

Implementation of HPV-testing for cervical cancer screening in programmatic contexts: The Jujuy demonstration project in Argentina

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The aim of this article is to present results of programmatic introduction of HPV testing with cytologic triage among women 30 years and older in the province of Jujuy, Argentina, including description of the planning phase and results of program performance during the first year. We describe the project implementation process, and calculate key performance indicators using SITAM, the national screening information system. We also compare disease detection rates of HPV testing in 2012 with cytology as performed during the previous year. HPV testing with cytology triage was introduced through a consensus-building process. Key activities included establishment of algorithms and guidelines, creating the HPV laboratory, training of health professionals, information campaigns for women and designing the referral network. By the end of 2012, 100% ($n = 270$) of public health care centers were offering HPV testing and 22,834 women had been HPV tested, 98.5% ($n = 22,515$) were 30+. HPV positivity among women over 30 was 12.7%, 807 women were HPV+ and had abnormal cytology, and 281 CIN2+ were identified. CIN2+ detection rates was 1.25 in 2012 and 0.62 in 2011 when the program was cytology based ($p = 0.0002$). This project showed that effective introduction of HPV testing in programmatic contexts of low-middle income settings is feasible and detects more disease than cytology.

Key words: cervical cancer prevention, screening, HPV test, Argentina

Abbreviations: CIN2+: cervical intraepithelial neoplasm 2+; HPV: human papillomavirus; JDP: Jujuy Demonstration Project; MoH: Ministry of Health; PHCs: public health care centers; PPV: positive predictive value; SITAM: Sistema de Información para el Tamizaje (National Screening Information System).

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Cervical cancer remains a serious public health problem in developing countries where almost 90% of cases occur¹ and where cytological screening has been ineffective, due to a complex interaction of lack of organized programs, embedded inequity in availability of human resources and services, and lack of coordination among health services and professionals.²⁻⁴ In this context, cytology screening adds to the problem, as it requires frequent examinations and rigorous quality controls to compensate for its low negative predictive value.⁵

Recently, HPV testing has changed the scenario. Processing and interpretation of the test is automated, reducing the need for cytotechnicians and quality controls. Also, its high sensitivity and negative predictive value allows extension of the screening interval,^{6,7} which can facilitate screening and treatment coverage. Finally, it is more suitable where HPV vaccination has been introduced.⁵ Thus, HPV testing is expected to become the preferred test for cervical cancer screening.⁸ However, HPV testing will still need to be applied in health system contexts, where promotion activities are

What's new?

DNA testing for human papillomavirus (HPV) is rapidly becoming the preferred test for cervical cancer screening programs. But few studies have evaluated implementation strategies or program performance. Here, both implementation and performance are described for a recently introduced program for routine HPV-testing in the province of Jujuy, Argentina. The report details the year-long planning and implementation phase, during which fundamental components, including guidelines and outreach strategies, were developed. Analyses show that the program's main screening goals were fulfilled in its first year. The program's success inspired the rollout of HPV-testing to other Argentinian provinces.

conducted, quality services are assured, HPV laboratories work in coordination with diagnostic/treatment services and guidelines and regulations are followed by health professionals. It is therefore essential to evaluate performance of HPV testing in programmatic settings, generating evidence about implementation processes to assure its effectiveness at program level.

In Argentina, cytologic screening has been available for >50 years, with limited impact on cervical cancer mortality.^{9,10} In 2011, the Ministry of Health (MoH) launched the Jujuy Demonstration Project (JDP) to introduce HPV testing for primary screening.¹¹

This project is part of a national strategy to strengthen cervical cancer screening relaunched in 2008,⁴ which also included introduction of HPV vaccination in 2011.¹² The JDP is a 4-year implementation project (2011–2014) to develop, implement and evaluate the programmatic components of an HPV-based screening strategy. The project is being implemented in the Province of Jujuy, in Northeast Argentina, with high cervical cancer mortality.¹³ It involves working with the Jujuy Ministry of Health to introduce primary HPV testing with cytology triage for all women aged 30+ covered by public health insurance. It was organized in two phases: the planning phase (2011) and the screening phase (2012–2014). In this article, we describe the planning phase, and present first year results on program performance (2012). In addition, we compare the HPV testing detection rate with that obtained in 2011, when the Jujuy program was still cytology based.

Material and Methods**The setting**

In Argentina, the public health sector is comprised of the network of public hospitals and primary health care (PHC) units which provide care to the poor and the population not covered by the social security sector (workers of the informal economy and their families). For the uninsured, health services are provided free of cost, including screening, diagnosis and treatment. The province of Jujuy is located in Northwest Argentina; 85% of its population lives in urban areas. Its public health system includes a main hospital and 270 primary health care centers. The PHC System integrates approximately 700 paid full-time community health workers (CHWs) who twice yearly visit approximately 110,000 households for health-related tasks

including immunization and promotion of maternal/child health.

