Cervical Screening (Cervical Smear Test)

The benefits of screening

It has been shown that the cervical screening programme is associated with improved rate of cure of cervical cancer. [1]

Worldwide cervical carcinoma is the second most common female malignancy, causing approximately 500,000 new cases each year. [2] The age-standardised (European) annual incidence rate of cervical cancer is 13.2 per 100,000 females. [2] Age-standardised mortality rate for the UK was 2.9 per 100,000 in 2008. [3] 85-90% are squamous cell cancers and approximately 15% are adenocarcinomas, which are more difficult to detect. [4]

The cervical screening programme has not been without its critics, who have commented that the resulting reduction in mortality has been too small to justify the financial and psychosocial costs. However three-yearly screening up to 39 years of age, prevents 41% of cancers. Five-yearly screening between 40 and 54 years of age prevents 63% of cancers. [5]

Coverage of the programme

Standard call and recall schedule

- First invitation for screening at age 25 in England and Northern Ireland and age 20 in Wales and Scotland.
- Routine recall:
    - England: routine three-yearly recall between ages 25-49, then five-yearly recall until aged 65.
    - Scotland: routine three-yearly recall from age 20 until aged 60.
    - Wales: routine three-yearly recall from age 20 until aged 65.
    - Northern Ireland: routine three-yearly recall between ages 25-49, then five-yearly recall until aged 65.

- Consider offering a smear to patients above the upper age limit, who have not been screened since age 50 or have had previous abnormal tests.

The effectiveness of the policy in England will be carefully monitored. Current evidence shows that cervical screening in women aged 20-24 has little or no impact on rates of invasive cervical cancer up to age 30. [6] Some uncertainly still exists regarding its impact on advanced stage tumours in women under the age of 30. By contrast, screening older women leads to a substantial reduction in incidence of and mortality from cervical cancer.

A study of noncompliant women in Sweden concluded that the reasons women did not attend for smears was complex and affected by personal circumstances. Women who chose not to attend often felt healthy and cited other priorities. A negative body image, low self-esteem, feelings of discomfort when confronted with the gynaecological examination and fear of the results also influenced their non-attendance. [7]

The latest published statistics (31st March 2011) showed that the percentage of eligible women (aged 25 to 64) who were recorded as screened at least once in the previous five years was 78.6%. [5] This compares to 78.9% in 2010 and to 79.5% five years ago.

The screening process

A disposable plastic (or warmed metal) speculum should be inserted vaginally to view the squamocolumnar junction of the cervix. Liquid-based cytology (LBC) is now the method of choice.[4] A brush is used rather than a spatula, which is rotated against the squamocolumnar junction (usually in the cervical canal). Two systems for LBC are in use. Both systems use brushes which look similar. In one, the head of the brush that contains the cells is broken off into a pot that contains special preservative liquid. The brush head is sent to the laboratory in the pot (this is the SurePath® brand method). In the other system, the brush is rinsed in the preservative to wash the cells into the pot. The brush is then discarded (this is the ThinPrep® brand). LBC has been rolled out nationally. Reporting time is reduced and results are available and sent to the patient in approximately two weeks.

Older methods include the Papanicolaou (Pap) smear test which uses a brush or the Ayre spatula to sample the ectocervix, by rotating it twice through 360°. In both these methods, the material obtained is smeared on to a microscope slide, which is then sprayed with or immersed in a fixative solution prior to transporting to the laboratory.

Interpreting smear results

Cells are analysed to look for abnormalities in the appearance of the nucleus and other aspects of cell morphology (dyskaryosis). There is some lack of standardisation among laboratories, but basically one can expect to see one of the following results on a report:

- **Negative** - endocervical cells with normal nuclei are seen.
- **Inadequate** - the average national rate for inadequate smears is about 9%. Inadequate smears may be caused by insufficient or unsuitable material on the smear, inadequate fixation, poor spreading of the material on the slide, the presence of pus, blood or inflammatory exudate, or excessive cytolysis (this may be due to drying out of the smear, or hormone therapy).
- **Borderline** - this is reported in approximately 5% of smears. Cells are seen with abnormal nuclei, but the pathologist cannot say for certain that they are indicative of dyskaryosis. Many patients revert to normal smears eventually. Human papillomavirus (HPV) infection is sometimes found in this group. Very few of these patients go on to develop cancer.
- **Mild dyskaryosis** - this occurs in approximately 5% of smears. Again, many women with this finding eventually revert to normal smears. HPV infection is a common association. Strictly speaking, the cervical intraepithelial neoplasia (CIN) grading system should not be used on smears but on cervical biopsy material obtained during colposcopy. However, mild dyskaryosis usually equates to CIN 1. Cancer is very unlikely.
- **Moderate dyskaryosis** - this usually equates to CIN 2 and is seen in approximately 1% of samples. CIN 2 is considered a precancerous condition with an intermediate probability of developing into cancer.
- **Severe dyskaryosis** - this usually equates to CIN 3. It occurs in about 0.5% of smears and is at the higher risk end of the cancer spectrum. About 0.1% of smears will show nuclear and other cellular changes suggestive of carcinoma, sometimes referred to as carcinoma in situ.
- **Glandular neoplasia** - occasionally, abnormalities of glandular cells are seen, suggestive of adenocarcinoma in situ, adenocarcinoma of the cervix, endometrial adenocarcinoma, or adenocarcinoma of an organ outside the uterus.

