol Reprod Biol, 2013. **170**(2): p. 526-32.
28. Perkins, R.B., et al., *Effectiveness of a provider-focused intervention to improve HPV vaccination rates in boys and girls.* Vaccine, 2015. **33**(9): p. 1223-9.
29. Bednarczyk, R.A., et al., *Attitudes and knowledge of Georgian physicians regarding cervical cancer prevention, 2010.* Int J Gynaecol Obstet, 2013. **121**(3): p. 224-8.
30. Kepka, D., et al., *Is provider type associated with cancer screening and prevention: advanced practice registered nurses, physician assistants, and physicians.* BMC Cancer, 2014. **14**: p. 233.
31. Vadaparampil, S.T., et al., *Physicians' human papillomavirus vaccine recommendations, 2009 and 2011.* Am J Prev Med, 2014. **46**(1): p. 80-4.
32. Perkins, R.B. and J.A. Clark, *Providers' perceptions of parental concerns about HPV vaccination.* J Health Care Poor Underserved, 2013. **24**(2): p. 828-39.
33. Daley, M.F., et al., *Human papillomavirus vaccination practices: a survey of US physicians 18 months after licensure.* Pediatrics, 2010. **126**(3): p. 425-33.
34. Dobson, S.R., et al., *Immunogenicity of 2 doses of HPV vaccine in younger adolescents vs 3 doses in young women: a randomized clinical trial.* Jama, 2013. **309**(17): p. 1793-802.
35. Lazcano-Ponce, E., et al., *Overcoming barriers to HPV vaccination: non-inferiority of antibody response to human papillomavirus 16/18 vaccine in adolescents vaccinated with a two-dose vs. a three-dose schedule at 21 months.* Vaccine, 2014. **32**(6): p. 725-32.
36. McCormack, P.L. and E.A. Joura, *Spotlight on quadrivalent human papillomavirus (types 6, 11, 16, 18) recombinant vaccine(Gardasil(R)) in the prevention of premalignant genital lesions, genital cancer, and genital warts in women.* BioDrugs, 2011. **25**(5): p. 339-43.
37. SI-PNI: Sistema de Informação do Programa Nacional de Imunizações. *Estratégia de Vacinação contra HPV*. DATASUS 2014 August 12, 2014]; Available from: http://pni.datasus.gov.br/consulta_hpv_14_selecao.php.
38. Fantástico. *Efeitos colaterais à vacina do HPV são reação emocional, dizem médicos [Video file]*. 08-04-2015]; Available from: http://globotv.globo.com/rede-globo/fantastico/v/efeitos-colaterais-a-vacina-do-hpv-sao-reacao-emocional-dizem-medicos/3629541/.
39. Markowitz, L.E., et al., *Human papillomavirus vaccine introduction--the first five years.* Vaccine, 2012. **30 Suppl 5**: p. F139-48.
40. Stillo, M., P. Carrillo Santisteve, and P.L. Lopalco, *Safety of human papillomavirus vaccines: a review.* Expert Opin Drug Saf, 2015: p. 1-16.
41. Macartney, K.K., et al., *Safety of human papillomavirus vaccines: a review.* Drug Saf, 2013. **36**(6): p. 393-412.

42. *Brazil: Human Papillomavirus and Related Cancers, Fact Sheet 2014*. 2014, ICO Information Centre on HPV and Cancer: Barcelona, Spain.
43. Secretaria de Estado da Saúde do Estado de Santa Catarina, *Informe técnico sobre a vacina papilomavírus humano (HPV) na atenção básica*. 2014.
44. *Sistema de Informações do Programa Nacional de Imunizações (SI-PNI)*. 2014 July; Available from: http://pni.datasus.gov.br/.
45. Perlman, S., et al., *Knowledge and awareness of HPV vaccine and acceptability to vaccinate in sub-Saharan Africa: a systematic review.* PLoS One, 2014. **9**(3): p. e90912.
46. Fishman, J., et al., *Parent and adolescent knowledge of HPV and subsequent vaccination.* Pediatrics, 2014. **134**(4): p. e1049-56.
47. DiClemente, R., R. Crosby, and M. Kegler, *Emerging Theories in Health Promotion Practice and Research*. 2nd ed. 2009, San Francisco: Jossey-Bass.
48. Bastos, R.C., et al., *Brazilian meningococcal C conjugate vaccine: Scaling up studies.* Vaccine, 2015.
49. Safadi, M.A., et al., *Evolving meningococcal immunization strategies.* Expert Rev Vaccines, 2015. **14**(4): p. 505-17.