In 2007, a situational diagnosis was carried out to evaluate the provincial program, as part of the broader project to strengthen cervical cancer prevention at country level.⁴ The diagnosis showed that in Jujuy the program faced several organizational problems, including low coverage, lack of reliable information systems, lack of information on follow-up and treatment of women with precancerous women, as well as lack of adherence to programmatic norms and recommendations by health services and providers.¹³ Conventional cytology was the primary screening test. Colposcopy, although not recommended by the program, was commonly used as a screening method. The target age was 25–60, with a 2-year interval between negative smears. However, annual screening after becoming sexually active was the usual practice. The province had 6 cytology laboratories, in charge of reading around 23,000 Pap smears per year, with no quality controls.¹³ Screening was mainly opportunistic, with no active search of target women. Based on this diagnoses, the provincial program was reorganized in 2008. Target age was established as 25–64, with active search of women aged 35–64. Screening interval was set as 1,1,3. A centralization process of cytology laboratories was undertaken as well as external quality controls, and by 2011 the number of operating laboratories was reduced to three. SITAM was introduced as the information system and monitoring of follow-up and treatment was initiated.¹⁴ During the period 2009–2011, Jujuy almost doubled the number of smears read.¹⁵ Based on these promising results, the province was selected to be the first Argentinean province to introduce HPV testing as the primary screening test in 2012, in the context of the Demonstration Project presented in this article.

Methodology

We used a combination of methods, according to the different study objectives:

- a. Description of the decision-making process leading to introduction of HPV testing, and how different stakeholders were involved based on content analysis of program reports and documents (information sheets, power point presentations, etc.) and observation derived from our participation in the policy definition.

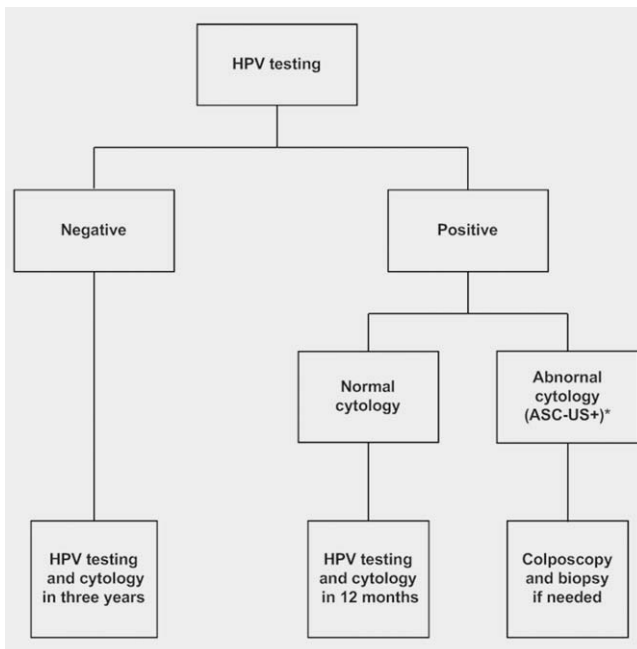


Figure 1. Cervical Screening Algorithm for women aged 30+ with HPV testing. *ASC-US+ includes: Atypical Squamous Cell Undetermined Significance (ASC-US); Low grade Squamous Intraepithelial Lesion (L-SIL); Atypical Squamous Cells cannot exclude H-SIL (ASC-H); High grade Squamous Intraepithelial Lesion (H-SIL); Atypical Glandular Cells (AGS) and Adenocarcinoma In Situ (AIS). HPV: human papillomavirus.

b. Description of algorithms and programmatic components developed for the JDP, on the basis of program documents and systematized program activities.

c. Measurement of key program efficacy indicators:

The JDP adoption and coverage goal was to have 100% of the 270 PHC centers using HPV testing as primary screening, with a coverage goal of 80% of the target population (women aged 30–64, with public health insurance) in 3 years, corresponding to an annual screening goal of 18,700 women.¹⁶ In Jujuy, a call–recall system to invite women is not available, therefore the goal was to be achieved through promotion campaigns. TV and radio spots were broadcast on local TV channel and radios, posters and leaflets were displayed in PHCs centers and hospitals. Also a mobile trailer traveling all around the province to provide cervical and mammographic screening was implemented by the provincial MoH. Arrival of the trailer to a specific town was preceded by promotion through CHWs during their home visits.

