



## Attitudes to Changes in Cervical Screening Guidelines: Preliminary Views of Australian General Practitioners and Nurse Practitioners

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### Abstract

**Background:** Since its inception in 1991, the organised Australian National cervical cytology screening programme has resulted in the reduction in incidence and mortality from cervical cancer. However, under the Renewal program, these guidelines will change from May 1<sup>st</sup> 2017, from cytology screening biennially from 18 years, to HPV DNA testing every 5 years from 25 years of age for those repeat negative.

**Objectives:** To establish the attitudes of Australian general practitioners (GPs) and nurse practitioners to renewed cervical screening guidelines, specifically to delaying onset of screening from 25 years, widening the screening interval to 5 years and adopting an HPV DNA test as a primary screening method.

**Study design:** GPs and nurse practitioners were invited to complete an online survey through advertisements in e-newsletters. The survey assessed participants' demographics, cervical screening practices and perceived barriers to screening according to the proposed new guidelines. Responses were on a 7-point Likert scale. Statistical analysis was performed using the chi-square for categorical variables and student T-test for continuous variables. Adjusted odds ratios were determined using multivariate logistic regression.

**Results:** Of the 191 respondents, 50% were GPs. Mean age was 48 years, 90% were female, 81% had graduated from Australian or New Zealand-based universities, and 64% practiced in metropolitan areas. The majority of both professional groups (84% GPs, 75% nurse practitioners) were willing to accept the proposed renewed guidelines. However, approximately half of respondents were concerned that young women would not attend for other health checks, if routine pre-cancer screening were not offered (51% GPs, 49% Pap nurses).

**Conclusions:** Whilst most participants were willing to follow the renewed guidelines, many had concerns that women would not attend for regular health checks if pre-cancer screening were not offered. A larger representative study should be undertaken to guide targeted education prior to introduction of the guidelines.

### Keywords

Cervical screening, HPV testing, Extended interval, Attitudes, General practitioner, Pap nurse, Nurse practitioner, Primary care research

### Introduction

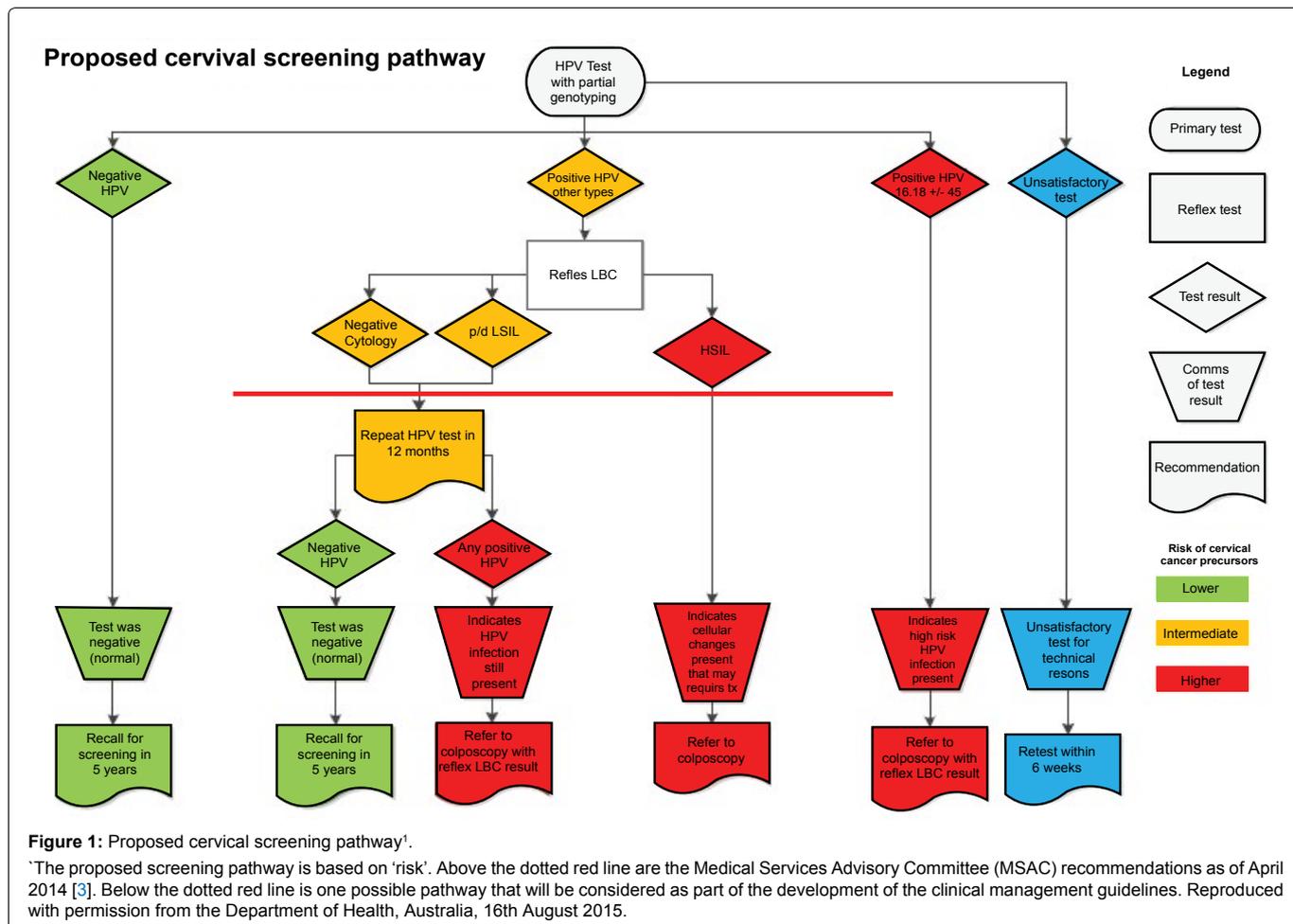
For over two decades the organised National Cervical Screening Program (NCSP) in Australia has recommended Papanicolaou (Pap) testing biennially from age 18 years, or two years after the onset of sexual activity, whichever occurs later, with a three-year screening participation rate of 70.2% [1]. On the 10<sup>th</sup> of May 2015, the Australian Federal Government announced funding of the renewed National Cervical Screening Program (NCSP) that will introduce new guidelines across Australia to be implemented from the 1<sup>st</sup> of May 2017 [2]. These will involve a human papillomavirus (HPV) DNA test collected in a liquid based cytology (LBC) medium and performed every five years, commencing at the age of 25 years with triaging by partial HPV genotyping and reflex LBC [3]. Immediate referral to colposcopy will be indicated if a woman tests positive for high-risk HPV (hrHPV) genotypes 16 and 18, or tests positive for other hrHPV types and LBC indicates a high-grade abnormality [3] (Figure 1).