Test limitations

The limitations of Pap smears include variable sampling of cervical cells, poor transfer of cellular material on to the glass slide and suboptimal preparation and fixation by the smear taker. The widespread introduction of liquid-based cytology (LBC) has reduced the inadequate rate from around 10% to 2.7%.[5] LBC is also 12% more sensitive than older methods.[4]

It should be remembered that cervical screening is but one strand of several approaches that should be taken in the continued battle against cervical cancer. Despite the screening programme, 3,200 new cases of cervical cancer are seen each year. Some authorities view the condition as an entirely preventable disease and it has been suggested that each new case should be subject to a confidential enquiry in a similar manner to maternal deaths.

Future developments[5]

Computer-assisted detection of cervical abnormalities may be possible in the future.

HPV vaccination was introduced in September 2008 for girls aged 12-13 but it will be many years before this programme has an effect on the incidence of cervical cancer.

Screening protocols

Recall protocol for negative screening results	
History	**Action**
No previous cervical screening history Previous abnormal screening Previously treated for CIN	Routine recall
Previous screening results negative	Routine recall
Women aged 65* and over with no previous negative screening history	Three negative tests, three years apart, then no further recall
Previous abnormal screening	For minor abnormalities (borderline and mild dyskaryosis) follow protocol for the particular abnormality - see under 'Management of results', below
Previously treated for CIN	Follow-up protocol for patients treated for CIN - see under 'Management of results', below
Previous CIN 1 (not treated)	At least three negative tests, 6-12 months apart, then routine recall

Management of results

Negative (normal)

It is appropriate to:

- Investigate and manage incidental findings. eg infections.
- Ensure that the patient is informed of the result.
- Recall as appropriate for a negative result.

Inadequate

- Repeat sample immediately after treating any infection or atrophy, preferably within three months.
- Repeat sample as soon as convenient if technically inadequate.
- If persistent (three inadequate samples), advise assessment by colposcopy. [8]

Borderline

- Borderline nuclear change in endocervical cells - refer for colposcopy.
- Borderline nuclear change in squamous cells:
- Treat any associated condition and repeat the screen at no more than six months (particularly important where there is an association with HPV. The majority of smears will return to normal by this stage.
- Refer for colposcopy if there are three smears in a series (reported as borderline nuclear change in squamous cells) without the woman being returned to routine recall, or three borderline or more severe results in a 10-year period.
- Three consecutive negative results, six months apart, are required before returning to routine recall.
- Repeat a sample in three to six months when the differential diagnosis is between benign/reactive changes and higher degrees of dyskaryosis or possible glandular neoplasia.
- The laboratory may recommend a repeat screening in a shorter interval, or that gynaecological referral should be considered.

Mild dyskaryosis

- Ideally, women should be referred for colposcopy after one mild dyskaryotic smear, but it remains acceptable to recommend a repeat test within six months - many will have returned to normal by this stage. [8]
- Always refer for colposcopy after two tests reported as mild dyskaryosis without a return to routine recall.
- Three consecutive negative results, six months apart, are required before returning to routine recall.
- If a single mild dyskaryotic result is obtained after treatment for carcinoma in situ stage 2 or worse, refer for colposcopy.
- If, in a 10-year period, there are three borderline or more severe results, refer to colposcopy.

In some areas of the UK, women with borderline or mild dyskaryotic changes are offered an HPV DNA test. Women who test positive for high-risk types of HPV are referred for a colposcopy straight away. Research has shown that HPV DNA testing leads to earlier detection of clinically relevant CIN grade 2 or worse, which when adequately treated, improves protection against CIN grade 3 or worse and cervical cancer. [9] High-risk HPV types (16, 18, 31, 33) have been found to be present in close to 100% of all cervical cancers. Equally, women with a mild or borderline smear result, who have no evidence of high-risk HPV infection are very unlikely to develop cervical cancer. [8] HPV testing is not currently recommended for primary screening, but this may change.

Moderate dyskaryosis

Refer for colposcopy.

Severe dyskaryosis

Refer for colposcopy.

Further reading & references

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