According to guidelines, the test is indicated for all women aged 30+. Women younger than 30 continue to be Pap-screened. Cytology is the triage test, to identify HPV+ women who need immediate referral for colposcopy/biopsy. HPV testing and cytologies are taken at the same time, but cytologies are read only if HPV tests are positive. This decision was made to limit the number of visits HPV+ women should have to complete the diagnosis/treatment process.

HPV+ women with abnormal cytology (ASCUS+) are referred for colposcopy/biopsy; women HPV+ with normal cytology are rescreened in 1 year. Women HPV– are rescreened in 3 years (Fig. 1).

Analyzed outcomes are (a) percentage of PHCs using HPV testing; (b) percentage of screened women who are 30 years or older; and (c) percentage of the annual screening goal for the target population achieved.

For HPV tested women aged 30+ we analyzed (a) HPV positivity rate, (b) the percentage of women referred to colposcopy, (c) percentage of women who actually had colposcopy performed, (d) percentage of women with histologically confirmed CIN2+, (e) percentage of women with CIN2+ treated within 12 months after initial screening, and (f) percentage of women HPV+/normal cytology who were rescreened in 1 year.

We analyzed data from SITAM, the national online information system that registers screening/diagnosis/treatment events from women attending the public health system.¹⁷ One hundred percent of follow-up and treatment in public health system are registered in SITAM. Those women who reported treatment in private services without confirmation of that information by the provincial program ($n = 6$) are not included in SITAM, then they were considered lost to follow-up. This category is presented separately in the corresponding figure (Fig. 3). In total, 19 cases of CIN2+ were treated in the private sector, 68% of them (13/19) were included in SITAM. Colposcopies, biopsies and treatments not registered in SITAM were considered lost to follow-up.

We compared the HPV test detection rate of histologically confirmed CIN2+ and positive predictive value (PPV) with the detection rate and PPV of cytology as conducted in the year 2011, when the program was still cytology based. While in 2012 HPV+ women were referred to colposcopy on the basis of any cytologic abnormality, in 2011, women were referred on the basis of HSIL+ Pap. Therefore, we also calculated the detection rate of CIN2+ of HPV testing if only women with HPV+ tests and HSIL+ cytologies had been sent to colposcopy. The data source for these analyses was SITAM. CIN2+ detection rates were compared using Fisher's exact test.

Results

The first phase: Planning and implementation

Activities developed in this phase of the project are shown in Table 1 and Figure 2. The need of introducing HPV testing was first formally discussed in 2010, during a seminar where around 150 health authorities and providers of the 24 Argentinean provinces gathered to discuss programmatic activities with international and national scientists and project managers, and discuss future program directions. The majority of province representatives agreed to incorporate the HPV test for primary screening. It was proposed to begin implementation in selected pilot areas to evaluate logistic and managerial aspects of introduction.¹⁸

This proposal was presented to the highest national authorities, who agreed on the public health relevance of introducing HPV testing, as cervical cancer prevention had been established as a priority, and HPV vaccination was to be introduced in 2011. The demonstration project would begin in the province of Jujuy, where provincial and national programs were already collaborating closely to strengthen cervical cancer prevention. The project outline was approved by the provincial health authorities, who declared the JDP a public health priority. Provincial ministerial areas involved in project design and planning were: Maternal and Child health

(the provincial program belongs to this Direction), Primary Health Care and Health Services. Chiefs of the main provincial hospital services (Pablo Soria Hospital) were also involved. Several meetings were held to define and establish working agendas and timetables.

A Scientific Advisory Committee was established, with representatives from scientific societies, national universities, NGOs involved in cervical cancer prevention, women and human rights' organizations and international organizations such as PAHO and IARC-WHO. The JDP objective and planned activities were positively reviewed by this Committee.

Guidelines and algorithms for screening/diagnosis/and treatment were elaborated through a consensus process including representatives of the main national/provincial scientific gynecologic, cytology and pathology societies, and a representative from IARC-WHO. Tests to be used according to age, screening intervals, as well as referral patterns according to HPV testing, cytology, colposcopy and biopsy results were agreed upon and published as National Recommendations.¹⁹

Hybrid Capture 2 was selected as the screening test, as it was at that time the only test approved by the ANMAT, the Argentinean drug regulatory agency. The HPV test was provided to the province of Jujuy by the National Ministry of Health as part of the Jujuy Demonstration Project.

