

# WHERE ARE WE TODAY WITH CERVICAL CANCER IN AUSTRALIA?

Cathryn Wharton, Lesley Rowlands, Dorota Gertig

Victorian Cytology Service, Carlton South, Victoria ■ Email: dgertig@vcs.org.au

## Abstract

Cervical screening has had a significant impact on the incidence and mortality of cervical cancer in developed regions of the world, particularly where organised screening programs have been implemented. In Australia, the National Cervical Screening Program was established in 1991. The two-year participation rate for Australian women in 2004-2005 was estimated to be 61% and has been relatively constant over the last decade. Australia currently has the lowest mortality rate (1.9 women per 100,000) and second lowest incidence rate (9.1 women per 100,000) from cervical cancer in the world. However, this largely represents a reduction in incidence of squamous cell carcinomas, which are more readily preventable by screening than adenocarcinomas. The incidence of cervical cancer plateaus after the age of 35 years and increases again for older women (11.6 women per 100,000 age 75 years and over). The mortality from cervical cancer for Aboriginal and Torres Strait Islander women is more than four times that of non-Indigenous women. The National Cervical Screening Program has been highly successful in reducing both incidence and mortality from cervical cancer in Australia, however inequities in the burden of disease exist, particularly for Indigenous women.

Widespread cervical screening, based on the Pap test, has been very successful at identifying pre-cancerous cervical lesions and reducing cervical cancer incidence and mortality worldwide.<sup>1,7</sup> Since the introduction of the organised cervical screening program in Australia, mortality from cervical cancer has declined markedly and is now the 18th most common cause of cancer mortality in Australian women. Australia has the lowest mortality rates from cervical cancer in the world.<sup>8,9</sup> Although cervical screening became available through Government funded opportunistic screening in Australia in the 1960s, the National Cervical Screening Program was introduced in 1991 and Pap test registries and cancer registries in each Australian state and territory monitor the incidence and mortality from cervical cancer.

## National Cervical Screening Program

In 1988, the Cervical Cancer Screening Evaluation Steering Committee reviewed cervical screening in Australia and recommended that cervical screening would be most effective through an organised approach. The Organised Approach to Preventing Cancer of the Cervix was established in 1991 and renamed the National Cervical Screening Program in 1995. The program aims to: increase participation rates; support the establishment of reliable smear taking and assessment services; improve management of screen detected abnormalities; as well as monitor and evaluate these processes.<sup>10</sup> The program targets all 18 to 69 year-old Australian women and encourages them to have Pap tests every two years.

The program has overseen the establishment of Pap test registers in each state and territory. These are confidential databases of Pap test results for the purposes of issuing reminder letters to women when Pap tests are due and providing a safety net for the follow-up of women with abnormal Pap tests. The

registers also provide information to laboratories, in the form of screening histories, to assist in the reporting of current tests, and quantitative data to manage quality assurance activities.

With the inception of the organised approach to cervical screening, a national policy around the target ages, screening intervals and management of screen detected abnormalities was developed.<sup>11</sup> These guidelines have recently been updated within an evidence-based framework, to reflect the current state of cervical cancer in Australia and our understanding of the natural history of cervical cancer.<sup>12</sup> The 2005 National Health and Medical Research Council's guidelines introduced the Australian Modified Bethesda System 2004 for the reporting of low and high-grade squamous intraepithelial abnormalities (LSIL and HSIL) and management recommendations that are appropriate to their differing neoplastic potential.

Because gynaecological cytology reporting involves human interpretation, it is prone to error and it is important to monitor accuracy and maintain uniform standards of performance across Australian laboratories. The most meaningful interpretation of laboratory quality is achieved through aggregate performance measures, as these reflect day-to-day reporting practices. In July 1999 it became mandatory that Australian cytology laboratories present annual data relating to quantitative national performance measures, as part of the triennial accreditation to retain government (Health Insurance Commission) funding.<sup>13</sup> The laboratory performance measures have been aimed at the main reporting processes of a cytology laboratory, addressing the profile of cytology reporting categories, the accuracy of cytology reports that predict a high grade abnormality and the accuracy of negative cytology reports.<sup>13</sup> State and territory cervical cytology registries facilitate the process of laboratory compliance with performance standards, through the provision of

relevant data. The high quality of education and training for Australian cytologists, laboratory accreditation processes and mandatory laboratory performance standards have ensured a high standard of cervical cytology and contributed to the success of the National Cervical Screening Program.