The "Renewal" guidelines have occurred in response to a greater understanding of the natural history and progression of HPV

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infection and cervical disease outcomes in young women [4] as well as the impact the government-funded HPV vaccine program has had on reduction of vaccine-related HPV infections [5], as well as on histologically diagnosed HSIL [6]. Traditionally, young women have demonstrated very high rates of hrHPV infection [7] with cervical dysplasia being common, but largely low-grade, transient and regressing naturally overtime [8]. Cervical cancer is rare in young Australian women with the crude incidence rate for those aged between 20 to 24 years in 2010 being 2.3 new cases per 100 000 women [1]. Also, a long latent phase of up to 30 years exists from the development of high-grade dysplasia to cervical cancer [9]. It is important to minimise intervention in young women for mild cervical dysplasia that may regress naturally [10]. Recurrent treatments can be associated with potential future obstetric morbidity (premature rupture of the membranes, preterm labour and low birth weight) [11]. Furthermore, screening women younger than 25 years of age has been found to have minimal impact on the incidence of cervical cancer in women younger than 30 years of age [12].

Internationally, more conservative screening guidelines have already been incorporated into existing screening programs [13,14]. North American doctors have adopted HPV DNA testing in the context of an abnormal Papanicolaou (Pap) test result, but most do not routinely perform it concurrently with a Pap test although their guidelines do advise concurrent testing as primary screening [13,15]. Attitudes held by doctors in the United States towards a prolonged screening interval included a belief that patients would feel uncomfortable with less frequent testing [13,16], yet doctors personally felt comfortable with the extended intervals [16]. Doctors felt women would not present regularly for other screening tests or that the extended interval would create anxiety as cervical cancer could remain undetected [13]. If Australian clinicians were found to have similar concerns, then further evidence-based information would need to be made readily available concurrently with the introduction of the final Renewal guidelines.

Previously we undertook an electronic survey of Royal Australian College of Obstetricians and Gynaecologists (RANZCOG) affiliates regarding attitudes to potential new changes to cervical cancer screening guidelines, during their announcement in 2014 [17]. The survey was emailed to 4725 RANZCOG members and 956 responses were received (20.2% response rate) [17], which was comparable to the usual 30% response rate for medical practitioner focused surveys in Australia [18,19]. To date no Australian-based study has analysed the attitudes of non-RANZCOG affiliated General Practitioners (GPs) and nurse practitioners to the revised guidelines. Understanding their views is important, as they play a pivotal role in the cervical screening program, with 1.7 of every 100 GP visits involving cervical screening [20]. As a national representative body for Pap nurses does not exist, the number of Australian nurses involved in screening is unknown. However, of the 600,759 Pap tests collected in Victoria during 2013, 38,012 (6.3%) were collected by nurse practitioners [21]. Therefore, nurse practitioners are another trusted professional group whose opinions could strongly influence the views of the community with respect to screening [22].

Significant disparities in cervical cancer rates exist in Australia with higher rates being apparent in rural and remote areas [23]. Screening participation rates appear to be mostly similar across geographic regions, however, may be as low as 44% for very remote women [24]. It is thought that a complex interplay of a range of factors including socioeconomic status, lack of engagement in preventative health, indigenous status and cultural disconnect with mainstream services may contribute to this [25]. Therefore, it's important to assess the impact of practice location contributes to other clinical factors in decision making.

The objective of this study was to explore the attitudes of Australian GPs and nurse practitioners to the renewed guidelines (specifically to delaying screening to 25 years, widening the screening interval to 5 years and adopting HPV DNA testing as a primary screening method to commence around 2017, as recommended by the National Cervical