Table 1. Key activities performed during the planning phase

Consensus-building with key actors (decision-makers, scientific societies, opinion leaders)
Establishment of the Scientific Advisory Committee
Elaboration of guidelines and algorithms for screening/diagnosis/and treatment
HPV laboratory installation
Design and organization of the referral network for diagnosis/treatment
Design of communication and outreach strategy
Training of health professionals
Redesign of the information system

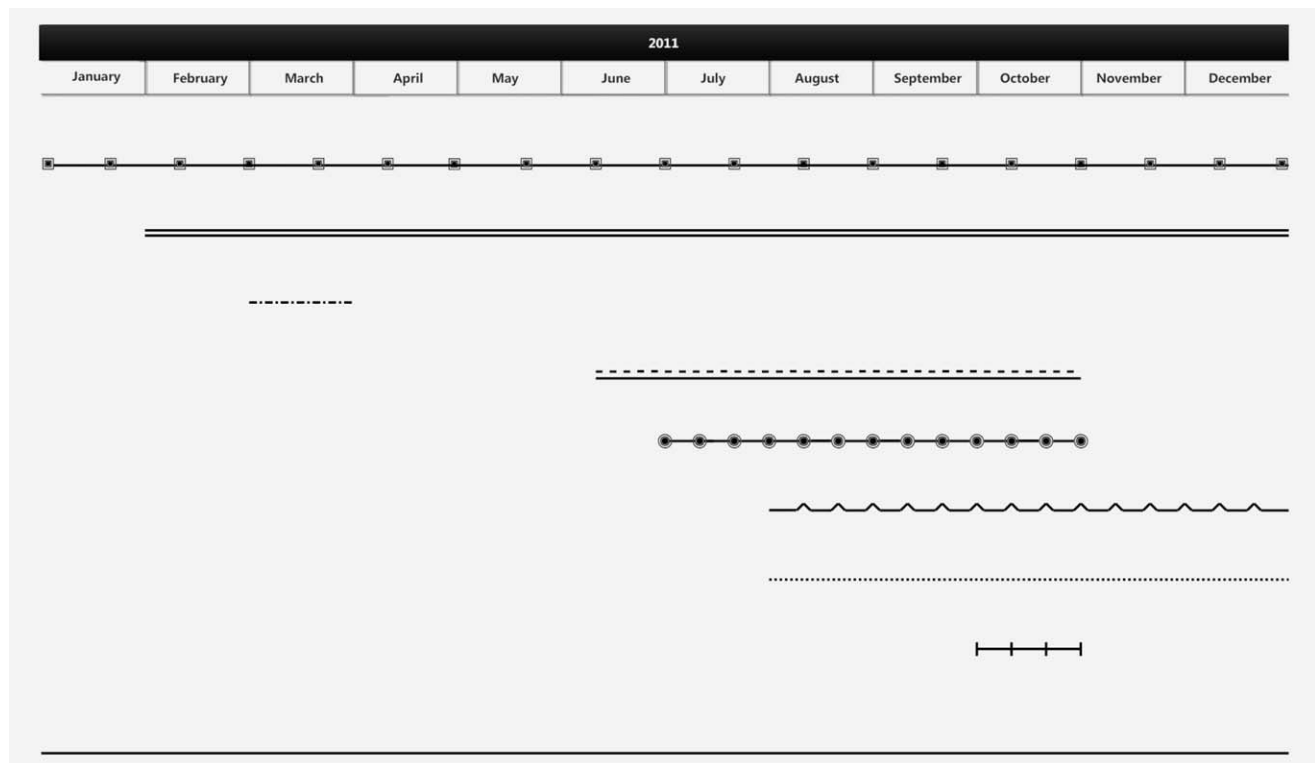


Figure 2. Timeline of the first phase of Jujuy Demonstration Project. ■ Consensus-building with key actors (decision-makers, scientific societies, opinion leaders). == Design of communication and outreach strategy. --- Establishment of the Scientific Advisory Committee. == Elaboration of guidelines and algorithms for screening, diagnosis and treatment. ● HPV laboratory installation. ~ Training of health professionals. Design and organization of the referral network for diagnosis and treatment. | Redesign of the information system.

