Cancer screening in primary care

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Abstract
Cancer is a major cause of mortality throughout the world. However, with early intervention, many of these deaths may be prevented. Knowledge of cancer symptoms and the use of screening tests, as well as changes in risk factors may alter the course of this group of diseases.

Introduction
Cancer is the second largest cause of mortality, the largest being cardiovascular disease. It is estimated that one in three people develop cancer in their lifetime, and one in four people die as a result of cancer.1 Cancer kills more people every year than AIDS, tuberculosis and malaria combined.2

Cancer
A cancer is a cell that has lost its normal control mechanisms and thus has unregulated growth and lack of differentiation. Cancer can develop from any tissue within any organ at any age. As cancer cells grow and multiply, they form a cancerous mass that invades local tissue and may spread, or metastasise, around the body.3,4

Carcinogens such as certain viruses, chemicals, radiation or sunlight can change the genetic material of a cell and prime it to become cancerous. Tables I and II list chemicals and viruses associated with different types of cancer. A genetic flaw or another agent (called promoters) may make certain cells more susceptible to carcinogens. Several factors such as susceptible cells, promoting agents and carcinogens are required to cause cancer.3

Risk factors – A host of genetic and environmental factors increase the risk of developing cancer. Research shows that up to 90% of cancers may be caused by environmental factors. Occupational carcinogens such as asbestos and uranium, encountered by mine workers, are not easily avoided, but exposure to certain environmental factors such as UV light may be limited. It is believed that two blistering burns from overexposure to the sun before the age of 18 years may dramatically increase the risk of skin cancer later in life.3,5

Lifestyle factors such as overindulgence in alcohol, smoking or use of tobacco products, and an unhealthy diet increase cancer risk. Excessive consumption of alcohol may increase the risk of oesophageal cancer, smoking increases the risk of lung cancer, and a diet high in smoked food and pickled foods increases the risk of stomach cancer.3

Table I: Carcinogens: chemicals that can cause cancer

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Type of cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental and industrial</td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>Lung, skin</td>
</tr>
<tr>
<td>Asbestos</td>
<td>Lung, pleura</td>
</tr>
<tr>
<td>Aromatic amines</td>
<td>Bladder</td>
</tr>
<tr>
<td>Benzene</td>
<td>Leukaemia</td>
</tr>
<tr>
<td>Chromates</td>
<td>Lung</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>Nose, throat</td>
</tr>
<tr>
<td>Nickel</td>
<td>Lung, nasal sinuses</td>
</tr>
<tr>
<td>Vinyl chloride</td>
<td>Liver</td>
</tr>
<tr>
<td>Uranium</td>
<td>Lung</td>
</tr>
<tr>
<td>Lifestyle</td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>Oesophagus, mouth, throat</td>
</tr>
<tr>
<td>Betel nuts</td>
<td>Mouth, throat</td>
</tr>
<tr>
<td>Tobacco</td>
<td>Head, neck, lungs, oesophagus, bladder</td>
</tr>
<tr>
<td>Medical</td>
<td></td>
</tr>
<tr>
<td>Alkylating agents</td>
<td>Leukaemia, bladder</td>
</tr>
<tr>
<td>Diethylnitrosamine</td>
<td>Liver, vagina (if exposed as a foetus)</td>
</tr>
<tr>
<td>Oxymetholone</td>
<td>Liver</td>
</tr>
</tbody>
</table>

