Cancer in older adults: management and prevention

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INTRODUCTION

In 2012, cancer surpassed cardiovascular disease to become the number one cause of
death in Australia\(^1,2\). Cancer disproportionately affects older adults, defined here as the age
group $>65$ years. The correlation between cancer risk and age has been thoroughly
established in epidemiological studies and partially elucidated through genetic and molecular
pathways\(^3\). This paper will discuss the concept of cancer being “unpreventable” as we face an
ageing population and increased incidence of cancer and “unmanageable” as age related
factors such as physiological and cognitive decline, comorbidities and social functioning act as
obstacles to quality cancer care. Cancer control will then be explored in the context of
Australia’s ageing population. As it becomes clear that cancer is a disease of age, Australia’s
medical education and research must also progress to empower future medical practitioners
to deliver high quality care to this population with special needs.

PART 1: AGEING AND CANCER

Age as a risk factor for cancer

With age, comes an increased risk of cancer. Older adults account for 60% of
incidences of cancer and 70% of cancer related deaths\(^4\). The process of ageing favours two
essential processes in cancer development: the acquisition of mutations and the formation of
a molecular and cellular environment which favours carcinogenesis\(^5\). As one ages, processes
like DNA repair become less active and efficient, allowing DNA adduct formation,
hypomethylation of DNA and more frequent mutations, chromosomal breaks and
translocations\(^3\). Mutations can inactivate anti proliferative and apoptotic tumour suppressor
genes, cause proto oncogenes to become oncogenes or hinder the function of DNA repair
genes. The accumulation of such non lethal genetic damage is the basis of cancer.

A permissible cellular microenvironment is necessary for tumour progression once a
somatic cell mutation has occurred. In tissues in young individuals, growth signals and
inhibitory factors prevent these potential tumour cells from proliferating and progressing to a
neoplastic phenotype. However in tissue from older adults, senescent cells secrete degradative
enzymes, inflammatory cytokines and growth factors which disrupt tissue structure. Further
age related changes influence hormonal status and inflammation, modify receptor expression
and HPA axis function. Together, these changes create a cellular microenvironment which
promotes the expression of premalignant cells and their ultimate transformation into
malignant phenotypes\(^3,6\).
Age as a prognostic factor in treatment

Age related factors such as late presentation and diagnosis, poor response to treatment or complicated management due to comorbidities contribute to poor outcomes in older cancer patients.

Age correlates with a progressive loss of neurones and neurotransmitters causing cognitive decline. Patients hence have poor insight into their condition, leading to late presentation allowing growths to become more advanced or even metastasise; limiting treatment options. Various forms of dementia are also more prevalent in this age category, while visual acuity and hearing are more likely to be impaired. This contributes to poor understanding of and compliance with treatment as well as limited participation in clinical trials. Only 9 - 15% of older adults participate in clinical trials even though over half of all new diagnoses are made in this population. A limited data regarding this age group leads to a lack of standardised management.

The toxic side effects of chemotherapy are more common in older patients due to age related physiological changes. Inefficient DNA repair will caused prolonged toxicity from chemotherapeutic agents, while decreased liver and nephron mass and function will reduce metabolism and excretion. Reduced functional reserve of systems predisposes to organ failure if additional tissue losses occur. Furthermore, reduced stem cell proliferation and haematopoiesis cause slow recovery of mucosal cells and blood cell regeneration after chemotherapy. Issues like comorbidities and polypharmacy are also important. Anthracyclines for instance are cardiotoxic and are contraindicated in patients with cardiovascular disease. The average older patient is on six medications, which could interact with chemotherapeutics.

Age is a predictor for increased surgical morbidity and mortality. Decreased functional reserve makes this group less able to endure the stress of surgery. Comorbidities, especially if patient is assessed as ASA III or IV, can further depress function and increase the risk from surgery. This is particularly evident in the respiratory system. Age related decrease in lung compliance and power of muscles of respiration lead to high rates of COPD, pneumonia, and CSA. These pre dispose to aspiration pneumonia, hypoxaemia, hypoventilation and atelectasis during sedation, causing lengthened ICU stay and increased mortality.
Age is associated with a decline in autonomic function which impairs homeostatic mechanisms, predisposing older surgical patients to intraoperative haemodynamic instability\(^8\), an important risk factor for stroke. Since elderly patients can potentially already be host to other risk factors for stroke like hypertension, atherosclerosis, decreased physical activity and luminal damage, surgery could significantly increase their risk of cerebrovascular complications. Concern for post operative adverse effects on cardiac, pulmonary, cerebral systems or exacerbation of existing diseases can lead to exclusion of older patients from surgical treatment\(^8\). Age therefore hinders many aspects of cancer care.