APPENDIX

SUPPLEMENT: ADDITIONAL TABLES

Table 6. Respondent perception of who is responsible for educating patients about human papillomavirus vaccine in public health posts, by health care professional type. São Paulo, Brazil, 2014.

Respondent type		Responsible for education about HPV vaccine						
		Doctor	Nurse	Tech[a]	Aux.[b]	CHA[c]	Other[d]	Don't know
Total (n=193)		83 (43.1)	142 (73.6)	54 (28.0)	73 (37.8)	49 (25.4)	11 (5.7)	9 (4.7)
Respondent type	Doctor (n=39)	17	24	8	6	4	2	3
	Nurse (n=32)	14	26	10	18	9	0	0
	Tech[a] (n=9)	6	9	4	4	3	0	0
	Aux.[b] (n=48)	13	35	10	23	6	5	1
	CHA[c] (n=59)	20	44	20	21	26	4	5
	Other (n=5)	2	3	1	0	3	0	0

[a]Nurse technician

[b]Auxiliary nurse, medical assistant rough equivalent

[c]Community health agent

[d]Other consists of pharmacy staff, administrative assistant and social worker

Table 7. Respondent perception of who is responsible for administering human papillomavirus vaccine in public health posts, by health care professional type. São Paulo, Brazil, 2014.

Respondent type		Responsible for administering HPV vaccine						
		Doctor	Nurse	Tech[a]	Aux.[b]	CHA[c]	Other[d]	Don't know
Total (n=195)		2 (1.0)	36 (18.5)	66 (33.9)	149 (76.4)	0	0	7 (3.6)
Respondent type	Doctor (n=39)	0	7	21	20	0	0	1
	Nurse (n=32)	0	7	10	30	0	0	0
	Tech[a] (n=9)	0	1	4	8	0	0	0
	Aux.[b] (n=49)	1	4	6	47	0	0	0
	CHA[c] (n=60)	1	15	23	40	0	0	6
	Other (n=5)	0	2	1	3	0	0	0

[a]Nurse technician

[b]Auxiliary nurse, medical assistant rough equivalent

[c]Community health agent

[d]Other consists of pharmacy staff, administrative assistant and social worker

SUPPLEMENT: SURVEY

Conhecimentos, Atitudes e Práticas de profissionais de saúde de vacinação contra o Papilomavírus humano (HPV) em unidades básicas de saúde (UBSs) em São Paulo, Brasil.

Faculdade de Medicina
Universidade de São Paulo
2014

INSTRUÇÕES

1. POR FAVOR, SIGA AS INSTRUÇÕES QUE SEGUEM IMEDIATAMENTE APÓS AS QUESTÕES QUANTO À POSSIBILIDADE DE ESCOLHA DE RESPOSTAS MULTÍPLAS OU SOMENTE UMA RESPOSTA POR QUESTÃO.

2. ASSINALE A RESPOSTA NO ESPAÇO DESTINADO.

3. CASO ESCOLHA "OUTROS," FORNEÇA INFORMAÇÕES ADICIONAIS SOBRE SUA RESPOSTA NO ESPAÇO DISPONÍVEL.

4. ESCREVA O HORÁRIO DE INÍCIO E TÉRMINO DO QUESTIONÁRIO NO ESPAÇO INDICADO.

5. CASO SURJAM QUAISQUER PERGUNTAS AO DECORRER DO QUESTIONÁRIO, ENTRE EM CONTACTO CONOSCO:
   IZA (11) 98139-6208

Horário de início:	____ ____ : ____ ____ (horas : minutos)

-- CONTINUE NA PRÓXIMA PÁGINA --

SEÇÃO I	
Nesta primeira seção, será perguntado sobre algumas questões gerais sobre si mesmo e esta UBS. Pode-se recusar a responder quaisquer perguntas que não lhe sejam convenientes.	
[D1] Quantos anos tem?	[___ ___] Anos
[D2] Qual seu sexo?	☐ Masculino ☐ Feminino ☐ Outro
[D3] Qual é a sua profissão?	☐ Médico ☐ Enfermeiro ☐ Técnico de Enfermagem ☐ Auxiliar de Enfermagem ☐ Agente Comunitário de Saúde ☐ Outro (especifique): _____ ☐ Não sei
[D4] Qual é a sua especialidade? ***[Selecione todos que se apliquem]***	☐ Pediatra ☐ Obstetra/Ginecologista ☐ Clínico Geral ☐ Saúde Coletiva ☐ Sanitarista ☐ Educador em Saúde ☐ Outro (especifique): _____ ☐ Não se aplica ☐ Não sei
[D5] Há quantos anos está trabalhando no SUS?	[___ ___] Anos ☐ Não sei
[D6] Em que ano você se formou no seu programa de formação ou graduação profissional?	[___ ___ ___ ___] ☐ Não sei