**Table 1:** Summary of key questionnaire domains<sup>a</sup>.

Screening Concept	Scale Items
<ul style="list-style-type: none"> <li>Attitudes towards HPV testing and intention to screen with HPV testing instead of cytology (primary endpoint)</li> </ul>	<ul style="list-style-type: none"> <li>"I would be willing to perform an HPV test to screen for cervical cancer at/after the age of 25 and every 5 years instead of a Pap smear every two years after onset of sexual activity in my patients (to commence around 2017) as recommended by the National Cervical Screening Program Renewal)" (from 1 strongly disagree to 7 strongly agree)<sup>b</sup></li> </ul>
<ul style="list-style-type: none"> <li>Attitudes towards delaying cervical screening until 25 years of age</li> </ul>	<ul style="list-style-type: none"> <li>"I am uncomfortable with delaying the age of cervical screening until 25 years of age" <sup>b</sup>(from 1 strongly disagree to 7 strongly agree)<sup>b</sup></li> </ul>
<ul style="list-style-type: none"> <li>Attitudes towards HPV testing from 25 years of age at widened screening intervals</li> </ul>	<ul style="list-style-type: none"> <li>"Having an HPV test to screen for cervical cancer starting at/after the age of 25 and every five years instead of a Pap smear every two years after onset of sexual activity would: be accurate/be safe/be protective/be acceptable/be resource efficient." <sup>b</sup>(from 1 strongly disagree to 7 strongly agree)<sup>b</sup></li> </ul>
<ul style="list-style-type: none"> <li>Facilitating factors for delaying screening to 25 years</li> </ul>	<ul style="list-style-type: none"> <li>"Which of the following factors are more reassuring for you, or that you consider are acceptable reasons for delaying screening to 25 years in young women: I feel more reassured when a woman has had the HPV vaccine prior to sexual activity/I feel more reassured when a woman has had the HPV vaccine even if it was after onset of sexual activity/I feel more reassured when a woman has only been in same sex relationships/In general terms cervical changes in young women are largely low-grade and have a high rate of regression/Screening exposes young women to unnecessary obstetric risks/Cervical cancer in women under 25 years is very rare irrespective of HPV vaccination/Screening does not appear to reduce the incidence rates of cervical cancer in young women &lt; 25 years." (from 1 strongly disagree to 7 strongly agree)<sup>b</sup></li> </ul>
<ul style="list-style-type: none"> <li>Factors that may be barriers to delayed screening to 25 years</li> </ul>	<ul style="list-style-type: none"> <li>"Could you please indicate if the following are situations where you would continue screening from 18 years in the following situations (even though the new guidelines as of 2017 suggest cervical screening from 25 years): When a woman has already had a personal history of high-grade cervical changes prior to 25 years /when a woman has already had a personal history of high-grade cervical changes prior to 25 years/When a sexually active woman has a strong family history of cervical cancer/When a woman has early stage of fist sexual intercourse (16 years)/When a woman gives a past history of genital-contact childhood sexual abuse (&lt; 16 years)/When a woman gives a past history of genital-contact unwanted adolescent sexual activity (16 to 17 years)/When a sexually active woman has not had the HPV vaccine/When a sexually active woman has HIV or is immunosuppressed." (from 1 strongly disagree to 7 strongly agree)<sup>b</sup></li> </ul>

<sup>a</sup>Table is not the complete survey.

<sup>b</sup>Results were dichotomized  $\leq 4$  and  $> 4$  from a 7 point Likert scale.

Screening Program Renewal). We conducted a web-based survey to determine potential barriers and facilitating factors for general practitioners and nurses to adopting the new guidelines.

## Materials and Methods

### Participants

Australian-based GPs and nurse practitioners (including Pap nurses) responded to advertisements placed in the Royal Australian College of General Practitioners (RACGP) e-newsletters in all states/territories; Medicare Locals (ML) newsletters covering five states and one territory (Australian Capital Territory, Greater Metro South Brisbane, Southern Adelaide Fleurieu Kangaroo Island, Inner West Sydney, Northern Adelaide, Southern Eastern Sydney and Tasmania); PapScreen Victoria (PSV) e-newsletters for Victorian Pap nurse providers; and the Australian College of Nurse Practitioners (ACNP) email distribution list. ACNP members could be Pap nurse providers or specialise in a different area of health and not be involved in cervical screening. A single reminder email was sent to participants whose emails could be accessed, specifically GPs and nurse practitioners who were members of Family Planning Victoria or worked at the study institution (The Royal Women's Hospital).

### Materials

The survey was modified from a similar survey undertaken by over 900 RANZCOG affiliates [26]; and originally adapted from a Canadian study that was modelled on the theory of planned behaviour (TPB) [27]. The TPB is often used to examine health-screening behaviours and is especially beneficial when the behaviours examined are under voluntary control [28]. Four Victorian GPs piloted the questionnaire during March 2015, which resulted in minor modifications (Appendix 1 Survey). The survey was accessible via a Survey Monkey<sup>®</sup> (www.surveymonkey.com) web-link. It consisted of 23 questions and took around 15 minutes to complete. Participants, who clicked on the web-link read a more detailed information statement describing the significance of the study and consented electronically before participation. An informative cervical screening activity was provided at the end of the survey and GPs

could gain two continuing medical education (CME) points per hour for its completion. Please refer to [appendix 2](#) (Checklist for reporting results of internet e-surveys) for more information regarding the data collection process.

### Analysis

The main research question was: 'I would be willing to perform an HPV test to screen for cervical cancer at/after the age of 25 years and every five years after onset of sexual activity in my patients (to commence around 2017 as recommended by the National Cervical Screening Program Renewal)'. Willingness to adopt the guidelines was determined using a seven point Likert scale where 1 indicated 'unwilling' or 'disagree' and 7 indicated 'willing' or 'agree'. An identical dichotomization was used in the RANZCOG affiliate sub-study [23] based on a cross tabulation sub analysis where  $\leq 4$ , indicated 'unwilling' or 'disagree' and  $> 4$ , indicated 'willing' or 'agree'. Characteristics (including age, gender, role, years since graduation from medical or nursing school, country of graduation, location of practice, professional group affiliation, workplace and proportion of female patients seen by the participant as a proportion of their practice, acceptance of HPV vaccination guidelines) were used to explore willingness to undertake new screening practice if national guidelines recommended it. Then self-perceived benefits and barriers to offering delayed screening at age 25 years were explored by providing participants with different scenarios and asking them to provide answers on a seven point Likert scale (where 1 indicated 'unwilling' or 'disagree' and 7 indicated 'willing' or 'agree'), for whether they would continue to screen from 18 years of age. [Table 1](#) summarises the key questionnaire domains that were found in the survey (the survey is attached as [Appendix 1](#)).

Responses obtained from those who only completed the demographic module were completely excluded from the analysis. Nurse Practitioners not involved in cervical screening were included in the analysis of the main research question (willingness to adopt new guidelines), and only Pap nurse providers (from PSV in Victoria or ACNP from throughout Australia) were included in further detailed analyses regarding facilitating factors and barriers to delayed

**Table 2:** Participant demographics (n = 191); and their association with willingness to perform screening from 25 years every 5 years with HPV testing.