Table II: Viruses associated with cancer

<table>
<thead>
<tr>
<th>Virus</th>
<th>Associated cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cytomegalovirus</td>
<td>Kaposi’s sarcoma</td>
</tr>
<tr>
<td>Epstein-Barr virus</td>
<td>Burkitt’s lymphoma, Immunoblastic lymphoma, Nasopharyngeal carcinoma</td>
</tr>
<tr>
<td>Hepatitis B virus</td>
<td>Hepatocellular carcinoma</td>
</tr>
<tr>
<td>Herpesvirus 8</td>
<td>Kaposi’s sarcoma</td>
</tr>
<tr>
<td>HIV</td>
<td>Kaposi’s sarcoma, Lymphoma</td>
</tr>
<tr>
<td>Human papillomavirus viruses</td>
<td>Cervical carcinoma</td>
</tr>
<tr>
<td>Human T-cell lymphotrophic virus</td>
<td>T-cell lymphomas, Hairy cell leukaemia</td>
</tr>
</tbody>
</table>
Family history and genetic factors may also influence the risk of developing cancer, although less than 15% of cancers develop due to genetic heritage. People with chromosomal abnormalities have an increased risk of cancer. Women with a mother, sister or other female relative with breast cancer have a risk 1.5 to 3 times greater than women without a family history of breast cancer.

Types and symptoms of cancer
Cancers may affect many different organs and tissues within the body; cancers of the lungs, skin, breast and gastrointestinal tract are the most common. The outcome of a cancer diagnosis depends on the site affected and the stage to which it has developed when it is detected. For example, lung cancer is often only diagnosed at a late stage when it has spread via metastases to other sites that may include the liver and the brain. This results in a poor 5-year survival rate.

In 2001 the National Cancer Registry (NCR) listed the leading cancers in South Africa. These are listed in Table III.

Prostate cancer
The prostate gland is part of the male reproductive system, and is situated between the pubic bone and the rectum. Prostate cancer is usually slow growing and may be asymptomatic. Regular screening tests are important to detect changes in the prostate gland. Factors that increase the risk of developing prostate cancer include: age (increases after age 50), poor diet (large amounts of red meat, high-fat dairy products), lack of exercise and family history.

Warning signs of prostate cancer include:
- Frequent urination, especially at night
- Difficulty in starting urination or holding back urination
- Painful or burning sensation when urinating
- Blood in urine
- Pain in the lower back, pelvic area or upper thighs

These symptoms may also be related to inflammation or enlargement of the prostate or to benign prostatic hyperplasia. However, a patient experiencing these symptoms should undergo further examination.

Testicular cancer
Testicular cancer is generally rare, but is the most common cancer for men from ages five to 35. It can present in any male at any time.

Risk factors for testicular cancer include: age (mainly 15 to 35), undescended testicle, family history, or a mother with breast cancer.

Symptoms of testicular cancer include:
- Hard, painless lump on the testicle
- Slight enlargement of one testicle
- Dull ache or heavy feeling in the testicles, groin or lower abdomen

A doctor should be consulted if any changes to the testicles are found.

Bladder cancer
Patients with chronic bladder inflammation such as frequent infections, or urinary tract problems, or those with physiological problems such as a bladder birth defect have an increased risk of bladder cancer. Other risk factors include smoking, exposure to certain chemicals e.g. aromatic amines, and a diet high in fried meats and animal fats.

The symptoms of bladder cancer are non-specific and may be linked to other conditions. However, the presence of these symptoms, indicate that further investigation is required. Symptoms include:
- Blood in the urine
- Pain or burning during urination
- Change in bladder habits, such as having to urinate more frequently, or feeling the need to urinate without producing much urine
- Change in urine colour

Bladder cancer often causes no symptoms until an advanced stage is reached.

Lung cancer
Some sources list lung cancer as the leading cause of cancer deaths in women and men. Only 2% of those diagnosed with lung cancer that has spread to other areas of the body are alive five years after the diagnosis. In cases where lung cancer is diagnosed at an earlier stage, the 5-year survival rate is around 49%.

Cigarette smoking is the most important cause of lung cancer. The risk is related to the following factors:
- The number of cigarettes smoked
- The age at which the person started smoking
- How long the person has smoked

Other causes of lung cancer include: passive smoking, air pollution, asbestos exposure, and lung diseases such as tuberculosis.

