Appendixes

Appendix A: Cervical cancer: symptoms, detection and treatment

Cervical cancer affects the cells lining the cervix, which is the lower part of the womb or uterus where it joins the inner end of the vagina. Like other cancers, cervical cancer is a disease where normal cells change, begin to multiply out of control, and form a growth or tumour. The cancer may arise from the squamous cells at the transformation zone where the squamous cells on the outside of the cervix join the columnar cells in the lining of the cervical canal (squamous cell carcinoma) or from the cells in the cervical canal (adenocarcinoma). Over two-thirds of cervical cancers are squamous cell carcinomas, which are most easily detected on the Pap smear, while about 20% are adenocarcinomas. If not detected early, the tumour can invade local tissue and spread or metastasise to other parts of the body. The main symptoms of cervical cancer are unusual bleeding from the vagina and, very rarely, an unusual vaginal discharge. However, these symptoms are quite common and may not be due to cancer.

A cervical cancer may take 10 or more years to develop, but before this the cells may show pre-cancerous changes. These early changes can be detected by a Pap smear, which is described in more detail below. Cervical cancer can be prevented with early treatment of these abnormalities. The most recent classification of these pre-cancerous lesions has two levels of severity, low-grade epithelial abnormalities (LGEA) and high-grade epithelial abnormalities (HGEA). An earlier classification described various grades of cervical intra-epithelial neoplasia (CIN). Low-grade abnormalities include minor changes in squamous cells and CIN 1 while high-grade abnormalities include CIN 2, CIN 3, squamous carcinoma in situ, adenocarcinoma in situ and invasive carcinoma (squamous or adenocarcinoma).

The Pap smear is the most common way to detect pre-cancerous changes, which rarely cause any symptoms. The test involves a doctor inserting a speculum into the vagina and gently scraping the surface of the cervix. This process collects cells that are transferred onto a slide or into a special liquid, which is then sent to a pathology laboratory for assessment. Pap smears are offered by general practitioners, gynaecologists, family planning clinics, women's health centres, hospital outpatient clinics and, in some circumstances, specially trained nurses.

If the Pap smear shows an abnormality, the woman may be advised to have a repeat Pap smear if the abnormality is low-grade or she may be advised to have a colposcopy. With colposcopy, a doctor is able to look directly at the cervix under magnification using an instrument called a colposcope. Using a special stain the doctor can highlight any suspicious area, which may be pre-cancerous or cancerous. The doctor will then take a tissue sample (a biopsy) of the suspicious area for further examination by the pathologist.

Pre-cancerous changes can easily be treated to prevent the progression to cervical cancer. The type of treatment depends on whether the change observed is low or high grade, the woman's age and general health, whether she wants to have children, and her preferences.

There is a range of treatments for pre-cancerous changes, including laser treatment, loop excision (LLETZ), cryosurgery (cold coagulation), electrodiathermy or cone biopsy (either by laser or by scalpel). In a small number of instances a hysterectomy may be necessary.

For invasive cancer, a cone biopsy or hysterectomy is generally performed. If the cancer cells are only detected on the surface of the cervix, it may be treated by a cone biopsy. If it has invaded deeper into the cervix a hysterectomy is generally performed. In advanced cases, a radical hysterectomy is needed to remove the cervix and uterus along with a margin of tissue around the cervix and lymph nodes from the pelvis. Radiotherapy is sometimes used as well as surgery, and for more advanced cases it may be used on its own.

Appendix B: Data sources and limitations

All data used in this report are based on calendar years. Data are derived from multiple sources and are summarised below.