### Participation in the National Screening Program

Over the last decade, participation in the National Screening Program, as measured by two-year participation rates, has remained relatively consistent. The national participation rate for the two-year period 1996-1997 was 61%. This increased to 63.4% for the period 1998-1999, but then stabilised to around 61% from 2002-2006.<sup>8</sup>

While the participation rates within each state and territory have been relatively consistent, there has been some variation in the participation rates between states and territories. The highest two-year participation rate for the period of 2004-2005 for any state or territory was 65.4% in Victoria, whereas the lowest was 58.2% in NSW (Figure 1).

The vast majority of women have their repeat test within 24 months. The proportion of women undergoing early re-screening (defined as more than one test over a 21 month interval) has declined from 32% in 1999 to 26.2% in 2004.<sup>14</sup>

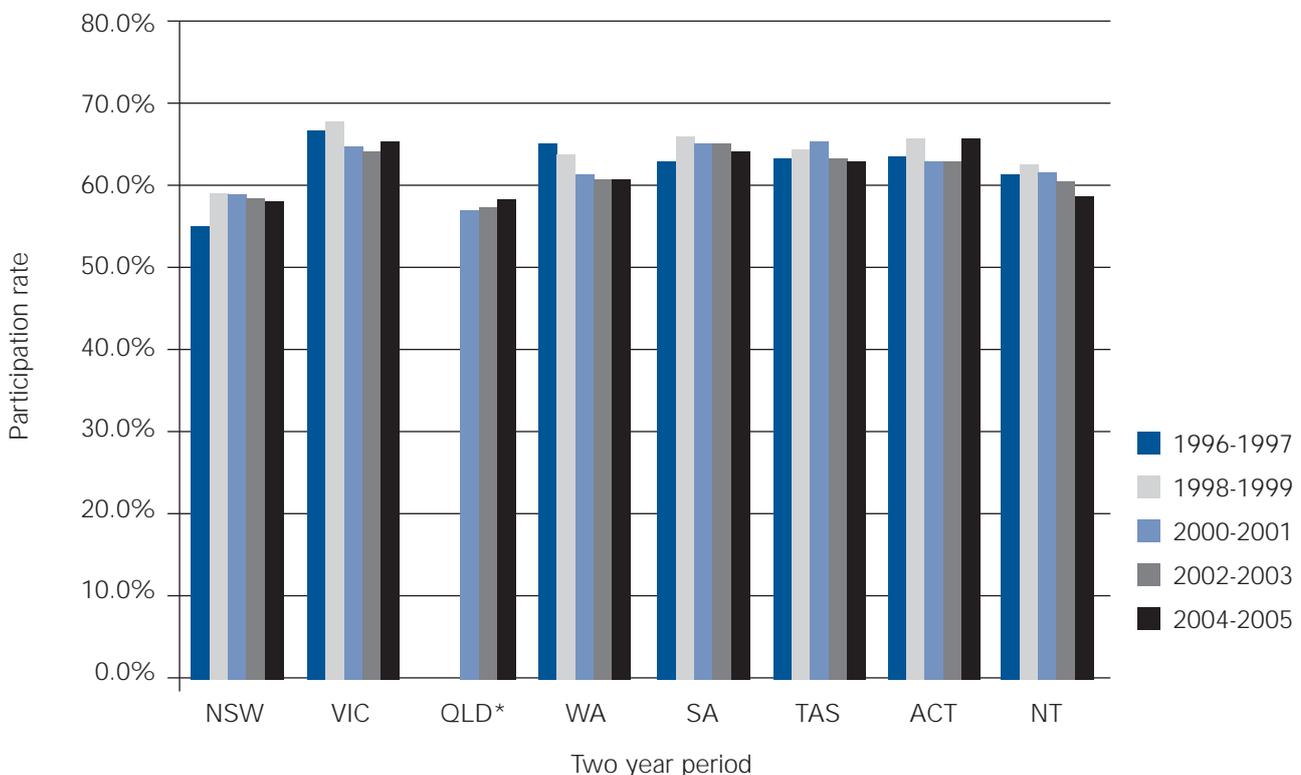
### Detection of pre-cancerous cervical lesions