Up to 25% of people with lung cancer have no symptoms when the cancer is diagnosed. However, typical symptoms may include:
- Cough
- Haemoptysis
- Chest pain
- Shortness of breath

Table III: Leading cancers in South Africa (2000–2001)

<table>
<thead>
<tr>
<th>Leading five male cancers</th>
<th>Leading five female cancers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate 1 in 23</td>
<td>Breast 1 in 29</td>
</tr>
<tr>
<td>Lung 1 in 69</td>
<td>Cervix 1 in 44</td>
</tr>
<tr>
<td>Oesophagus 1 in 82</td>
<td>Uterus 1 in 144</td>
</tr>
<tr>
<td>Colorectal 1 in 97</td>
<td>Colorectal 1 in 162</td>
</tr>
<tr>
<td>Bladder 1 in 108</td>
<td>Oesophageal 1 in 196</td>
</tr>
</tbody>
</table>

Breast 1 in 29
Cervix 1 in 44
Uterus 1 in 144
Colorectal 1 in 162
Oesophageal 1 in 196
A new cough or a change in a chronic cough of a smoker or former smoker should be evaluated further.\textsuperscript{9}

**Oesophageal cancer**

Cancer of the oesophagus may include adenocarcinoma or squamous cell carcinoma. Adenocarcinoma of the oesophagus occurs as a complication of chronic reflux of gastric contents into the lower oesophagus. Squamous cell carcinoma occurs more commonly in people who use tobacco products and alcohol in excess, or who have previously swallowed a caustic substance such as lye.

The most common symptom of oesophageal cancer is difficulty in swallowing.\textsuperscript{9}

**Colon and rectal cancer**

Most colorectal cancers arise from abnormal cells in the glands covering the inner walls of the colon. People with any of several conditions known as adenomatous polyposis syndromes have a higher than normal risk of developing colorectal cancer. These syndromes tend to be inherited.

Another group of colon cancers may develop without the precursor of polyps. These hereditary nonpolyposis colorectal cancers (HNPCC) are associated with a genetic abnormality. Other risk factors for colon cancer include ulcerative colitis, Crohn's disease, and a history of breast, uterine or ovarian cancer, and a family history of colon cancer. Lifestyle risk factors include a diet high in fat, low in fibre, obesity, and smoking.

Symptoms of colorectal cancer include:
- Rectal bleeding
- Blood in stools
- Abdominal distension
- Unexplained and persistent nausea and vomiting
- Unexplained weight loss
- Change in bowel movements
- Sensation of incomplete evacuation of bowel movements

**Ovarian cancer**

It is estimated that one in 297 women in South Africa will be diagnosed with ovarian cancer.\textsuperscript{10} Early detection of the cancer increases the possibility of successful treatment. Women with a family history of the disease are at increased risk for developing ovarian cancer. Ovarian cancer has been linked to three hereditary syndromes:

1. Breast-ovarian cancer syndrome – this syndrome has been linked to a hereditary genetic mutation.
2. Hereditary nonpolyposis colorectal cancer syndrome (HNPCC) – is a hereditary cancer syndrome associated with colorectal cancer. Other organ systems that may be involved include the uterus, ovaries, breasts, stomach and pancreas.
3. Site-specific ovarian cancer syndrome – may be linked to genetic mutation.

Other factors that may increase ovarian cancer risk include: no pregnancies, Ashkenazi Jewish heritage, asbestos exposure, irradiation of the pelvis, and repeated exposure of the genitals to talc. The risk of ovarian cancer may be decreased by factors that inhibit ovulation, including oral contraceptives. Pregnancy and breastfeeding, removal of the ovaries and hysterectomy also decreases the risks of ovarian cancer.

Symptoms of ovarian cancer include:
- Pelvic pain or pressure
- Pain with intercourse
- Abdominal swelling
- Urinary frequency
- Constipation
- Loss of appetite and/or feeling full after eating little
- Gas and/or diarrhoea
- Nausea and vomiting

**Uterine cancer**

Uterine or endometrial cancers may develop in the endometrium or in the connective tissue of the uterus. Risk factors may include: obesity, no pregnancies, early puberty (before age 12), late menopause (after age 52), treatment with unopposed oestrogen or high levels of oestrogen, treatment with tamoxifen, other cancers and a family history of cancer. The use of combined oral contraceptives decreases the risk of endometrial cancer.