Table B1: Cervical screening indicators data sources

Indicator	Description	Data source
1	Participation rate for cervical screening	National Cervical Screening Program
2	Early rescreening	National Cervical Screening Program
3	Low-grade abnormality detection	National Cervical Screening Program
4	High-grade abnormality detection	National Cervical Screening Program
5	Incidence of micro-invasive cervical cancer National Cancer Statistics Clearing House (ICD 180)	National Cancer Statistics Clearing House
6, 8	Incidence of squamous, adenocarcinoma, adeno-squamous and other cervical cancer (ICD 180)	National Cancer Statistics Clearing House
7, 9, 10	Mortality from cervical cancer (ICD9 180) For 1999 data (ICD10 C539)	AIHW Mortality Database

Population data

The Australian Bureau of Statistics estimated resident female population has been used to calculate incidence and mortality rates. Participation rates were calculated using the average of the 1998 and 1999 estimated resident female population (see Appendix D for tables). There may be some variation in published participation rates because national rates use estimated resident population data in the denominator whereas local data analysis may use census counts. The denominator population used to calculate cervical screening participation rates has been adjusted by the estimated proportion of women who have had a hysterectomy by age. These data were derived from the 1995 National Health Survey, and are tabled in Appendix D.

The age-standardised rates in this publication are calculated using the total estimated 1991 mid-year Australian resident population. Where appropriate, rates are also standardised to the World Standard Population for international comparison. Both the Australian and World Standard Populations are in Appendix D.

Cervical screening

Indicators 1-4 do not include data from Queensland because the cervical screening register in Queensland was not operational at the time of data processing. The incidence and mortality data used in Indicators 5-9 include Queensland.

Due to the difficulties of Indigenous identification, mortality data used in Indicator 10 are based on deaths in Western Australia, South Australia and the Northern Territory only.

Other data limitations

- Hysterectomy fractions are calculated using national data derived from the National Health Survey using aggregate data that does not necessarily reflect variation at the State or Territory level.
- Participation rates will be underestimates to the extent that a small percentage of women choose to opt-off local registers.

- The participation numbers for States and Territories other than WA and ACT, and the Australian totals, may be overestimated because of double counting of some women in registers. This may be the result of difficulty in identifying State or Territory of residence for women in border areas and the inclusion in registers of women resident overseas.
- Participation rates published by State and Territory programs may differ from those in this publication because of variation in denominators used.

Appendix C: Methods

This section describes the methods employed to calculate the estimates presented in the tables in the body of this publication.

Crude rates

A crude rate is defined as the number of events over a specified period of time (e.g. a year) divided by the total population. For example, a crude cancer incidence rate is similarly defined as the number of new cases of cancer in a specified period of time divided by the population at risk. Crude mortality rates and cancer incidence rates are expressed in this report as rates per 100,000 population. Crude participation rate is expressed as a percentage.

Age-specific rates

Age-specific rates are calculated by dividing the number of cases occurring in each specified age group by the corresponding population in the same age group expressed as a percentage or a rate per 1,000 or 100,000 population. This rate may be calculated for particular age and sex groupings, e.g.

$$\text{Age-specific cervical cancer incidence rates in females aged 50-54} = \frac{\text{New cases 1997 aged 50-54 years}}{\text{1997 female population aged 50-54 years}} \times 100{,}000$$

$$= \frac{76}{536{,}230} \times 100{,}000$$

$$= 14.2 \text{ per } 100{,}000$$

Age-standardised rates (AS rate)

Rates are adjusted for age to facilitate comparisons between populations that have different age structures, e.g. between youthful and ageing communities. There are two different methods commonly used to adjust for age. In this publication we use direct standardisation in which age-specific rates are multiplied against a constant population (the Australian 1991 Standard Population unless otherwise specified). This effectively removes the influence of age structure on the summary rate that is described as the age-standardised rate. The method may be used for the calculation of participation, incidence and mortality rates. The method used for this calculation comprises three steps.

Step 1: Calculate the age-specific rate (as shown above) for each age group.

Step 2: Calculate the expected number of cases in each 5-year age group by multiplying the age-specific rates by the corresponding standard population and dividing by 100,000, giving you the expected number of cases.

Step 3: Sum the expected number of cases in each age group to give the age-standardised rate. Divide this sum by the total of the standard population and multiply by 100,000.

Confidence intervals

Population numbers for incidence, mortality and screening have a natural level of variability for a single year above and below what might be expected in the mean over many years. The percentage variability is small for large population numbers but high for small numbers such as mortality in a young age group. One measure of the likely difference is the standard error, which indicates the extent to which a population number might have varied by chance in only one year of data.

In the 95% confidence interval there are about nineteen chances in twenty that the difference will be less than two standard errors.