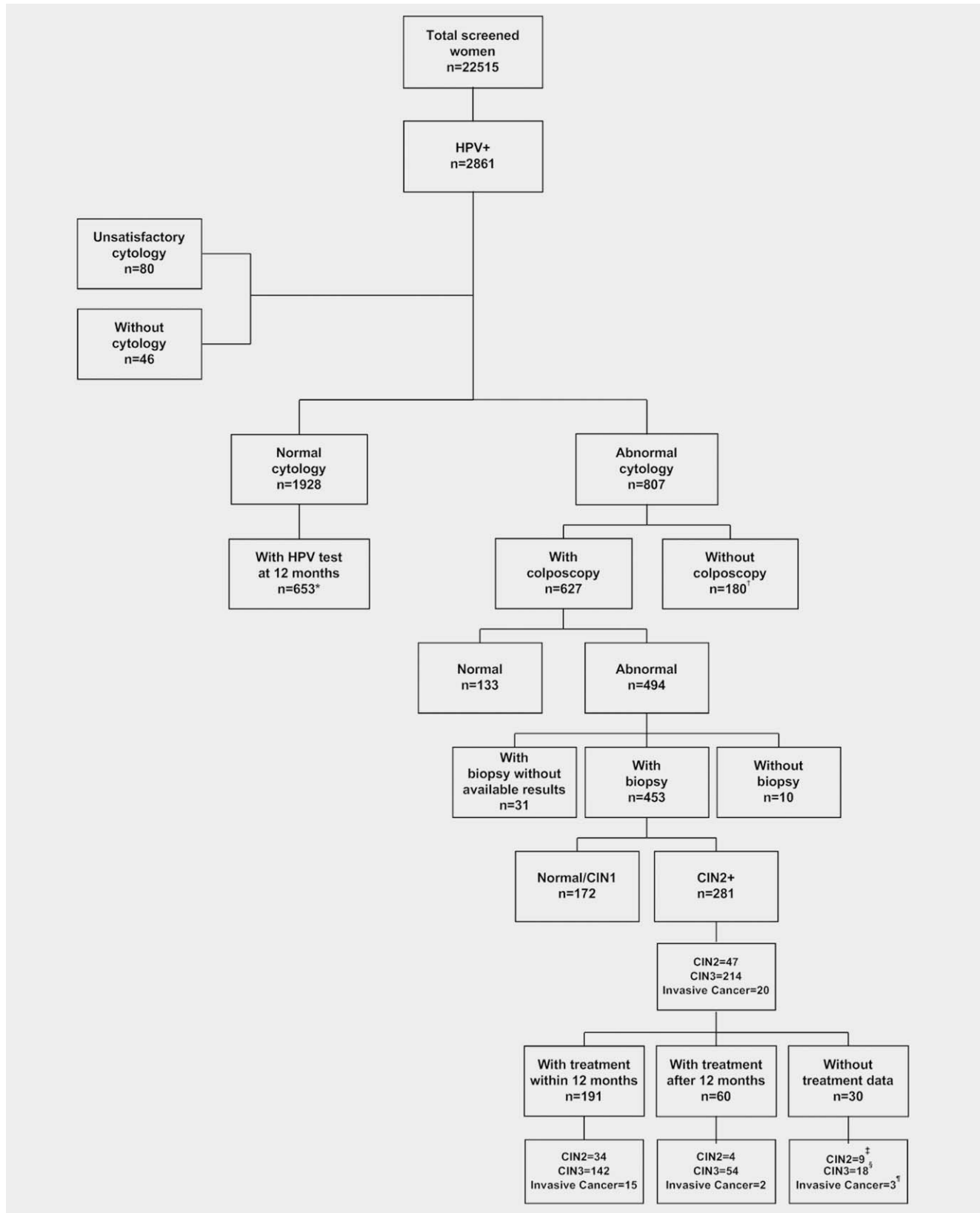


Figure 3. Follow-up of HPV-positive women. July 2012. * Women with HPV test at 18 months = 910. † Women reported follow-up in private services = 19; negative Pap test = 26; moved = 11; refused treatment = 4; no data = 120. ‡ Women reported treatment in private services = 1; refused treatment = 2; did not complete treatment = 4; no data = 2. § Women reported treatment in private services = 3; moved to another province = 1; refused treatment = 5, did not complete treatment = 6; no data = 3. ¶ Women reported treatment in private services = 2; moved to another province = 1.

Table 2. Sociodemographic characteristics of screened women aged 30+ in Jujuy by year, 2011–2012

	2011 ¹		2012 ²		<i>p</i> values
	<i>n</i>	(%)	<i>n</i>	(%)	
Age					
30–34	5,642	26.5	5,628	25.0	NS
35–44	7,524	35.4	8,345	37.1	
45–54	4,744	22.3	5,016	22.3	
55–64	2,687	12.6	2,924	13.0	
65+	686	3.2	602	2.7	
Total	2,1283	100.0	22,515	100.0	
Pap in the last 3 years					
Yes	6,871	32.3	12,191	54.1	0.000
No	14,412	67.7	10,324	45.9	
Total	21,283	100.0	22,515	100.0	
Health insurance³					
Yes	3,531	17.7	4,412	20.0	NS
No	16,377	82.3	17,597	80.0	
Total	19,908	100.0	22,009	100.0	

¹Cytology-based screening.²HPV testing.³Missing cases: 2011: 1,375; 2012: 506.