Cervical screening is effective in reducing mortality from cervical cancer because it detects cervical lesions at an early stage, when they are amenable to treatment. Under the new cytology coding schedule (Australian Modified Bethesda System 2004), cervical squamous abnormalities may be broadly grouped into low-grade and high-grade categories. Low-grade abnormalities on cytology are quite common in Australia, particularly among young women, because of the higher prevalence of HPV infection in young women and the frequent screening interval in Australia. In 2002, 4.3% of cytology reports in NSW were low-grade abnormalities, with the highest rate of 9.4% in women aged 20-24 years.<sup>12</sup> However, overall in Australia in 2005, the incidence of histologically confirmed low-grade lesions was much lower at 0.8 per 100,000 women. The incidence of histologically confirmed high-grade lesions was 7.5 per 100,000 women for the same time period. This rate was highest in women aged 20-24 (19.2 per 100,000) and declined markedly after the age of 30 years.

### International incidence and mortality from cervical cancer

The world age-standardised incidence rate of cervical cancer is 16.2 women per 100,000, and the mortality rate is 9 per 100,000 women.<sup>9</sup> However, the incidence and mortality from cervical cancer around the world

Figure 1: Participation of women in the National Cervical Screening Program



\*Queensland registry not operational until 1999

Source: Australian Institute of Health and Welfare (AIHW). Cervical screening in Australia 2004-2005. Cancer series No. 38. Cat. No. CAN 33. 2007: Canberra.

varies greatly. It is estimated that 83% of new cases of cervical cancer occur in developing countries where screening programs are not well established or effective.<sup>3</sup> Eastern Africa has the highest incidence and mortality rates of cervical cancer, followed by other regions of Africa, Melanesia, Central America, Polynesia, Asia, Europe and then Australia and New Zealand (Table 1).

**Table 1:** Incidence of cervical cancer and mortality rate per 100,000 women for world regions, 2002

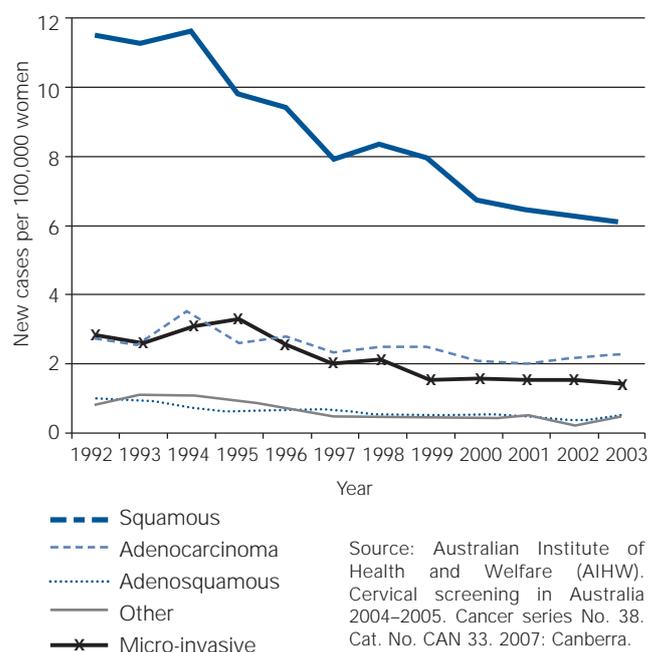
Region	ASR (w)	
	Incidence	Mortality
Eastern Africa	42.7	34.6
Southern Africa	38.2	22.6
Melanesia	38.1	21.7
Caribbean	32.6	16.0
Central America	30.6	15.0
Western Africa	29.3	23.8
South America	28.6	12.9
Middle Africa	28.0	23.0
South-Central Asia	26.2	15.0
South-Eastern Asia	18.7	10.2
Central and Eastern Europe	14.5	7.1
Northern Africa	12.1	9.8
Southern Europe	10.7	3.3
Western Europe	10.0	3.4
Northern Europe	9.0	3.6
Northern America	7.7	2.3
Eastern Asia	7.4	3.7
Australia and New Zealand	7.4	2.0
Western Asia	5.8	2.9