The 95% confidence intervals in this report were calculated using the software package Palisade@risk (http://www.palisade.com). These calculations were based on 1,000 simulations using a binomial or Poisson distribution with the observed data to calculate the distribution parameters.

Appendix D: Population data

Table D1: Australian Standard Population[1] and World Standard Population[2]

Age group	World Standard Population (W)	Australian 1991 Standard Population (A)
0-4	12,000	1,271,703
5-9	10,000	1,272,208
10-14	9,000	1,241,619
15-19	9,000	1,364,074
20-24	8,000	1,396,764
25-29	8,000	1,399,663
30-34	6,000	1,425,735
35-39	6,000	1,328,387
40-44	6,000	1,294,271
45-49	6,000	1,029,145
50-54	5,000	846,934
55-59	4,000	725,950
60-64	4,000	736,868
65-69	3,000	671,390
70-74	2,000	510,755
75-79	1,000	384,495
80-84	500	229,828
85+	500	154,247
Total	**100,000**	**17,284,036**

Sources: 1. Australian Bureau of Statistics (1993); 2. Doll and Smith (1982).

Table D2: Hysterectomy fractions for women aged 18-80+ years, Australia, 1995

Age group	% of women who have not had a hysterectomy
18-19	98.4
20-24	99.8
25-29	99.3
30-34	98.0
35-39	91.9
40-44	85.2
45-49	79.1
50-54	68.5
55-59	68.5
60-64	67.8
65-69	68.8
70-74	66.8
75-79	66.8
80+	61.5
Total	**84.3**

Source: Australian Bureau of Statistics 1995.

Table D3: Estimated resident female populations, by States and Territories, June 1998

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
0-4	211,964	151,230	118,238	61,590	46,451	15,566	10,462	8,599	624,234
5-9	216,598	156,623	122,769	64,891	48,262	16,882	10,785	8,227	645,215
10-14	212,926	154,468	121,554	66,277	49,492	17,415	10,863	7,568	640,736
15-19	211,691	156,110	122,923	64,859	48,307	16,804	11,724	6,801	639,297
20-24	219,602	167,409	126,100	67,118	49,190	15,037	13,223	7,940	665,691
25-29	246,280	186,409	136,225	71,206	53,605	16,466	13,292	9,531	733,145
30-34	237,843	180,162	128,250	69,463	53,750	16,601	12,265	8,436	706,925
35-39	253,091	185,703	137,485	73,996	58,855	18,924	12,781	7,923	748,913
40-44	235,756	174,788	128,226	70,927	55,553	17,901	12,324	7,007	702,629
45-49	216,581	161,284	119,578	64,508	53,063	16,475	12,174	5,783	649,539
50-54	192,250	142,523	105,601	53,595	47,242	14,574	9,998	4,445	570,287
55-59	147,772	108,537	78,235	40,092	35,929	11,424	6,505	2,646	431,183
60-64	129,092	95,392	63,813	33,488	31,816	9,980	4,771	1,754	370,123
65-69	123,457	90,160	59,496	30,121	30,876	9,500	3,946	1,136	348,707
70-74	117,664	86,057	55,247	26,908	30,802	8,806	3,614	806	329,909
75-79	95,504	69,353	44,979	21,587	25,717	7,403	2,866	513	267,923
80-84	64,393	46,276	30,230	14,665	17,197	5,165	1,752	316	180,000
85+	54,706	41,424	25,580	13,305	15,255	4,173	1,310	249	156,006
Total	**3,187,170**	**2,353,908**	**1,724,529**	**908,596**	**751,362**	**239,096**	**154,655**	**89,680**	**9,410,462**

Source: AIHW Population Database based on estimated resident population data compiled by ABS.