Symptoms of endometrial cancer include:
- Abnormal vaginal bleeding
- Any vaginal bleeding after menopause
- Pelvic pain
- Swelling in the pelvic area
- Unexplained weight loss

**Cervical cancer**

It is estimated that between one in 35 and one in 41 women in South Africa will develop cervical cancer in their lifetime.\textsuperscript{10,11} This cancer is slow to progress from normal cervical tissue to precancerous changes, to invasive cancer. This allows for early detection of the disease. The risk of developing these abnormal changes has been associated with certain factors, including: infection with human papillomavirus (HPV), early sexual contact, multiple sexual partners, cigarette smoking, and oral contraceptive use.

Cervical cancer may remain asymptomatic until it has progressed to a dangerous stage. Symptoms may include:
- Abnormal vaginal bleeding
- Heavy periods
- Pain during intercourse
- Abnormal vaginal discharge

**Breast cancer**

Breast cancer is primarily a disease of women, with one in 29 women in South Africa developing breast cancer. However, almost 1% of breast cancers occur in men. The risk of breast cancer increases with age, from one in 280 between the ages...
often mistaken for a sore that does not heal. Depression with crusting and bleeding may develop. A BCC is blood vessels may be visible within the tumour. A central

Most breast cancer is discovered before symptoms are present, either by finding an abnormality on mammography or by detecting a breast lump. Symptoms include:

- Breast lumps. Not all lumps are cancerous, but all require evaluation.
- Unusual swellings
- Puckering or dimpling of the skin of the breast
- Scaly skin around the nipple
- Changes in the shape of the breast
- Changes in the nipple, such as inversion
- Discharge from the nipple

Skin cancer

Skin cancer is the most common of all human cancers, however the NCR excludes skin cancer in determining the total rates and risks for all cancers combined. Skin cancers are made up of basal cell carcinomas (BCC), squamous cell carcinomas (SCC) and malignant melanoma. The majority of skin cancers are BCC and SCC. These are malignant but are unlikely to spread to other parts of the body. Melanomas tend to spread, and may be fatal if not treated early. Precancerous lesions may develop into cancer over time. These include actinic keratosis, a patch of red or brown, scaly, rough skin, which can develop into SCC. Abnormal moles may develop into melanoma. Ultraviolet (UV) light exposure is the most common cause of skin cancer.

It has been estimated that 75% of skin cancer could be prevented by adequate skin protection in childhood. Other causes include use of tanning booths, exposure to high levels of x-rays, and contact with certain chemicals such as arsenic, tar, oils, and soot. Other risk factors include:

- Fair skin that freckles or sunburns easily
- Genetic disorders that deplete skin pigment such as albinism and xeroderma pigmentosum
- Patients previously treated for skin cancer
- People with numerous moles or large moles that were present at birth

Darker skinned people have a negligible incidence of skin cancer due to the melanin in their skin, but may develop skin cancer around the eyes, around the nails, inside and under their feet, as well as on scar tissue, where the skin has been damaged.

A BCC usually looks like a raised, smooth pearly bump on the sun-exposed skin of the head, neck and shoulders. Small blood vessels may be visible within the tumour. A central depression with crusting and bleeding may develop. A BCC is often mistaken for a sore that does not heal.

A SCC is a well-defined, red, scaling, thickened patch on sun-exposed skin. SCCs may ulcerate and bleed, and if left untreated, may develop into a large mass.

Most malignant melanomas are brown to black pigmented lesions. Warning signs include a change in size, shape, colour or elevation of a mole. Pain, itching, ulceration, or bleeding of a mole, or the appearance of a new mole in adulthood should be evaluated.

Cancer screening

Screening tests are performed in people with no symptoms but who may be at risk. Early detection of the disease allows for less radical therapy and decrease in cancer mortality. However, there are drawbacks to screening tests:

1. They may be costly
2. False-positive results lead to additional costs for further tests and anxiety in the patient
3. False-negative results may result in further symptoms being ignored

Screening tests should be performed when a high-risk group can be identified, when the disease has an asymptomatic period where treatment would alter the outcome, and where treatment is available that is acceptable and effective at changing the history of the condition.