**PART 2: MANAGING THE UNPREVENTABLE**

**EOLC, assumptions and under treatment**

Age is an undeniable risk factor for cancer, rendering cancer “unpreventable” in a sense. Management then becomes an important means of cancer control. Ageism can cloud the judgement of even the most experienced practitioners, who may assume a paternalistic view that the elderly patient will not tolerate therapy or would not be interested. It has been found that older cancer patients have decreased survival rates due to incomplete staging, decisions to avoid aggressive treatment and limited referral to tertiary cancer care centres\(^3\). Medical students can learn that such assumptions create an environment where older patients are under appreciated, under assessed, under consulted and ultimately under treated.

When discussing therapeutic options, medical practitioners much avoid assumptions about heterogeneity of the elderly population. This group is actually as likely to consent to curative treatment as their younger counterparts, however their priority is maintaining quality of life, rather than prolonging life\(^1^1\). Medical students will also learn that this group tends to have a lower degree of health literacy and knowledge, and will often be less assertive in decision making discussions. In this case, it is important to involve carers and family\(^3\).

In both geriatrics and oncology, quality of life, patient autonomy and dignity are supreme. Thus in considering oncology care in the ageing population, conversations regarding EOLC must be initiated early in treatment. It is also important to determine whether the elderly cancer patient will be able to tolerate treatment and consider the patient’s goals of care in relation to their life expectancy. The decision to palliate is as important as the decision to pursue aggressive treatment\(^1^1\).
Optimising cancer treatment in older adults

In the older adult population, many social and physical factors need to be taken into consideration when choosing appropriate treatment. A Comprehensive Geriatric Assessment can be made, which takes into account functional status, number and severity of comorbidities, socioeconomic issues, nutritional status, polypharmacy and geriatric syndromes. Optimisation of treatment should involve early identification and removal of reversible factors which can impede treatment for an elderly patient, particularly anaemia, neutropenia, pain, malnutrition and depression. Prophylactic haematopoietic growth factors can limit neutropenia and consequent infections while EPO can be improve anaemia. Thorough patient education can ensure early recognition of mucositis and treatment through immediate fluid resuscitation before life threatening dehydration occurs. Malnutrition, a common occurrence in the elderly, correlates with more severe haemotoxic effects with chemotherapy so, optimising nutrition with supplements and referral to dietician can be invaluable for patient wellbeing. Adjustment of dosing of renally excreted drugs can limit overexposure to these cytotoxic drugs in a group prone to having a decreased GFR. For pain, a combination of pharmacological support as per the WHO Pain ladder or non pharmacological therapy like massage and exercise can be useful. Supportive therapy and management along with correction of comorbidities and nutritional defects enables older patients to receive chemotherapy.

In many early stage cancers like breast, lung and GI cancers, surgery constitutes the first line therapy, ranging from diagnostic in aim to curative and even palliative. However surgery is frequently discounted as a treatment option in older cancer patients on account of the increased risk of morbidity and mortality which was discussed in Part 1. A systematic review on the use of surgery in CRC in elderly patients showed that this group was more likely to be given palliative surgery and less likely to be candidates for curative surgery. Medical students need to be reminded that chronological age does not determine physiological age. With detailed assessment of the individual patient’s functioning, proper pre operative planning and timely intervention, procedures can potentially carry only a minimally increased risk.
Supporting older adults and their carers

Recognising depression in older cancer patients and appropriate referral is essential to maintain their motivation to receive treatment. The Geriatric Depression Scale has 79 - 100% sensitivity for detecting depression in this group\textsuperscript{13}. Steps should also be taken to enable coping. Patients need to be reassured that voicing their concerns regarding their treatment and emotions is perfectly acceptable and even expected. The Cancer Council Australia provides helpful fact sheets free of charge, such as “Coping with a cancer diagnosis” to empower patients\textsuperscript{14} while Cancer Australia, an Australian Government website provides patient orientated resources regarding living with cancer and cancer support organisations\textsuperscript{15}. Contact should be established with these support networks, as desired.

Family caregivers play possibly the most vital role in caring for patients with cancer. Care incorporates emotional support, practical assistance like transport to treatment facilities, daily activities and coordinating medication and treatment routines. This can however cause stress for the (usually unpaid) family member. As medical students and future medical practitioners, we need to be able to provide options to reduce this stress wherever possible, for example giving long acting growth factors to reduce the expense and inconvenience of frequent clinic visits\textsuperscript{16}. It is also important for medical students to be aware of local community services which provide education, respite and support for carers. Lack of caregiver support is a major factor that could interfere with treatment and one which could easily be avoided or reversed with appropriate carer support\textsuperscript{7}.