The HPV laboratory was established as part of the cytopathology service at the Pablo Soria Hospital, which from that moment on centralized reading of all cytologies of women aged 30+.²⁰ As samples can be kept without cold chain for 14 days, samples arriving at the HPV laboratory beyond that time were to be discarded with no processing.

The referral network for diagnosis/treatment was reorganized and the 18 provincial colposcopy units, distributed all around the province, were assigned colposcopies for HPV+ women with abnormal Pap smears. The capacity of these units to increase the number of colposcopy diagnoses was evaluated as adequate.

A communication and outreach strategy was designed, with development of communication/education materials for women and health professionals.²¹ Materials informed women of the availability of HPV testing, stressing that HPV is a common regressive infection, and that precancerous lesions resulting from persisting infections are treatable.

During 2011/2012 several training courses took place, including more than 700 CHWs from the Jujuy Direction of Primary Health Care. They received training on cervical cancer prevention, HPV-based screening and communication of HPV results. In addition, ten gynecologists were trained as provincial trainers for HPV specimen collection. These replicated training for the rest of the 150 test takers belonging to the public health sector.

The Head of the HPV laboratory, as well as the technician received 4-day training at the company's (Qiagen) HPV laboratory located in Sao Paulo, Brazil. Furthermore, one 1-day refresher course on colposcopy diagnosis for all colposcopists

Table 3. HPV test and cytology results

	<i>n</i>	%
Screened women by HPV results		
HPV–	19,654	87.3
HPV+	2,861	12.7
Total	22,515	100.0
HPV+ by cytology results		
Normal	1,928	67.4
Abnormal	807	28.2
Unsatisfactory smears	46	1.6
Without cytology	80	2.8
Total	2,861	100.0

Screened women aged 30+. Jujuy 2012.

working at public health care centers was organized. Special emphasis was made during training on the fact that HPV testing of young women might result in increased overdiagnosis and overtreatment, with potential harm for women.

The data management system (SITAM) was redesigned by national MoH staff in order to incorporate a specific HPV module for registration of HPV testing.

In order to provide support for women with precancerous lesions, two trained provincial staff members (navigators) monitor their adherence to diagnosis and treatment using SITAM.²²

In September 2011, The National Resolution 1472¹¹ was enacted to incorporate HPV testing, establishing the main components of the JDP. The provincial MoH enacted the provincial Resolution Ner. 7665/11,²³ which endorsed the National Resolution.

Second phase: Results of first year

By the end of 2012, 100% (*n* = 270) of public health care centers were offering HPV testing as primary screening and 22,834 women had been HPV tested, 98.5% (*n* = 22,515) were 30+. Table 2 shows socio-demographic characteristics of screened women aged 30+ in 2011 and 2012. In 2012, 45.9% of HPV-screened women aged 30+ had no Pap in the last 3 years and 80% had public health insurance. Compared to women screened in 2011, a higher proportion of HPV tested women aged 30+ in 2012 had a Pap in the last 3 years (*p* = 0.000); but differences were not significant for age and health insurance characteristics.

Annual screening goal: in total, 17,531 women aged 30–64 with no health insurance were screened, representing an achievement of 93.7% of the annual screening goal (*n* = 18,700 women).

Follow-up and cin2+ detection

Of the 22,515 women aged 30+ and HPV tested, 2,861 (12.7%) were HPV+. Of them, 1,928 had normal cytology, 807 had an abnormal cytology and 80 had only HPV testing

Table 4. Number of HSIL cytologies, CIN2+ cases and CIN2+ detection rates, by year of screening

	2011 ¹	2012 ²
Total screened women 30+	21,283	22,515
HSIL cytology	261	529
CIN2	31	47
CIN3	93	214
Invasive cancer	9	20
CIN2+	133	281
CIN2+ detection rate ³	0.62	1.25

Jujuy 2011–2012.

¹Cytology-based screening.

²HPV testing.

³Differences in detection rate were statistically significant: $p = 0.0002$.

without cytology. The percentage of unsatisfactory smears was 1.6% (46/2,861; Table 3).

Of the 807 women HPV+ and with abnormal cytology, 627 (77.7%) attended colposcopy: 133 had normal and 494 abnormal colposcopy (Fig. 3). Another 19 women had colposcopies at private services and were not included. Four hundred fifty-three women had biopsies collected at public health services and had results in SITAM. In total, 72.6% of HPV+/abnormal cytology women had a diagnosis made (453 women with biopsy + 133 women with normal colposcopy/807 HPV+ with abnormal cytology women). Two hundred eighty-one CIN2+ were identified (CIN2 = 47; CIN3 = 214; invasive cancer = 20). Among these women, 191 (67.9%) had already been treated by December 2013 (86.1% by July 2014). PPV for CIN2+ detection for HPV testing with cytology triage of women ASCUS+ was 34.8% (281 women with CIN2+/807 HPV+ with abnormal cytology women).