ASR (w) = age standardised rate (world standard population)  
Source: GLOBOCAN 2002 database. ([www-dep.iarc.fr](http://www-dep.iarc.fr))

Compared to other countries with cancer registration systems, Australia now has the second lowest incidence rate of cervical cancer in the world.<sup>12</sup> The age standardised incidence rate of invasive cervical cancer in Australia (using the Australian population) in 2003 was 9.1 per 100,000 women, representing 6.1 per 100,000 for squamous cancers, 2.2 per 100,000 for adenocarcinomas and 0.8 per 100,000 for other types of cervical cancer.<sup>8</sup> The actual number of new cases of cervical cancer declined from 896 invasive cervical cancers (including 650 squamous, 146 adenocarcinomas and 100 other types) and 154 microinvasive cancers in 1991,<sup>14</sup> before the commencement of organised screening in Australia, to 578 invasive cancers (including 391 for squamous, 137 adenocarcinomas and 50 other types) and 80 microinvasive cancers in 2003.<sup>8</sup>

The reduction in cervical cancers from 1991 to 2003 has been predominantly due to a decrease in squamous cell carcinomas, with relatively little decline in the incidence of adenocarcinomas (Figure 2). The incidence of adenocarcinomas since the inception of the program declined only modestly from 2.7 per 100,000 women in 1992 to 2.2 per 100,000 in 2003.<sup>8</sup> Cervical screening is most effective for the prevention of squamous cancers, as cytology is less effective in detecting cervical adenocarcinomas, in part because of the difficulties of sampling glandular lesions in the endocervical canal and difficulties in interpretation of cytologic abnormalities.<sup>12</sup>

**Figure 2:** Incidence of cervical cancer by histological type for women aged 20-69 years, 1992-2003



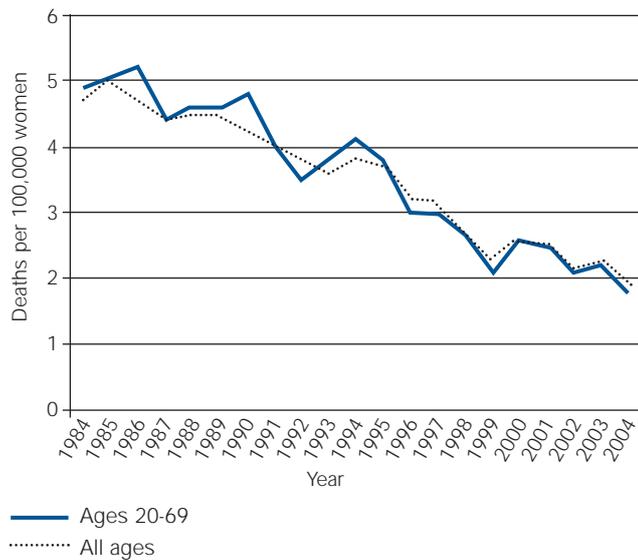
In 2004, cervical cancer accounted for 212 deaths of Australian women. The age-standardised mortality rate (to Australian population) from cervical cancer declined from 4.7 deaths per 100,000 women in 1984 to 1.9 in 2004 (Figure 3).<sup>8</sup> These low mortality rates are largely attributed to the success of the National Cervical Screening Program.