Variable and group	Overall cohort;	Participants who answered the main research question regarding willingness to undertake new screening practice if national guidelines recommended it <sup>a</sup>		
		Willing to perform revised guidelines; > 4 <sup>b</sup> ,	Unwilling to perform revised guidelines; ≤ 4 <sup>b</sup>	p-value
<b>Age, mean (SD)</b>	48.1 (10.0)	47.9 (10.2)	49.0 (8.8)	0.570
	N (%)	N (%)	N (%)	N (%)
<b>Female</b>	172 (90.1)	117 (80.1)	29 (19.9)	0.743
<b>Role</b>				0.174
GP	95 (49.7)	69 (84.2)	13 (15.9)	
Nurse	96 (50.3)	60 (75.0)	20 (25.0)	
<b>Years since graduation, mean (SD)</b>				
Medical school	21.6 (11.6)	22.0 (11.5)	20.2 (12.0)	0.608
Nursing school	25.3 (11.0)	25.2 (10.8)	25.0 (11.1)	0.934
<b>Country of graduation</b>				0.102
Australia/New Zealand	155 (81.2)	111 (82.2)	24 (17.8)	
United Kingdom	16 (8.4)	11 (73.3)	4 (26.7)	
Other	20 (10.5)	7 (58.3)	5 (41.7)	
<b>Location of practice</b>				1.000
Metropolitan	122 (63.9)	82 (79.6)	21 (20.4)	
Regional/rural	69 (36.1)	47 (79.7)	12 (20.3)	
<b>Professional group affiliation</b>				
RANZCOG diplomat GP	24 (25.3)	20 (95.2)	1 (4.8)	0.167
Non RANZCOG diplomat GP	71 (74.7)	49 (80.3)	12 (19.7)	
Pap nurse provider	76 (79.2)	55 (82.1)	12 (17.9)	0.002
Non Pap nurse provider	20 (20.8)	5 (38.5)	8 (61.5)	
<b>Workplace</b>				0.956
Individual GP clinic	10 (5.2)	7 (77.8)	2 (22.2)	
Group GP clinic	105 (55.0)	70 (77.8)	20 (22.2)	
Group GP including gynaecologist	7 (3.7)	5 (100.0)	0 (0.0)	
Community clinic	36 (18.9)	27 (81.8)	6 (18.2)	
Hospital	12 (6.3)	7 (77.8)	2 (22.2)	
Other	21 (11.0)	13 (81.3)	3 (18.8)	
<b>Female patients seen by the participant as a proportion of their practice</b>				
≤ 29%	4 (2.1)	2 (66.7)	1 (33.3)	0.712
30-75%	113 (59.5)	75 (79.0)	20 (21.1)	
> 75%	73 (38.4)	51 (81.0)	12 (19.1)	

All results reported as N (%) unless otherwise specified.

<sup>a</sup>Proportion who answered willingness to change screening practice question to be in accordance with the revised guidelines question may not be equivalent to the overall cohort proportion due to missing data.

<sup>b</sup>Responses were on a 7 point Likert scale which was dichotomised as ≤ 4, indicating 'unwilling' or 'disagree' and > 4, indicating 'willing' or 'agree'.

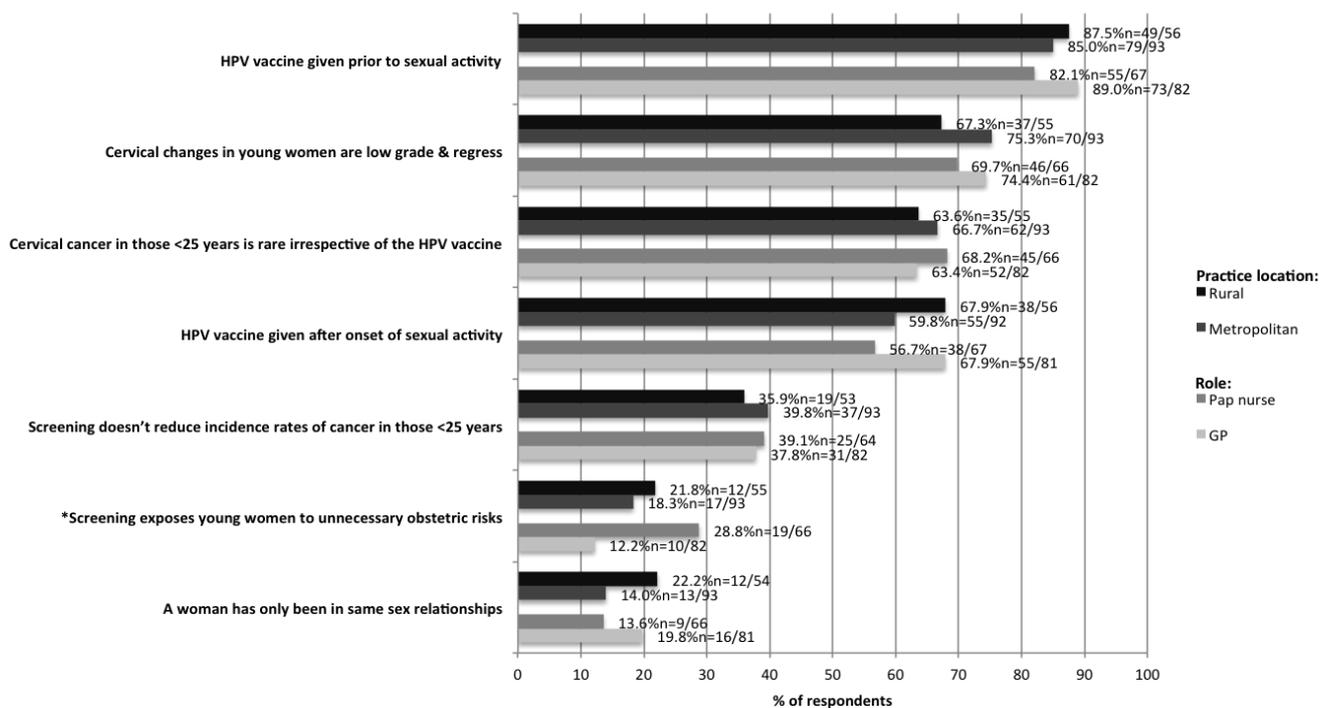
screening, reasons to continue screening from 18 years of age, reasons for colposcopic referral if an hrHPV test were negative and factors that correlate with willingness to follow the revised guidelines.