PART 3: PREVENTING THE UNMANAGEABLE

Common cancers in Australia and their modifiable risk factors

In Australia, 60% of all cancers diagnosed are melanomas, prostate, colorectal, breast and lung cancers\textsuperscript{1}. As established in Part 1, age is associated with carcinogenesis. For instance, besides gender, age is the strongest risk factor for breast cancers\textsuperscript{17}. Part 2 explored the hinderances age creates for the treatment of cancer rendering the disease “unmanageable” in some cases. Thus we now turn to cancer prevention, the cancer control method which will have the greatest impact on public health, and is also the most cost effective. Approximately 40% of all cancer deaths are preventable, particularly those linked to modifiable risk factors which are predominantly lifestyle related\textsuperscript{18,19}. Tobacco smoking is the biggest modifiable risk factor for cancer, accounting for 20% of cancer deaths in Australia\textsuperscript{19}. Other important risk
factors which could reduce the impact of Australia’s cancer burden include alcohol use, physical activity, obesity and nutrition\textsuperscript{18,19}.

\textbf{Targeting the ageing population in cancer prevention initiatives}

In Australia, positive health promotion messages are ubiquitous. The public is well aware that smoking kills and that our sedentary lifestyle coupled with poor nutrition is leading to widespread obesity. The issue facing health promoters is how to present this information to the ageing population in a palatable way. As the regular healthcare provider and coordinator of treatment for many older patients, general practitioners are at a unique position to initiate discussions regarding risk factors, provide advice and access to resources and support patients in modifying their lifestyle.

Tobacco causes not only lung cancer, but oesophageal, oral, laryngeal, stomach, kidney, bladder, cervical and colorectal cancer\textsuperscript{19}. With Australian live expectancy at approximately 81 years, smoking cessation — especially in the younger subset of the >65 year old age group — can significantly reduce the lifetime risk of cancer. Within 10 years of cessation, lung cancer risk halves. Within 15 years, all cause mortality in former smokers declines to equal that of non smokers\textsuperscript{20}. These figures easily combat patient perceptions that “the damage has been done”. Following the 5A's approach which includes patient follow up and support is essential to successful cessation\textsuperscript{20}.

Regular physical activity is associated with an estimated 20 - 40\% reduced risk of breast cancer and associated with decreased risk of CRC and advanced prostate cancer\textsuperscript{21,22,23}. Health practitioners can encourage older patients to lose weight to not only lower their cancer risk, but also to experience tangible benefits like improvement in comorbidities like diabetes, osteoarthritis, cardiovascular disease and respiratory disease. Weight reduction also improves mobility which will in turn improve quality of life in the autumn years. Community exercise programs can be a means of socialising and increasing community involvement. There are numerous guides to physical activity in older adults created by the Australian government which detail simple exercise routines\textsuperscript{24}.

A high fibre diet low in meat and fat has been found to be a protective factor for colorectal cancer in some studies, but not in others. Regardless of this, a healthy varied diet is important in prevention of obesity which IS associated to increased risk of and death from
CRC\textsuperscript{22}. Obesity is also implicated in breast, endometrial and oesophageal cancer amongst others\textsuperscript{23}. Dietary guidelines specifically for older Australians are available, such as the NHMRC’s ‘A practical guide to the Dietary Guidelines for Older Australians’\textsuperscript{25}.

General practitioners also play an integral role in screening. Current recommendations for the asymptomatic, average risk population include screening mammograms every 2 years for women aged 50 - 69 for breast cancer and FOBT every 2 years for adults aged 50 - 75 for CRC. These screening tests have significantly contributed to better outcomes through earlier detection\textsuperscript{21}. It is the role of the GP to determine through family history and other factors, which patients are at increased risk and need more rigorous screening. Proportional representation of older adults in clinical trials will assist in developing standardised guidelines for screening of common cancers in older Australians.

**CONCLUSION**

Cancer is closely associated with ageing. The key challenge Australia faces moving forwards is data collection to enable us to make informed decisions regarding care in an age group with highly specific needs. The design of clinical trials needs to consider the different functional status and comorbidities in the >65 year old age group in order to develop standardised guidelines for cancer control which will consider patients in terms of both their physiological age and chronological age. Timely and appropriate information provision remains important both in terms of early cancer detection and increasing patient involvement in decisions regarding their care. Furthermore, as we strive to achieve higher quality cancer care, clinicians must remember to consider bio-psycho-social factors and the impact of proposed treatment on the quality of life of older cancer patients. Early initiation of supportive measures and EOLC planning is essential. As Australia’s population ages and the incidence of cancer rises, this disease of the elderly will hopefully become increasingly preventable and manageable.
REFERENCES


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