The incidence of invasive cervical cancer continues to rise with age (18.3 women per 100,000 aged 80-84 years) with a modest plateau in incidence in the 45 to 49 year age group (Figure 4). On the other hand, the incidence of micro-invasive cervical cancer peaks in the age group of 30 to 34 years at 2.7 women per 100,000, but then gradually declines with age. Micro-invasive cancers are a reflection of early detection in the screening program.

Mortality from cervical cancer rises dramatically after age 60 years and is highest in older age groups with the age-standardised mortality rate for ages 75 years or older being 11.6 women per 100,000 (Figure 4).

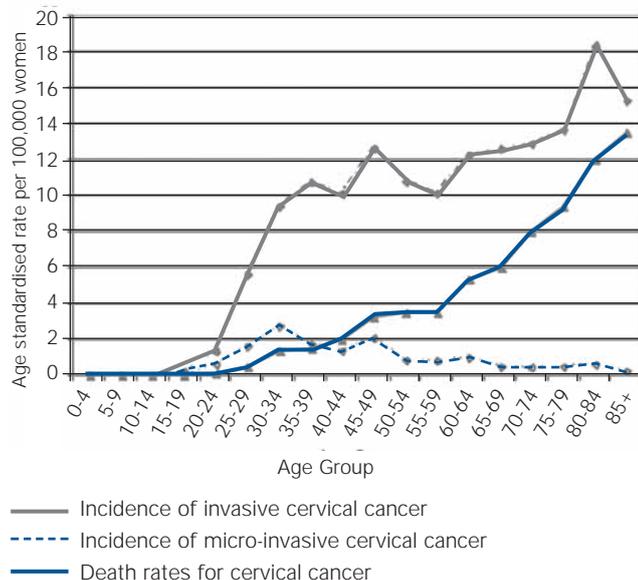
It is interesting to note that the low mortality from cervical cancer in Australia, which currently has a two

**Figure 3: Mortality from cervical cancer in Australia, 1985-2004**



Source: Australian Institute of Health and Welfare (AIHW). Cervical screening in Australia 2004-2005. Cancer series No. 38. Cat. No. CAN 33. 2007: Canberra.

**Figure 4: Age standardised incidence and mortality rates of cervical cancer, 2000-2003**



Source: Australian Institute of Health and Welfare (AIHW). Cervical screening in Australia 2004-2005. Cancer series No. 38. Cat. No. CAN 33. 2007: Canberra.

year screening program, is similar to some Northern European countries, which have three to five year screening intervals. In a recent paper by Canfell et al, screening uptake and changes in cervical cancer incidence and mortality were compared between Australia and the UK, which has a predominantly three year screening interval.<sup>4</sup> Lifetime participation in the screening program was found to be similar at around 90% and incidence and mortality fell by similar proportions in both countries, 33% and 36%

respectively. The authors concluded that the policies in both countries were of similar effectiveness despite a shorter screening interval in Australia.

There are variations in mortality rates from cervical cancer between metropolitan, regional and rural areas within Australia. Although the death rate for cervical cancer has reduced in recent years overall, it remains higher in remote and rural areas than in metropolitan areas. The 2000-2003 age standardised mortality rate was 2.4 for remote areas and 2.5 for regional areas, compared with 1.9 for metropolitan areas.<sup>8</sup>

There are inequities in the burden of disease for Australia's Indigenous population. During the period 2001-2004 the age standardised mortality rate for cervical cancer for Aboriginal and Torres Strait Islander women aged 20-69 years was more than four times the rate for non-Indigenous women, at 9.9 per 100,000 (95% CI 6.0-15.3) for indigenous women compared to 2.1 per 100,000 for non-indigenous women (95% CI 1.9-2.5).<sup>8</sup> As a greater proportion of Indigenous women reside in remote areas, the higher rates in remote areas largely reflect the increased rates for Indigenous women.