The statistical program STATA 13.1 \* (StataCorp, LP, and College Station, TX, USA) was used for data analyses. The differences between those willing to accept the changes and those who were not were assessed using either Chi squared or Fisher's exact test for categorical data (such as gender, practice location, professional group affiliation) and independent sample t-test for continuous data (such as age, years since graduation). All continuous variables were checked for normality prior to data analysis using Shapiro-Wilks test and found to be normally distributed. In addition, Chi squared test was used to determine any associations between likelihood of referral for colposcopic assessment based on practice location. Multivariable logistic regression was used to determine independent predictors of willingness to accept the guidelines. All variables significantly associated with outcome of interest at univariate analysis and those of clinical importance were included in the model. This was an opportunistic study and sample size calculation was not performed.

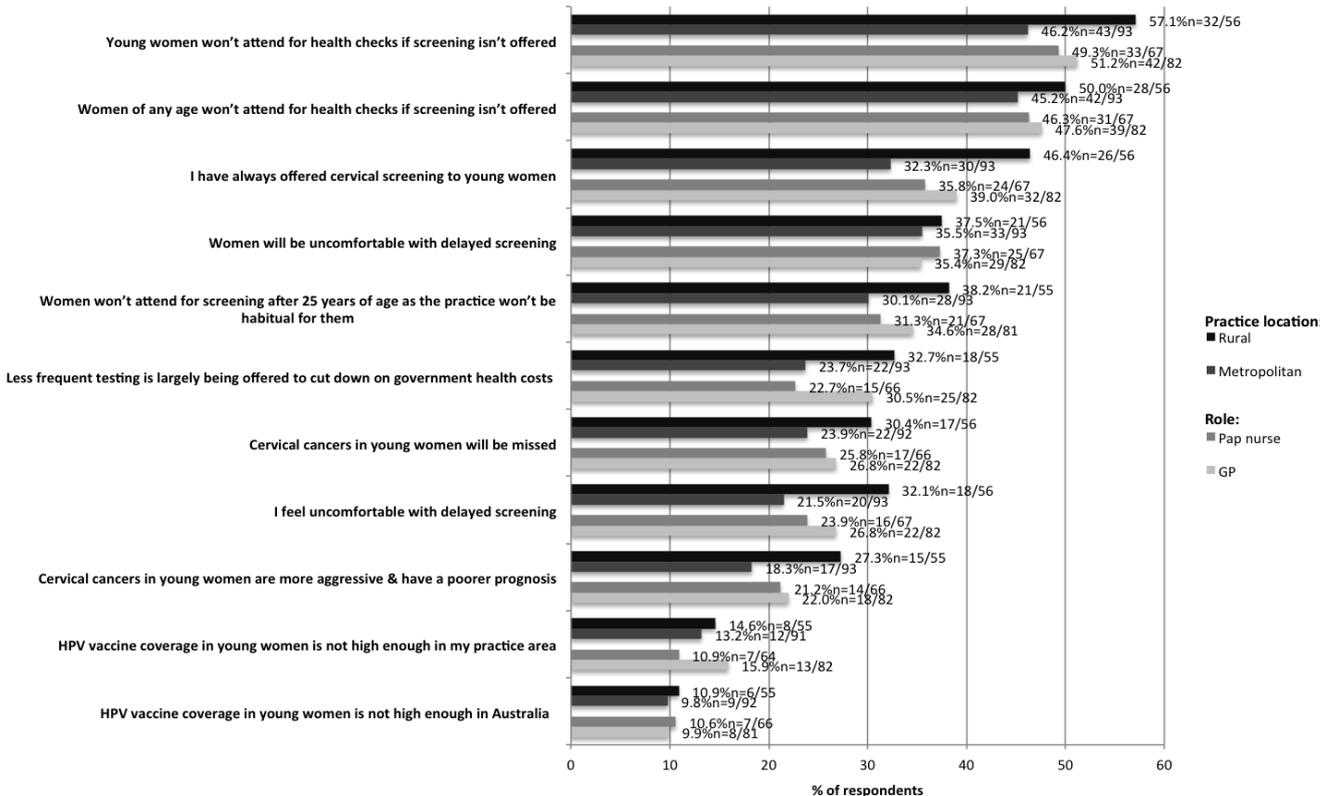
## Results

From the 13<sup>th</sup> of April to the 4<sup>th</sup> of August 2015, 226 responses were received. Thirty-five were excluded, as questions beyond demographics were not completed. Of the 191 respondents (95 GPs; and 96 nurses), 161 (84.3%) completed the entire survey. Mean age was 48.1 ± 10.0 years, most were female (n = 171, 90.1%), had graduated from Australian or New Zealand-based universities (n = 155, 81.2%), and practiced in metropolitan areas (n = 122, 63.9%).

Overall, 84.2% (n = 69) of GPs and 75.0% (n = 60) of nurse practitioners were willing to follow new cervical screening guidelines (delay onset of screening to 25 years every 5 years with HPV testing), if the national guidelines recommended it (Table 2). Pap nurses were more willing to adopt the renewed guidelines in comparison to nurse practitioners not involved in screening (82.1% [n = 55] vs. 38.5% [n = 5], p = 0.002). Almost all respondents agreed that the national cervical screening guidelines were important to them (97.6% GPs (n = 80), 100% Pap nurses (n = 67) and 69.2% nurse practitioners who were not Pap nurses (n = 9)) (data not included in tables/figures).