Table D4: Estimated resident female populations, by States and Territories, June 1999

Age group	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
0-4	210,825	149,345	117,830	61,742	46,022	15,373	10,369	8,481	620,101
5-9	217,147	157,607	124,506	64,778	48,311	16,591	10,727	8,378	648,219
10-14	213,517	155,122	122,073	66,783	48,963	17,091	10,794	7,465	641,992
15-19	214,180	157,811	125,527	65,940	49,288	16,951	11,568	7,015	648,380
20-24	218,587	167,569	125,120	67,885	48,428	14,750	13,024	7,837	663,257
25-29	248,403	186,122	136,228	71,363	52,440	16,005	13,157	9,524	733,363
30-34	236,656	181,447	128,549	69,303	53,023	16,123	12,164	8,579	706,004
35-39	254,383	187,302	139,312	74,660	58,441	18,625	12,635	8,055	753,568
40-44	238,135	176,533	130,717	71,804	56,080	17,940	12,380	6,971	710,706
45-49	220,757	164,621	122,514	66,279	53,683	16,750	12,104	6,019	662,831
50-54	198,358	147,675	110,532	56,265	48,969	15,085	10,507	4,711	592,163
55-59	154,145	113,036	82,604	41,983	37,196	11,878	6,866	2,900	450,656
60-64	131,505	96,830	66,557	34,641	32,448	10,136	4,947	1,767	378,852
65-69	121,817	90,079	59,234	30,379	30,570	9,450	4,002	1,178	346,720
70-74	117,014	85,765	55,803	27,180	30,571	8,771	3,655	818	329,585
75-79	100,326	73,381	46,982	22,832	26,932	7,774	3,118	538	281,885
80-84	63,969	45,675	30,432	14,329	17,045	5,104	1,796	316	178,671
85+	57,752	43,539	27,214	14,152	16,105	4,430	1,431	276	164,903
Total	**3,217,476**	**2,379,459**	**1,751,734**	**922,298**	**754,515**	**238,827**	**155,244**	**90,828**	**9,511,856**

Source: AIHW Population Database based on estimated resident population data compiled by ABS.

Appendix E: NHMRC guidelines for the management of women with screen-detected abnormalities

This reference sheet is a summary of the NHMRC guidelines for the management of women with screen-detected abnormalities. It is intended to assist medical practitioners to take appropriate action on receipt of Pap smear reports.

Low-grade epithelial abnormalities		
Pap smear report	**Investigation**	**Management**
Non-specific minor squamous cell changes/atypia		Repeat smear at 12-monthly intervals until it reverts to normal.
Minor changes in endocervical cells/ low-grade glandular change	Repeat smear in 6 months using cytobrush and spatula. If low-grade abnormality persists, refer for colposcopy and biopsy if indicated.	If endocervical cell abnormality confirmed, refer to gynaecologist for appropriate treatment.
HPV effect/HPV-associated cell changes	Repeat smear at 6-monthly intervals. If HPV-associated cell changes persist after 12 months, refer for colposcopy.	If HPV confirmed, continue with 6 monthly smears until 2 negative reports are received. Repeat smear annually for 2 years then revert to 2-yearly screening.
Possible CIN 1 ± HPV/possible mild dysplasia	Repeat smear at 6-monthly intervals until 2 successive negative reports are received. If lesion persists for 12 months, refer for colposcopy.	If CIN 1 confirmed, follow either observational or active management program as explained on reverse of sheet.
CIN 1 ± HPV/mild dysplasia	Refer for colposcopy and biopsy if indicated.	If CIN 1 confirmed, follow either observational or active management program as explained on reverse of sheet. If higher grade abnormality diagnosed, see below.

High-grade epithelial abnormalities		
Pap smear report	**Investigation**	**Management**
CIN 2 ± HPV/moderate dysplasia	Refer for colposcopy and directed biopsy.	If CIN 2 confirmed, treatment by gynaecologist with appropriate expertise is required.
CIN 3 ± HPV/severe dysplasia	Refer for colposcopy and directed biopsy.	If CIN 3 confirmed, treatment by gynaecologist with appropriate expertise is required.
CIN 3 ± HPV with possible invasion; Endocervical glandular dysplasia; or Adenocarcinoma in situ	Refer to gynaecologist with expertise in colposcopic evaluation of malignancies.	Treatment by gynaecologist with appropriate expertise is required.
Invasive squamous cell carcinoma (SCC) or Adenocarcinoma	Refer to gynaecologist skilled in the management of malignancies, or a specialist unit, for urgent evaluation and management.	Treatment by gynaecologist with appropriate expertise is required.
Inconclusive – abnormal cells highly suggestive but not diagnostic of a high-grade abnormality	Refer for colposcopy and possible biopsy, unless there is an obvious diagnostic difficulty e.g. epithelial atrophy or infection. In this case, treat the problem and repeat the smear.	If high-grade lesion confirmed, treatment by gynaecologist with appropriate expertise is required.