Diagnosis of advanced cervical cancer has also been found to be more common for Indigenous women. For Indigenous women with cervical cancer, 37% had advanced disease at diagnosis (regional or distant spread) compared with 24% of non-Indigenous women with cervical cancer.<sup>15-16</sup> The five year cancer survival rate for Indigenous women was also much lower at 27.1% compared with 70% for non-Indigenous women.<sup>16</sup>

Similar disparities have been seen on an international level with ethnic groups (such as non-Hispanic white women, African Americans, American Indians and Vietnamese Americans).<sup>17</sup> Although data on participation in the Australian screening program by Indigenous status are not available in all jurisdictions, these inequities are largely believed to be due to reduced access to screening services for Indigenous women and lower participation in the screening program.<sup>18-21</sup> To improve participation of Indigenous women in the screening program, inequalities need to be addressed in limited resources, access to health care and social and cultural barriers to screening.

The National Cervical Screening Program has been highly effective in reducing cervical cancer mortality and morbidity in Australia. However, it is informative to consider the screening histories of women who continue to be diagnosed with cervical cancer in Australia to determine whether these cancers are primarily failures of detection or failure to participate in screening. Studies have found that the proportions of non-compliant women or women with no Pap test history are higher for cervical cancer cases than controls.<sup>22-28</sup>

Data from Victoria suggests that approximately 94% of women diagnosed with invasive squamous cervical cancer between 2002-2004 have either no screening history or an inadequate screening history in the 10 years prior to diagnosis, whereas for glandular cancers this proportion was 73%.<sup>29</sup> This indicates that the primary reason for diagnosis with cervical cancer in the

current screening program is inadequate participation in screening.

It has been estimated that in 2003, approximately 70% of squamous carcinomas were prevented by cervical screening in Australia, compared to earlier estimates of 46% in 1989. This improvement has been attributed to the improved follow-up of cytologic abnormalities, improved laboratory quality assurance and an increase in participation in the screening program by Australian women.<sup>2</sup>

## Conclusion

Over recent decades the Australian National Cervical Screening Program has been highly successful in reducing the impact of cervical cancer in Australia, resulting in the lowest mortality rates in the world. Since the beginning of the program, the incidence of squamous cell carcinoma has almost halved, although there is some recognition that the program has not been as effective at reducing incidence of glandular cervical cancers.

Despite the program's success in Australia, mortality among Indigenous women is substantially higher than non-Indigenous women and these inequities in screening participation need to be addressed. With the recent implementation of the HPV vaccination program, participation in the screening program needs to be carefully monitored in the years ahead to ensure that women continue to participate and that cervical cancer incidence continues to decline.