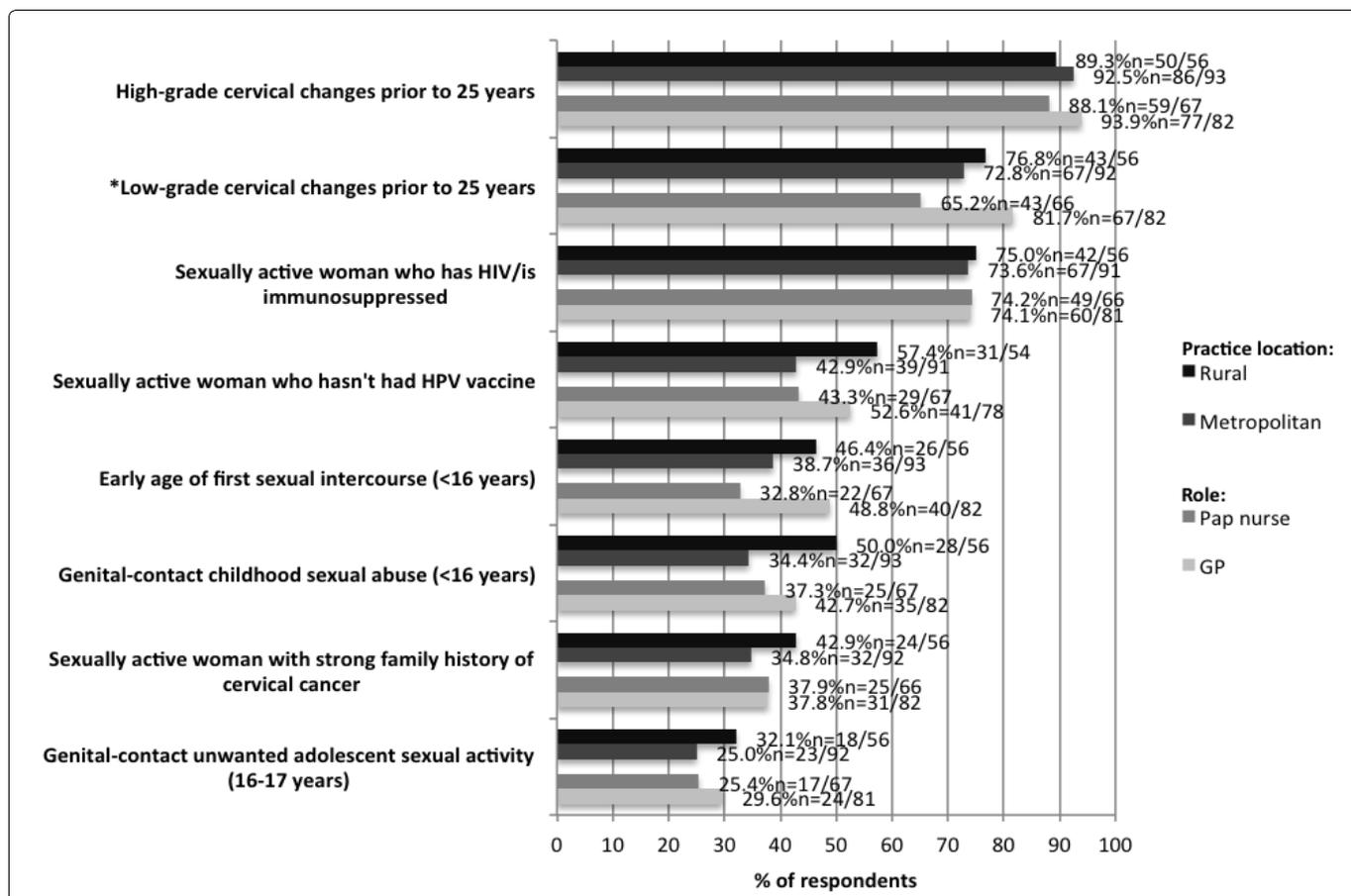
**Figure 2:** Facilitating factors to offering delayed screening from 25 years of age, based on role and practice location.  
 \*p < 0.05  
 Nurses who did not identify as cervical screening providers were excluded from the analysis of this figure.



**Figure 3:** Barriers to offering delayed screening from 25 years of age, based on role and practice location.  
 Nurses who did not identify as cervical screening providers were excluded from the analysis of this figure.

Facilitating factors and barriers for delaying screening to 25 years are shown in figure 2 and figure 3. In general there were no differences in responses based on practice locations and/or role (GP/Pap nurse). But a higher proportion of Pap nurses compared to GPs felt that cervical screening exposes young women < 25 years to unnecessary obstetric risks (28.8% [n = 19/66] vs. 12.2% [n = 10/82] p=0.013)

(Figure 2). Around 40% of participants agreed that screening did not impact on cervical cancer incidence in the young. Most felt reassured about delayed screening to 25 years, when a woman had received the HPV vaccine prior to sexual activity. However, only 52.6% of GPs (n = 50) and 63.2% of Pap nurses (n = 48) agreed that they had access to reliable HPV vaccination guidelines (p = 0.213) (data not included)



**Figure 4:** Reasons why respondents would continue to screen women aged < 18 years even though the revised guidelines recommend screening from 25 years of age, based on role and practice location.

\*p < 0.05

Nurses who did not identify as cervical screening providers were excluded from the analysis of this figure.

**Table 3:** Likelihood of referring for colposcopic assessment according to professional role and practice location of participants.