Screening tests

Two of the most widely used screening tests in women are the Papanicolaou (Pap) test to detect cervical cancer and mammography to detect breast cancer. These tests have been successful in decreasing cancer mortality.

Measuring the blood level of prostate-specific antigen (PSA) is a common screening test for prostate cancer. However, levels may also be raised in benign prostatic hyperplasia, thus giving false positive results that require further investigation.

Screening tests can be performed at home such as breast or testicular self-examination. The skin should also be inspected on a regular basis for any changes. Table IV lists cancer screening procedures available and recommendations for their use.

Cancer screening in primary care

Primary healthcare providers can play an important role in the detection of cancers. While most pharmacists are not equipped to carry out any tests, they are well-placed to recognise early symptoms, and to educate patients on the disease, risks factors and possible prevention. Pharmacists may be able to assist in the education and detection of skin cancer. Patients should be encouraged to undertake regular screening and to perform self-examinations for breast or testicular cancer, and to report symptoms to their doctor.

All primary healthcare facilities (i.e. government clinics) in South Africa provide cervical cancer screening, and some are equipped to perform mammograms.
Cancer education
Early detection can significantly alter the course of the disease. Although many symptoms of cancer may be caused by another health problem, attention should be paid to any symptoms or early warning signs.

Early warning signs in children:
C – Continued, unexplained weight loss
H – Headaches, often with vomiting, at night or early morning
I – Increased swelling or persistent pain in bones, joints, back and legs
L – Lump or mass in the abdomen, neck, chest, pelvis or armpits
D – Development of excessive bruising, bleeding or rash
C – Constant infections
A – A white spot in black centre of the eye
N – Nausea that persists
C – Constant tiredness or noticeable paleness
E – Eye or vision changes
R – Recurrent fevers of unknown origin

Early warning signs in adults:
C – Change in a wart or mole
A – A sore that does not heal
U – Unusual bleeding or discharge anywhere in the body
T – Thickening or lump anywhere in the body
I – Indigestion or difficulty swallowing
O – Ongoing hoarseness or cough
N – Notable change in bowel or bladder function

Conclusion
Cancer is responsible for many illnesses and a significant number of deaths. Reduction of cancer risk factors with education, prevention where possible, and early detection of cancer through screening, will increase the number of cancer survivors.

References
8. Testicular Cancer – what young men need to know www.cansa.org.za
10. CANSA Women’s Health Campaign. www.cansa.org.za

<table>
<thead>
<tr>
<th>Cancer</th>
<th>Procedure</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung cancer</td>
<td>Chest x-ray</td>
<td>Not recommended on a routine basis</td>
</tr>
<tr>
<td></td>
<td>Sputum cytology</td>
<td></td>
</tr>
<tr>
<td>Rectal and colon cancer</td>
<td>Stool examination for occult blood</td>
<td>Yearly after age 50</td>
</tr>
<tr>
<td></td>
<td>Rectal examination</td>
<td>Yearly after age 40</td>
</tr>
<tr>
<td></td>
<td>Sigmoidoscopy</td>
<td>Every 5 years after age 50</td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>Rectal examination and PSA test</td>
<td>Yearly after age 50</td>
</tr>
<tr>
<td>Testicular cancer</td>
<td>Self-examination</td>
<td>Monthly after age 18</td>
</tr>
<tr>
<td>Cervical, uterine and ovarian</td>
<td>Pelvic examination</td>
<td>Every 1 to 3 years from age 18, yearly from age 40</td>
</tr>
<tr>
<td>Cervical cancer</td>
<td>Papanicolau test</td>
<td>Yearly from age 18</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>Breast self-examination</td>
<td>Monthly after age 18</td>
</tr>
<tr>
<td></td>
<td>Breast physical examination</td>
<td>Every 3 years from age 18, yearly from age 40</td>
</tr>
<tr>
<td></td>
<td>Mammogram</td>
<td>Baseline exam between age 35 to 40, every 1 to 2 years from age 40, yearly from age 50</td>
</tr>
</tbody>
</table>

Table IV: Recommended cancer screening procedures

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