-- CONTINUE NA PRÓXIMA PÁGINA --

[D7] Qual é o motivo de consulta mais comum visto por você nesta UBS?	_____ _____ ☐ Não sei
[D8] Em uma semana normal de trabalho, quantos pacientes você atende nesta UBS?	[___ ___ ___ ___ ___] ☐ Não sei
[D9] Aproximadamente, que porcentagem de 0% a 100% de pacientes são adolescentes entre 9 a 13 anos nesta UBS?	[___ ___ ___] ☐ Não sei
[D10] O exame de Papanicolau é realizado nesta UBS?	☐ Sim **[SIGA PARA D11]** ☐ Não **[SIGA PARA K1]** ☐ Não sei
[D11] **Se você respondeu 'SIM' para D10**, quando você atende as mulheres em idade reprodutiva, você realiza exames de Papanicolau?	☐ Sim **[SIGA PARA D12]** ☐ Não **[SIGA PARA D13]** ☐ Não se aplica **[SIGA PARA D13]** ☐ Não sei
[D12] **Se você respondeu 'SIM' para D11**, com que frequência você realiza exames de Papanicolau?	☐ Raramente **[SIGA PARA K1]** ☐ Às vezes **[SIGA PARA K1]** ☐ Frequentemente **[SIGA PARA K1]** ☐ Não sei
[D13] **Se você respondeu 'NÃO' para D11,** você encaminha os pacientes para outra clínica ou especialidade?	☐ Sim ☐ Não ☐ Não sei

-- CONTINUE NA PRÓXIMA PÁGINA --

SEÇÃO II	
Existem duas vacinas contra o HPV, que foram aprovadas para uso no Brasil: a vacina quadrivalente (Gardasil®) e a vacina bivalente (Cervarix®). Para fins desta pesquisa, qualquer menção à vacina contra o HPV será referindo-se à vacina quadrivalente, Gardasil®. ***Nesta seção, serão feitas perguntas sobre a vacina quadrivalente, e sobre o programa nacional de vacinação contra o HPV do Ministério da Saúde do Brasil. Pode-se recusar a responder quaisquer perguntas que não lhe sejam convenientes.***	
[K1] Quantos tipos de Papilomavírus Humano (HPV) existem?	☐ 4 tipos ☐ 10 tipos ☐ 20 tipos ☐ Mais de 100 tipos ☐ Não sei
[K2] HPV pode ser transmitido por relação sexual?	☐ Sim ☐ Não ☐ Não sei
[K3] HPV pode infectar qual das seguintes áreas? ***[Selecione todas que se apliquem]***	☐ Região Anogenital ☐ Mucosa Oral ☐ Pele ☐ Não sei
[K4] A vacina quadrivalente, Gardasil®, protege contra qual das seguintes opções? ***[Selecione todas que se apliquem]***	☐ HPV tipos 6, 11, 16, 18 ☐ Cânceres Anais ☐ HIV ☐ Verrugas Genitais ☐ Cânceres de Cólon ☐ Cânceres de Colo do Útero ☐ Cânceres Penianos ☐ Não sei

-- CONTINUE NA PRÓXIMA PÁGINA --

[K5] Quem é elegível para receber a vacina contra o HPV em 2014 de acordo com o Ministério da Saúde?	☐ Somente meninas, 11-26 anos de idade ☐ Somente meninas, 11-13 anos de idade ☐ Meninas e meninos, 11-26 anos de idade ☐ Meninas e meninos, 11-13 anos de idade ☐ Outros (especifique): _____ ☐ Não sei
[K6] Qual é o intervalo necessário por dose para a vacina contra o HPV de acordo com o Ministério da Saúde?	☐ Inicial, 6 meses, 5 anos ☐ Inicial, 2 meses, 6 meses ☐ Inicial, 1 mês, 6 meses ☐ Outro (especifique): _____ ☐ Não sei

SEÇÃO III	
Nesta seção você vai ler uma série de declarações sobre o HPV, e a vacina contra o HPV. Por favor, indique se você concorda, é neutro sobre, ou discorda de cada afirmação. Pode-se recusar a responder quaisquer perguntas que não lhe sejam convenientes.	
[A1] **<u>Não</u>** é muito provável nesta comunidade que meninas de 9 a 13 anos sejam infectadas pelo HPV.	☐ Concordo ☐ Neutro ☐ Discordo ☐ Não sei
[A2] É importante evitar infecções de HPV em meninas de 9 a 13 anos nesta comunidade.	☐ Concordo ☐ Neutro ☐ Discordo ☐ Não sei
[A3] A vacina Gardasil® é eficaz na prevenção de infecções relacionadas com alguns tipos de HPV.	☐ Concordo ☐ Neutro ☐ Discordo ☐ Não sei
[A4] A vacina Gardasil® **<u>não</u>** é eficaz na prevenção do câncer de colo do útero e lesões pré-cancerosas de colo do útero.	☐ Concordo ☐ Neutro ☐ Discordo ☐ Não sei