Variable	Professional role, N (%)			Practice location, N (%)		
	GP	Pap nurse <sup>c</sup>	p-value	Metropolitan	Rural	p-value
<b>Currently largely refers to colposcopy for visible cervical abnormalities, post coital bleeding, intermenstrual or postmenopausal bleeding because; &gt; 4<sup>d</sup></b>						
-Isn't confident in visually distinguishing a normal from an abnormal cervix	34 (42.0)	27 (40.3)	0.837	43 (46.7)	18 (32.1)	0.080
-NHMRC guidelines recommend it	50 (61.7)	44 (66.7)	0.535	62 (68.1)	32 (57.1)	0.178
-For medicolegal reasons	42 (51.2)	23 (34.9)	0.046	47 (50.5)	18 (32.7)	0.035
<b>Would refer for colposcopic assessment even if a high risk HPV test were negative for; &gt; 4<sup>d</sup></b>						
-Visible cervical abnormalities	75 (91.5)	58 (86.6)	0.337	87 (93.6)	46 (82.1)	0.029
-Post coital bleeding	65 (79.3)	41 (61.2)	0.015	68 (73.1)	38 (67.9)	0.492
-Intermenstrual/ postmenopausal bleeding	57 (69.5)	42 (62.7)	0.380	59 (63.4)	40 (71.4)	0.372

<sup>c</sup>Nurse practitioners who did not identify as Pap nurses were excluded from the analysis of this table.

<sup>d</sup>Responses were on a 7 point Likert scale which was dichotomised as ≤ 4, indicating 'unwilling' or 'disagree' and > 4, indicating 'willing' or 'agree'.

in tables/figures). In the event of missed doses, Pap nurses were more likely to report that they would advise women to complete their HPV vaccination course, compared to GPs (81.6% (n = 62) vs. 77.9% (n = 74), p = 0.024) (data not included in tables/figures).

Around one quarter of respondents personally felt uncomfortable with delayed screening (26.8% [n = 22/82] GPs, 23.9% [n = 16/67] Pap nurses) and thought women would also be uncomfortable with delayed screening (35.4% [n = 29/82] GPs, 37.3% [n = 25/67] Pap nurses) (Figure 3). Both GPs and Pap nurses expressed concern that women of any age and young women in particular, would not

attend for other health checks such as sexual transmitted infection screening, if pre-cancer screening were not offered. There was no significance difference in results according to professional role or practice location.

Of the respondents, 23.2% [n = 19/82] of GPs and 25.4% [n = 17/67] of Pap nurses reported that they currently perform cervical screening in women less than 18 years of age. There was no significant difference between reasons for currently screening women younger than 18 years according to professional role or practice location (p > 0.050) (Figure 4). Of respondents who currently screen women

aged less than 18 years of age, more than half reported that they refer for colposcopy in the context of post-coital bleeding (PCB) (52.6% [n = 10/19] GPs, 56.3% [9/16] Pap nurses), but fewer referred for a menstrual irregularity (10.5% [n = 2/19] GPs, 35.3% [n = 6/17] Pap nurses) or at the patient's request (47.3% [n = 9/19] GPs, 29.4% [n = 5/17] Pap nurses) (Table 3). Under the revised guidelines, even if an hrHPV test were negative for a woman of any age, a large proportion would still wish to refer for colposcopic assessment, with GPs more likely to refer for PCB (79.3% [n = 65/82] GPs, 61.2% [n = 41/67] Pap nurses, p = 0.015). A high proportion of metropolitan based professionals stated they would refer to colposcopy for a visible cervical abnormality in the context of a negative hrHPV result compare to those practicing in rural areas (93.6% [n = 87/93] metropolitan, 82.1% [n = 46/56] rural, p = 0.029).

A multivariate analysis, adjusted for country of graduation of the clinician, determined the association between specific factors and willingness to follow the revised guidelines (Table 4). GPs who felt they had access to reliable HPV vaccination guidelines were more willing to follow the revised cervical screening guidelines (Adjusted [Adj] OR 6.3, 95% confidence interval [95% CI] 1.3 - 31.5, p = 0.024). GPs who referred symptomatic women for colposcopy for medicolegal reasons (Adj OR 0.10, 95% CI 0.02 - 0.62, p = 0.013) were less willing to adopt the guidelines. No significant associations were found for Pap nurses willingness to adopt "Renewal" in the multivariate analysis.

## Discussion

This exploratory study of GPs and nurse practitioners demonstrated that the majority of respondents were willing to perform an HPV DNA test every five years from 25 years of age, if national guidelines recommended it. Willingness to adopt these changes was associated with the importance of national guidelines as perceived by the clinician, an Australian or New Zealand-based university degree, and specifically for nurse practitioners, identification as a Pap nurse.

The main factor cited by respondents in support of delayed screening from 25 years of age was reassurance when a woman had received a full course of the HPV vaccine before sexual activity. The high three-dose vaccination coverage (73%) in the target population of 12-13 year olds across all socio-economic groups will therefore be a significant facilitator for acceptance of delayed screening to 25 years [29]. Furthermore by the time the guidelines are introduced the 16-17 year olds who had vaccination coverage of at least 66% in 2007 will be aged 27 years old [30]. As data are suggesting non-inferiority of the immune response to two-dose vaccination compared to three-dose vaccination (with some countries already adopting a two-dose vaccination program), further comfort with the guidelines may be seen over time for those who are "under vaccinated" [29,31,32]. A barrier highlighted by our study was the perception that women (particularly those < 25 years) would not attend for general health checks, including sexually transmitted infection (STI) screening, if

pre-cancer screening were not offered. Indeed a study of over 600 GPs and practice nurses in five Australian states reported they were more likely to offer chlamydia screening in the context of Pap screening than not (84% versus 55%) [33], and young women themselves have echoed the same sentiment [34]. Despite this, chlamydia screening coverage is significantly lower (around 9% in 20-24 year olds) [35] compared to Pap coverage of around 40% [24]. So it is clear that other barriers apart from cervical screening need to be addressed to increase uptake of STI screening in this group that could include education on the use of a self-collected urine or vaginal samples for chlamydia testing [34]. Another barrier for delayed screening was personal discomfort, as well as perceived discomfort by patients. A North American study by Perkins et al. in 2013 which examined the views of 366 Obstetricians and Gynaecologists to their updated screening guidelines, also found that 70% of the doctors surveyed felt their patients would be uneasy with a prolonged screening interval [16]. As a delayed and extended screening interval is new to Australian screening, an opportunity exists for targeted education before the renewed guidelines are implemented.