Of the 1,928 women HPV+ and with normal cytology, 653 (33.9%) were rescreened by December 2013 and 910 (47.2%) by July 2014.

In 2011 (Table 4), 261 women had HSIL+ cytologies, of which 190 were biopsied (data about number of colposcopies not known). In total, 133 CIN2+ were detected in 2011 (CIN2 = 31; CIN3 = 93; invasive cancer = 9). Eighty-four percent had been treated by December 2013. PPV for CIN2+ for cytology in 2011 was 50.9% (133 women with 2CIN2+/261 women with HSIL cytologies).

Differences in detection rates between years were statistically significant. The number of CIN2+ detected per 100 screened women was 1.25 and 0.62 in 2012 and 2011, respectively ($p = 0.0002$). If the detection rate of HPV testing for 2012 is recalculated considering only CIN2+ from women with HSIL+ (ASC-H, HSIL and cancer) cytology ($n = 529$), detection rate of HPV testing in 2012 would have been 1.15% (259/22,515).

Discussion

This is, to our knowledge, one of the first reports about programmatic introduction of routine HPV testing, with both

data about the implementation process and performance results. In the first year of JDP, all programmatic components were established, and performance indicators indicated that most main goals were achieved; suggesting that effective introduction of HPV testing in low-middle income settings is feasible. In addition, the study showed that HPV testing allowed detection of twice the number of CIN2+, when compared to previous cytology-based results, suggesting that the high test performance obtained in research contexts to detect CIN2+ can be replicated in a large-scale program. Based on these results, the Argentinean MoH has initiated rolling out of HPV testing to the whole country. In 2014, four additional provinces had introduced HPV testing.

In this first year, the expected number of women was screened. However, although the test was specifically indicated for women with public health insurance, 20% of screened women had social or private insurance, coincident with the fact that these women can also receive care at public health centers. As annual screening goals are set for women with public health insurance, which are the least likely to get screened,²⁴ special efforts are needed to assure that HPV testing reaches the target population, otherwise the benefits of its higher detection performance will be reduced. This is especially important in developing settings as most do not have nominalized invitation of women. Monitoring of coverage through information systems is essential to guarantee high coverage of the target population.

Adherence to the age recommendation by health professionals was very high, as a very small percentage of women younger than 30 was screened. This contrast with previous low adherence of health professionals to the age recommendation for cytology screening.⁴ The special emphasis during training on the fact that screening of young women might result in increased overdiagnosis and overtreatment, has probably facilitated this high adherence. We consider that training of health providers on the scientific basis of HPV testing and the rationale of algorithms must be an essential component of HPV testing introduction. Also, main medical scientific societies were part of the working group that defined algorithm and protocols. The important consensus building process concomitant with protocols elaboration might also have played a key role in this high adherence by health professionals.

The project also established the double collection of HPV testing specimens and cytological samples, with reading of smears only for HPV+. This allowed avoiding a second visit for smear collection, with potential reduction in loss to follow-up. In our project this resulted in 95.6% of HPV+ women with an immediate result for cytology. Adding an additional visit for triage might increase loss to follow-up and treatment, therefore decreasing effectiveness of HPV testing.²⁵

Our results showed that the detection rate of HPV testing doubled that obtained in 2011 with the cytology-based strategy, allowing for diagnoses of two times more women with

CIN2+. A higher disease detection of HPV testing compared to cytology has been reported by randomized-controlled trials.^{26,27} In Jujuy, this difference was obtained despite the fact that a higher proportion of women in 2012 had a Pap in the last 3 years compared to women screened in 2011, constituting a group with lower risk of disease. It should be noted, however, that the protocol for cytology-based screening in 2011 recommended referral only of women with HSIL+ cytologies whereas in the HPV testing protocol, all HPV+ women with ASCUS+ were referred. However, if we only include in the calculation of the detection rate of HPV testing CIN2+ cases from women with HSIL+ cytologies, the difference between screening methods is similar. If these results were confirmed in following years, colposcopic referral only of women HPV+ and cytology HSIL+ might be considered. Detection of CIN2+ was based on pathology diagnoses performed by pathology services of the public health care system in Jujuy, and are the ones that are in use for clinical management in the province. Therefore, our results show HPV detection rates that can realistically be achieved in programmatic conditions.