-- CONTINUE NA PRÓXIMA PÁGINA --

[A5] A vacina Gardasil® **não** é eficaz na prevenção de outros tipos de câncer da região anogenital, como cânceres penianos e anais.	☐ Concordo ☐ Neutro ☐ Discordo ☐ Não sei
[A6] A vacina Gardasil® é eficaz na prevenção de verrugas genitais.	☐ Concordo ☐ Neutro ☐ Discordo ☐ Não sei
[A7] A vacina Gardasil® é segura para ser administrada nas meninas de 9 a 13 anos.	☐ Concordo ☐ Neutro ☐ Discordo ☐ Não sei

SEÇÃO IV	
Nesta seção, será perguntado sobre a sua experiência em administrar a vacina HPV nesta UBS. Pode-se recusar a responder quaisquer perguntas que não lhe sejam convenientes.	
[P1] Nesta UBS, quem é o principal responsável pela orientações sobre o HPV e a vacina HPV?	☐ Médico ☐ Enfermeiro ☐ Técnico de Enfermagem ☐ Auxiliar de Enfermagem ☐ Agente Comunitário de Saúde ☐ Outro (especifique): _____ ☐ Não sei
[P2] Nesta UBS, que é o principal responsável por administrar a vacina contra o HPV?	☐ Médico ☐ Enfermeiro ☐ Técnico de Enfermagem ☐ Auxiliar de Enfermagem ☐ Agente Comunitário de Saúde ☐ Outro (especifique): _____ ☐ Não sei

-- CONTINUA NA PRÓXIMA PÁGINA --

[P3] Você pergunta com frequência às meninas de 11 a 13 anos nesta UBS se elas já foram vacinadas contra o HPV?	☐ Sim, sempre ☐ Sim, às vezes ☐ Não, mas abordarei a questão se levantada ☐ Não ☐ Não sei
[P4] Você administrou vacinas contra o HPV em meninas de 11 a 13 anos nesta UBS no último mês?	☐ Sim ☐ Não ☐ Não se aplica ☐ Não sei
[P5] Se uma jovem maior de 13 anos lhe pedisse para ser vacinada contra o HPV, a vacinaria?	☐ Sim **[SIGA PARA P7]** ☐ Não **[SIGA PARA P6]** ☐ Não se aplica **[SIGA PARA P6]** ☐ Não sei
[P6] **Se você respondeu 'NÃO' para P5**, você tomaria qualquer ação adicional para ajudá-la a obter o acesso à vacina?	☐ Sim, eu indicaria uma clínica particular ☐ Não, ela está fora da idade indicada pelo Ministério da Saúde ☐ Não, outro (especifique): _____ ☐ Não sei

-- CONTINUA NA PRÓXIMA PÁGINA --

[P7] Você tem comentários adicionais sobre a vacina HPV, Gardasil®? ***[Por favor, escreva sua resposta]***	_____ _____ _____ _____ _____ _____
[P8] Você tem comentários adicionais sobre o programa nacional de imunização contra o HPV? ***[Por favor, escreva sua resposta]***	_____ _____ _____ _____ _____ _____
Obrigado pelo seu tempo.	

Horário de término do questionário:	____ ____ : ____ ____ (horas : minutos)
Data:	__ __ /__ __ / __ __ __ __ (DD/MM/AAAA)

-- FIM --

[A SER PREENCHIDO PELA COORDENADORA DE ENTREVISTA]

Conhecimentos, Atitudes e Práticas de profissionais de saúde de vacinação contra o Papilomavírus humano (HPV) em unidades básicas de saúde (UBSs) em São Paulo, Brasil.

Faculdade de Medicina
Universidade de São Paulo
2014

Questionário Entregue	**Questionário Recolhido**
Data: ___ ___ /___ ___ / ___ ___ ___ ___ (DD/MM/AAAA) Hora: ___ ___ : ___ ___ (horas : minutos) Por: _____	Data: ___ ___ /___ ___ / ___ ___ ___ ___ (DD/MM/AAAA) Horas: ___ ___ : ___ ___ (horas : minutos) Por: _____