While the treatment for cervical dysplasia has the potential to be associated with obstetrics risks [11], 87.8% of GPs did not feel that screening posed an unnecessary risk, suggesting that they felt that the risks justified the benefits. Confusion remained over what course to take in the event of symptomatic women, with metropolitan practitioners more likely to refer for colposcopic assessment in the context of symptoms, even in HPV negative women. This is similar to a study of over 1400 Australian GPs which demonstrated that metropolitan GPs were more likely to have greater access to tertiary gynaecological services and more likely to refer for symptoms of endometrial cancer compared to rural GPs, particularly in the absence of written guidelines [36]. Current guidelines suggest that a Pap test is carried out with referral to a gynaecologist for intermenstrual bleeding (IMB) and referral to colposcopy for PCB [37]. It is important the revised written guidelines address management in the context of symptomatic HPV negative women. Also, a large proportion of respondents would continue screening from 18 years if there were a history of low-grade dysplasia prior to 25 years. While it is largely accepted that low-grade dysplasia is the cytopathic manifestation of HPV infection, and not on the continuum to cervical cancer [4], policy makers do need to provide clear guidance on recommended follow-up (or not) of those young women < 25 years already in the screening program.

Australia has around 24,000 GPs, 700 ACNP members and 500 Pap screen Victoria nurse providers [21,38,39]. In 2013-14, the Australian general practitioner population consisted of 43% female, 66% who practiced in urban centres, and 60% who had graduated from Australia [40]. Our study also comprised mainly Australian university graduates working in urban clinics: however the majority were female. A combination of methodological issues possibly contributed to the difficulties associated with

**Table 4:** Factors for GPs and Pap nurses that correlate with willingness to follow the revised guidelines (screening from 25 years, every 5 years with HPV testing).

Variable	GPs (n = 82)			Pap nurses (n = 67)*		
	Adj OR	95% CI	p-value	Adj OR	95% CI	p-value
Location of practice (metropolitan/rural)	1.3	0.3, 5.4	0.728	0.6	0.2, 2.2	0.433
Has access to reliable HPV vaccination guidelines; > 4 <sup>†</sup>	6.3	1.3, 31.5	0.024	1.1	0.3, 4.1	0.849
<b>Would refer for colposcopic assessment even if a high-risk HPV test were negative for; &gt; 4<sup>†</sup></b>						
Visible cervical abnormalities	1.2	0.1, 11.7	0.872	0.5	0.1, 4.7	0.573
Post coital bleeding	0.6	0.1, 3.5	0.612	0.3	0.1, 1.3	0.100
Intermenstrual/ postmenopausal bleeding	1.2	0.3, 4.8	0.780	0.5	0.1, 2.1	0.343
<b>Largely refers to colposcopy for visible cervical abnormalities, post coital bleeding, intermenstrual or postmenopausal bleeding because; &gt; 4<sup>†</sup></b>						
Isn't confident in visually distinguishing a normal from an abnormal cervix	0.2	0.04, 1.1	0.066	0.6	0.2, 2.2	0.444
For medicolegal reasons	0.1	0.02, 0.6	0.013	1.1	0.3, 4.1	0.896

(\*Nurse practitioners who did not identify as Pap nurses were excluded from the analysis of this table.

<sup>†</sup>Responses were on a 7 point Likert scale which was dichotomised as ≤ 4, indicating 'unwilling' or 'disagree' and > 4, indicating 'willing' or 'agree'.

participant recruitment which relied heavily on advertisements in GP and nurse practitioner targeted e-newsletters. This was done in an effort to notify as many different Australian GPs and nurse practitioners as possible about the survey to keep the sample as random as possible, similar to a simple random sampling design [41]. The sample size for part of the analysis was reduced further as non-Pap nurse practitioners were excluded so that we could focus in more detail on the views of those involved with cervical cancer screening, who according to a recent literature review are underutilised in Australian cervical screening [42]. There was also possible bias from the FPV GPs and nurse practitioners who may have had a greater knowledge of sexual health issues than other respondents or non-respondents. A larger number of survey respondents could possibly have been obtained if a more condensed paper version of the cervical screening survey had been offered. It has been reported that GPs prefer hard copies of surveys (81.1%) over all other designs including online surveys (17.1%), face-to-face interviews (1.7%) and telephone interviews (0.2%) [18]. Furthermore, time pressures significantly limit their participation in research [43]. A further limitation of the study is that due to the way the main research question was asked, we were unable to differentiate whether willingness to screen was more influenced by delayed aged (of 25 years) or more influenced by the wider 5 yearly screening interval. We were also unable to obtain detailed demographic information regarding General Practitioners and Nurse Practitioners and were therefore unable to analyse whether our sample was representative of the Australian GP and Nurse Practitioner community. Overall, due to the small response rate, the results from this study are unrepresentative of the wider Australian GP and Nurse Practitioner community and must be interpreted with caution.

## Conclusions

As GPs and nurse practitioners play a fundamental role in preventing cervical cancer, their attitudes will be pivotal in assuring the success of the new guidelines to be implemented from 2017 onwards. This study has highlighted gaps in knowledge that could be used to further educate GPs and nurse practitioners on the changing guidelines. It is also recommended that a larger and more representative study be conducted before the implementation of the revised guidelines.

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## Ethics Approval

The study was registered with The University of Melbourne (reference number: 1544794.1) and approved as a minimal risk study by the RWH Human Research Ethics Committee (HREC) (project number 15/15).

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## Conflict of Interests

None declared.

## Author Contributions

1. Conception and design of the study: OD, SG, AG, GO, JT, DM, DW, BB, YJ
2. Acquisition of data: OD, YJ
3. Analysis and interpretation of data: OD, AG, YJ

4. Drafting the article or revising it critically for important intellectual content: all authors

Final approval of the version to be submitted: all authors

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