Management of women with low-grade epithelial abnormalities

A cytological assessment of CIN 1 requires referral for colposcopy and, if indicated, biopsy. There is controversy over the management—observational and active. Both treatment options should be fully discussed with the woman.

Observational management

If the diagnosis of CIN 1 is confirmed and the woman elects not to be treated, cervical smears should be taken at 6-monthly intervals until the abnormality either regresses or progresses. After 2 negative smears at 6-monthly intervals, smears should be taken at yearly intervals. If two consecutive annual smears are normal the woman can revert to 2-yearly screening.

Active management

Treatment by an accepted method, either ablative or excisional.

Pap smear report	Management
Negative/within normal limits	Repeat smear in 2 years.
Negative/within normal limits and no endocervical cells present	Repeat smear in 2 years.
Negative with inflammation	Repeat smear in 2 years.
Note: Investigate any symptoms that are not readily explained, such as post-coital or intermenstrual bleeding. A negative Pap smear must not be taken as reassurance in these circumstances. Further investigation may involve referral to a gynaecologist.	
Unsatisfactory	Repeat smear in 6–12 weeks, with treatment and where possible correction of any problems beforehand if appropriate.

Post-treatment assessment	After initial post-treatment colposcopic assessment by gynaecologist, repeat smear at 6-monthly intervals for 1 year. Following treatment of a high-grade epithelial abnormality, smears should be repeated yearly thereafter. Following treatment for a low-grade epithelial abnormality, revert to normal 2-yearly screening after 2 consecutive normal smears at yearly intervals.
Special circumstances	
Total hysterectomy for CIN	Annual smears from vaginal vault for 5 years, then revert to 2-yearly smears.
Total hysterectomy for benign causes	No further smears required if previous smears were negative. Baseline smear if reason for hysterectomy and/or previous Pap smear history unknown.
Subtotal hysterectomy for benign causes-cervix present	Continue normal 2-yearly screening.
Abnormality during pregnancy	Refer for colposcopy during 1st trimester to exclude invasive disease. If confirmed high-grade abnormality, repeat colposcopy during mid-trimester to exclude progression. Lesion should be reassessed 8 weeks post-partum.

Glossary

Ablative therapy: the destruction of cells on the surface of the cervix using laser therapy, chemicals or diathermy.

ABS: Australian Bureau of Statistics.

ACT: Australian Capital Territory-a land-locked Territory of Australia situated within the State of New South Wales on the eastern seaboard with a population of 309,794 (1997). Its capital city is Canberra, which is also Australia's capital city.

Adjuvant: enhancing or administered to enhance the effectiveness of a treatment or substance.

AHMAC: Australian Health Ministers' Advisory Council.

AIHW: Australian Institute of Health and Welfare.

ASGC: Australian Standard Geographical Classification: the classification designed by the ABS to define the geography of Australia.

AS rate: age-standardised rate

Basement membrane: the delicate, noncellular layer on which an epithelium is seated. The epithelium forms the surface portion of the skin and lines hollow organs and all passages of the respiratory, digestive and genito-urinary systems.

Benign: not malignant.

Cancer (malignant neoplasm): a term used to describe one of several diseases which result when the process of cell division, by which tissues normally grow and renew themselves, becomes uncontrolled and leads to the development of malignant cells. These cancer cells multiply in an uncoordinated way, independently of normal growth control mechanisms, to form a tumour. This tumour may expand locally by invasion or systemically by metastasis via the lymphatic or vascular systems. If left untreated most malignant tumours will eventually result in death.

Cancer death: a death where the underlying cause is indicated as cancer. Persons with cancer dying of other causes are not counted in the death statistics in this publication.