## References

- Spaczynski M, Nowak-Markwitz E, Kedzia W. Cervical cancer screening in Poland and worldwide. *Ginekol Pol*, 2007, May. 78(5): p. 354-60.
- Mitchell H. How much cervical cancer is being prevented? *Med J Aust* 2003.178(6):298.
- Population Reference Bureau (PRB) and Alliance for Cervical Cancer Prevention (ACCP). *Preventing Cervical Cancer Worldwide*. 2004. Washington, DC: PRB; Seattle: ACCP.
- Canfell K, Sitas F, Beral V. Cervical cancer in Australia and the United Kingdom: comparison of screening policy and uptake, and cancer incidence and mortality. *MJA*, 2006. 185(9):482-86.
- Wain GV. Cervical cancer prevention: the saga goes on, but so much has changed! *MJA*, 2006.185(9):476-477.
- Farnsworth A. Prevention of cervical cancer. *Med J Aust*. 2003. 178(12):653-4.
- Arbyn M, Raifu AO, Autier P, Ferlay J. Burden of cervical cancer in Europe: estimates for 2004. *Ann Oncol*, 2007, Oct. 18(10): 1708-15.
- Australian Institute of Health and Welfare (AIHW). *Cervical screening in Australia 2004–2005*. Cancer series No. 38. Cat. No. CAN 33. 2007: Canberra.
- International Agency for Research on Cancer. *GLOBOCAN 2002 database*. [cited 2008 January 17]. Available from: <http://www-dep.iarc.fr/>.
- Department of Health and Ageing [monograph on the internet]. *National Cervical Screening Program* [cited 2008 March 18]. Available from: <http://www.health.gov.au/internet/screening/publishing.nsf/Content/cervical-11p>.
- National Health and Medical Research Council. *Screening to prevent cervical cancer: Guidelines for the management of women with screen detected abnormalities*. Canberra 1994.
- National Health and Medical Research Council. *Screening to Prevent Cervical Cancer: Guidelines for the Management of Asymptomatic Women with Screen Detected Abnormalities*. Canberra. 2005.
- National Pathology Accreditation Advisory Council (NPAAC). *Performance measures for Australian laboratories reporting Cervical Cytology*. 2003, Australian Government Department of Health and Ageing: Canberra ACT.
- Australian Institute of Health and Welfare (AIHW). *Cervical screening in Australia 2000–2001 and 1999–2000*. (Cancer Series number 24). 2003: Canberra.
- The Australian Institute of Health and Welfare (AIHW). *Aboriginal and Torres Strait Islander Health Performance Framework, 2006 report: detailed analyses*. 2007: Canberra.
- Condon JR, Barnes T, Armstrong BK, Selva-Nayagam S, Elwood J. Stage at diagnosis and cancer survival for Indigenous Australians in the Northern Territory. *MJA*, 2005; 182(6):277-280.
- Debbie S, Castle P, Cox T, Davey D, Einstein MH, Ferris DG, et al. American Cancer Society Guideline for Human Papillomavirus (HPV) Vaccine Use to Prevent Cervical Cancer and Its Precursors. *CA Cancer J Clin*, 2007. 57:7-28.
- Binns PL, Condon JR. Participation in cervical screening by Indigenous women in the Northern Territory: a longitudinal study. *MJA*, 2006. 185(9):490-494.
- Coory MD, Fagan P, Muller JM, Dunn N. Participation in cervical cancer screening by women in rural and remote Aboriginal and Torres Strait Islander communities in Queensland. *MJA*, 2002. 177(10):544-547.
- Hunt JM and Geia LK. Can we better meet the healthcare needs of Aboriginal and Torres Strait Islander women? *MJA*, 2002. 177(10):533-534.
- Ray M Lowenthal RM, Grogan PB, Kerrins ET. Reducing the impact of cancer in Indigenous communities: ways forward. *MJA*, 2005. 182(3):105-106.
- Hernández-Hernández DM, Linaldi-Yepez F, Apresa-García T, Escudero-de Los Rios P, Alvarado-Cabrero I, Ornelas-Bernal LA, et al. Associated Factors for Women's Non-Compliance for Cervical Cancer Screening. *Rev Med Inst Mex Seguro Soc*, 2007. 45(4):313-320.
- Choyce A, McAvoyn BR. Cervical cancer screening and registration--are they working? *J Epidemiol Community Health*, 1990 Mar. 44(1):52-4.
- Mitchell H, Higgins V, Burrows C. *Statistical Report 2001. Victorian Cervical Cytology Registry: 2002*, Melbourne.
- Kenter GG, Schoonderwald EM, Koelma IA, Arentz N, Hermans J, Fleuren GJ. The cytological screening history of 469 patients with squamous cell carcinoma of the cervix uteri; does interval carcinoma exist? *Acta Obstet Gynecol*. Scand 1996; 75(4):400-403.
- Nygård J, Nygård M, Skare G, Thoresen S. Screening histories of women with CIN 2/3 compared with women diagnosed with invasive cervical cancer: a retrospective analysis of the Norwegian Coordinated Cervical Cancer Screening. *Cancer Causes and Control*, 2005;16(4):463-474
- Abed Z, O'Leary M, Hand K, Flannelly G, Lenehan P, Murphy J, Foley M. Cervical screening history in patients with early stage carcinoma of the cervix. *Ir Med J*, 2006. 100(1):140-2.
- Turner MJ, Keane DP, Flannelly GM, Lenehan PM, Murphy JF, Foley ME. Cytological screening history of patients with early invasive cervical cancer. *Ir Med J*, 1990, Jun; 83(2):61-62.
- Wharton C. *Statistical Report 2006. Victorian Cervical Cytology Registry: 2007*, Melbourne.