Triage of HPV+ women was done through cytology because, despite important differences in quality between laboratories, in Argentina cytology is highly developed. A recommendation of the WHO Guidelines includes referring to colposcopy all HPV+ women.²⁸ However, that strategy can result in excessive workload for colposcopy units and overdiagnosis. Important work was carried out to improve cytology in Jujuy before the JDP, as part of the national program activities. In addition, cytologic triage allowed involving cytologists in the process of introducing HPV testing, facilitating acceptance of the project by health professionals. Despite the lack of a gold standard to ascertain sensitivity of the process, increases in detection rates in Argentina with this triage strategy suggest that high-quality, conventional cytology can be an effective triage method in HPV testing-based programs. This also indicates that the triage strategy in each country must be decided taking into account the history and level of development of cytologic screening and viability of changing to other options.

The algorithm set for HPV testing establishes that all HPV+/abnormal smear women are referred for colposcopy. This resulted in more than three times more women referred to colposcopy, when compared to the algorithm in use under cytological screening which only referred women with HSIL. Despite the increase in colposcopies, the percentage of women complying with diagnosis was similar to 2011, when the program was cytology based.¹⁴ The evaluation of the capacity of colposcopists to face increased demand was a key component of the planning phase, and the increase was adequately met by services, as confirmed by almost 80% of women with colposcopic diagnosis. Since low adherence to follow-up procedures is a factor for reduced effectiveness of screening,²⁵ planning of this stage must be carefully considered by programs introducing HPV testing using colposcopic diagnosis. Our study

showed that 34% of HPV+ women with normal cytology was rescreened in 1 year. Although the 1-year follow-up can be considered conservative, this low percentage is of concern, as these women have increased risk of developing CIN3+.²⁹ Special strategies must be put in place to assure rescreening of these high risk women. In 2014, lists of HPV+ women who had not been rescreened have been distributed among CHWs so they can contact these women during their visits. Counseling during communication of results is also being reinforced so women understand the importance of rescreening. The effectiveness of these strategies will be evaluated.

Although evidence suggests that screening interval can be increased between 5 and 10 years,^{7,28,30} in the JPD the screening interval was set at 3 years. The rationale for this was to initiate with the frequency recommended for cytology screening, to reduce potential resistance from gynecologists. Increasing the interval to 5 years, would reduce the number of women screened annually and would allow a more effective use of resources.

The limited effectiveness of screening in developing countries has been associated with poor cytology quality, low coverage and reduced adherence to diagnosis and treatment.² The need of high screening frequency and repeated visits due to the limited sensitivity of cytology have been pointed out as determining factors of program failure.⁵ Thus, during decades programs and scientists have struggled with the difficulty of organizing cytology-based screening. The development of HPV-DNA-based screening generated great expectations and renewed optimism among the public health community about a new technology that would solve problems and would allow, finally, to reduce the burden of this preventable cancer. Results from the JDP confirm that when compared to cytology screening HPV testing is a more effective tool to detect disease. However, the description of the programmatic context in which the HPV test was implemented also highlights the fact that efficacy of the test is highly dependent on high quality programmatic processes, including strategies to assure high screening/diagnosis/treatment coverage, coordination among services to assure that collectors, samples and results arrive in timely manner, and training needed at all levels to assure high quality procedures and processes. In the JDP, strengthening of the screening program was a previous step of HPV testing introduction, as the national program was relaunched in 2008,⁴ with extensive work carried out in the province of Jujuy to improve program quality,³¹ including centralization of cytology reading into one high quality laboratory. This was the laboratory where the HPV laboratory was later organized, facilitating processes related to the reading of smears of HPV+ women, among others.

Our study has several limitations: First, comparison of detection rates was performed between 2011 and 2012, for all women attending the public health care system. Therefore, it is not possible to assure that specimens came from the same population. However, we assumed that groups were similar regarding sociodemographic characteristics, because there

were no significant changes in the health system or in the population demographics from 1 year to another. The fact that there were no significant differences regarding sociodemographic variables included in the study supports this hypothesis. Second, this was not a population-based screening project, as screened women were those who responded to promotion carried out by the programme, and not invited with a call-recall system. Therefore, coverage results might be different from those obtained at a population-based level. Third, working at the MoH, or involved in the design and implementation of cervical cancer prevention activities in Argentina, all researchers in this study participated in processes linked to the project under investigation. Such experiences allowed them to gather insights into the implementation process, but, at the same time, may have biased the description of narrated activities. This potential bias does not affect quantitative outcomes, as they were calculated using data from SITAM, the national information system on screening.

Finally, our results show that HPV introduction was established as a health priority by national and provincial

health authorities, with consequent channeling of human and financial resources needed for its implementation. Doubtless, without those resources and support it would have not been possible to carry out high-quality activities and processes for successful HPV introduction. Strong support from health authorities must be a *sine-qua-non* condition for test introduction. Without such support, program effectiveness will not be assured.

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