CIN (cervical intraepithelial neoplasia): Squamous cell carcinoma of the cervix is mostly preceded, over a period of years, by a spectrum of asymptomatic abnormalities known as cervical intraepithelial neoplasia (CIN) graded as CIN 1 (mild dysplasia), CIN 2 (moderate dysplasia) and CIN 3 (severe dysplasia and carcinoma in situ). CIN usually occurs at least a decade before cervical cancer. If CIN remains untreated, some women will develop cervical cancer. It is difficult to anticipate which cases of CIN will regress or progress although a number of international studies have shown that 1% of CIN 1, 5% of CIN 2 and more than 12% of CIN 3 would progress to invasive cervical cancer (Jelfs 1995).

Colposcopy: a microscopic examination of the lower genital tract with a magnifying instrument called a colposcope. This method of conservative evaluation allows the clinician to more accurately assess the cytologic abnormality by focussing on the areas of greatest cellular abnormality and by sampling them with a punch biopsy to attain diagnosis.

DHAC: Commonwealth Department of Health and Aged Care (since October 1998) (Department of Health and Ageing since November 2001).

DHFS: Commonwealth Department of Health and Family Services (to October 1998).

DHSH: Commonwealth Department of Human Services and Health (1994-1996).

Epidemiology: the quantitative study of the distribution and determinants of health-related states and events in populations, and the application of this study to the control of health problems.

HGA: high-grade abnormalities - as defined for this report include CIN 1/2, CIN 2, CIN 3 or adenocarcinoma in situ.

Hysterectomy: refers to the surgical procedure whereby all or part of the uterus is removed.

Hysterectomy fractions: the proportion of women who have had their uterus removed by hysterectomy.

HPV: Human papilloma virus.

ICD-9: International Classification of Disease-a coding system used to identify the primary site of the malignancy. This classification is in its ninth revision.

Incidence: see new cancer case

Intraepithelial: refers to that area within the layer of cell tissues forming the epidermis of a body cavity. These cells comprise contiguous cells having minimum intercellular substance.

Invasive cancer: a tumour whose cells have a tendency to invade healthy or normal tissues.

LGA: low-grade abnormalities include atypia, warty atypia (human papilloma virus (HPV) effect), possible CIN, equivocal CIN, CIN 1 or endocervical dysplasia not otherwise specified (NOS).

Lymph node: masses of lymphatic tissue, often bean-shaped, that produce lymphocytes and through which lymph filters. These are located throughout the body.

Metastasis: the process by which a disease is transferred from one part of the body to another, for example, via the lymphatic system or the bloodstream.

Mortality: see cancer death

New cancer case: a person who has a new cancer diagnosed for the first time. One person may have more than one cancer and therefore may be counted twice in incidence statistics if it is decided that the two cancers are not of the same origin. This decision is based on a series of principles set out in more detail in a publication by Jensen et al. (1991).

NOS: Not otherwise specified.

NSW: New South Wales-a State of Australia on the eastern seaboard which has the largest capital city in Australia, Sydney, and a population of 6,274,370 (1997).

NT: Northern Territory-a Territory in the north of Australia with a population of 187,132 (1997) and Darwin as its capital city.

Pap smear: a test prepared for the study of exfoliated cells from the cervix (refer to Appendix A: Cervical cancer: symptoms, detection and treatment).

Post-partum: following childbirth.

Qld: Queensland-a State in the north-east of Australia with a population of 3,401,232 (1997) and Brisbane as its capital city.

Radiation therapy: the treatment of disease with any type of radiation, most commonly with ionising radiation, such as x-rays, beta rays and gamma rays.

RRMA: Rural, Remote and Metropolitan Areas Classification.

SA: South Australia-a State in the southern part of Australia with a population of 1,479,806 (1997) and Adelaide as its capital city.

Screening: the performance of tests on apparently well people in order to detect a medical condition at an earlier stage than would otherwise be the case.

Sensitivity: the proportion of individuals with the disease whom the screening test labels positive.

Stroma: the supporting framework of an organ.

Tas: Tasmania-an island State in the south-east of Australia with a population of 473,501 (1997) and Hobart as its capital city.

Vic: Victoria-a State in the south-east of Australia with a population of 4,605,148 (1997) and Melbourne as its capital city.

WA: Western Australia-the largest State in Australia, located in the west with a population of 1,798,129 (1997) and Perth as its capital city.

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