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Changes in the prevalence of comorbidity in the Australian population with cancer, 2007–2014

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ABSTRACT

Background: Coexistence of multiple chronic diseases is highly prevalent among the cancer population. This study aims to assess changes in the prevalence of chronic conditions among the population with cancer compared to the Australian general population between 2007 and 2014.

Methods: Data from three successive National Health Surveys conducted by the Australian Bureau of Statistics between 2007 and 2014 were utilized. Comparisons were made between the samples of the Australian population aged 25 years and above with a history of cancer and those respondents who did not report having had a cancer using logistics regression models.

Results: People with a history of cancer had significantly higher odds of reporting non-infectious comorbidity compared to the non-cancer groups across the three surveys. There were no significant changes in the prevalence of diseases affecting circulatory, musculoskeletal, digestive, nervous system, blood and blood forming organs, eye, skin and infectious and parasitic diseases over time among the population with cancer. The prevalence of mental and behavioural problems, endocrine, nutritional and metabolic diseases, and diseases of respiratory and genitourinary system has increased over time among the cancer survivors.

Conclusion: Comorbidity is more prevalent among the cancer population than the general population without cancer. The prevalence of comorbidity was fairly stable for most but not all comorbidities in the population with cancer over the eight-year study period. Further studies on the impacts of coordinated care models for the management of multi-morbidity experienced by cancer survivors that align with the 'National Strategic Framework for Chronic Conditions' are needed.

1. Introduction

There are approximately one million Australians alive today who have been diagnosed with cancer in the previous 31 years [1]. The five-year relative survival from all cancers combined improved from 48% to 68% between 1984–1988 and 2009–2013. These figures indicate that a greater number of Australians are now living with and beyond cancer than in the past, and that more people live with cancer as a chronic disease. Old age, tobacco use, obesity, physical inactivity, poor diet choice and excessive alcohol use are the common risks factors for the development of cancer as well as many other chronic diseases [2,3]. Coexistence of multiple chronic diseases is highly prevalent among the population with cancer and has been shown to account for a significant financial burden on the healthcare system [4,5]. Despite growing recognition of the significant impact of comorbidities among the population with cancer, there are limited data on comorbidities available in the Australian setting [6].

The Australian National Health Surveys (NHS) are designed to collect a range of health-related information as part of the monitoring of national health trends over time [7]. The information from these surveys provide a unique data source to assess the prevalence of comorbidities as it allows the common lifestyle risk factors shared between cancer and chronic diseases to be accounted for in the data analysis. Using 2011–2012 NHS, the largest health survey ever conducted in Australia, we have previously shown that comorbidity and poor health is more prevalent among the population with cancer than the non-cancer population [8]. However, there is limited comparative information on the changes in the prevalence of comorbid conditions over time. It is critical to examine the excess burden of chronic diseases experienced by cancer survivors over time to enable the development of models of care that align with the 'National Strategic Framework for Chronic Conditions'[9], an overarching policy for the prevention and

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management of multiple chronic diseases in Australia.

The objective of this study was to assess changes in the prevalence of comorbid conditions among the Australian population with cancer between 2007 and 2014 using data from three successive Australian NHS. We also compared the prevalence of chronic diseases between the population with cancer and the general population without cancer.

2. Methods

2.1. Data source

Data collected by the Australian Bureau of Statistics (ABS) from three successive NHS in 2007–08, 2011–12 and 2014–15, were utilised in this study. The data come from three independent samples. The surveys were conducted using a stratified multistage area sample of private dwellings and recorded a range of health-related information including health conditions, health risk factors, health status, health-related actions, demographic and socio-economic characteristics. The overall response rates (fully responding households after sample loss) were 91%, 85% and 82% for NHS 2007–08, 2011–12 and 2014–15 respectively, and the details have been described elsewhere [7,10,11]. The basic Confidentialised Unit Record Files (CURF) were used for the data extraction [12].

We analysed responses from participants aged 25 years and above. This age range was selected according to the predefined age groups across the three surveys to allow the separate data files to be merged for comparison. Participants were asked "Have you ever been told by a doctor or a nurse that you have any type of cancer?". For those who reported having had a cancer, they were asked the following question "Including cancer which is in remission, do you currently have cancer?". The responses from these two questions were used to derive the cancer status as "ever told has condition, still current and long term", "ever told has condition, not current" and "not known or not ever told, but condition current and long term" as recorded in the NHS. It must be noted that for the purposes of the NHS, all cancer reported as current was considered as a long term condition as described on the ABS website [13].

Cancer is classified as a chronic disease in the national health reports published by the Australian Institute of Health and Welfare (an Australian Government's agency which provides information and statistics on the health and welfare of the nation) [14,15]. "People living with cancer" or also known as cancer prevalence or survivorship population, refers to number of living people who have had a cancer diagnosis. Some of these people may have cancer diagnosed some time ago and that cancer may have been cured, while others may have cancer diagnosed more recently. Respondents who reported having a history of either malignant neoplasms (skin) and/or malignant neoplasms (other sites or site unknown), were classified in the overall cancer group in our study. We have included all the cancer cases and cancer status reported in the NHS to reflect the characteristics of cancer survivorship.

All other respondents who did not report having had a cancer were classified in the non-cancer control group. The socio-demographic characteristics including sex, age, country of birth, education level, geographical location, equivalised income of household, and common lifestyle risk factors including body mass index, smoker status, dietary intake (if met the fruit and vegetable consumption guideline), frequency of alcohol consumption in the last 12 months and physical activity for fitness, recreation or sport in the last week, were extracted for analysis.

2.2. Assessment of chronic conditions

The ABS list of health conditions classified in disease groupings covers the more common types of long-term conditions experienced in the Australian community. Participants were asked "I would like to ask you about any other long term health conditions that have lasted, or are expected to last, for 6 months or more". It must be noted that only selected types of health conditions (i.e. asthma, cancer, diabetes, heart or circulatory conditions, osteoporosis) where participants were asked this question specifically "Have you ever been told by a doctor or nurse that you have that condition?; hence, the status was being recorded as "ever told has condition" or "not known or not ever told" for those conditions. However, this question was not asked for other health conditions and the condition status was only being reported as "not known or not ever told".

We restricted the analysis of health conditions to condition status being recorded as "ever told has condition, still current and long term" and "not known or not ever told, but condition current and long term", as we were interested in long term chronic diseases. A decision was made to include "not known or not ever told, but condition current and long term", given the nature of the responses for condition status being captured differently in the dataset as described above. Health conditions with condition status being recorded as "ever told has condition, still current but not long term" or "ever told has condition, not current" or "condition current, but not known or not ever told, and not long term" were excluded.

Twelve disease groupings were included: (i) mental and behavioural problems; (ii) diseases of circulatory system; (iii) diseases of musculoskeletal system and connective tissue; (iv) endocrine, nutritional and metabolic diseases; (v) diseases of respiratory system; (vi) diseases of digestive system; (vii) diseases of genitourinary system; (viii) diseases of nervous system; (ix) diseases of blood and blood forming organs; (x) diseases of eye and adnexa; (xi) diseases of skin and subcutaneous tissue; and (xii) certain infectious and parasitic diseases (Table S1). We calculated the number of health conditions for each respondent based on the number of disease groupings. If the respondent had multiple conditions falling under the same disease grouping, it was counted once only, as we are interested in the prevalence of health condition by disease groupings according to the organ system.

2.3. Statistical analysis

The sample counts by age and sex for each survey were published elsewhere by the ABS [16–18].We assigned a weight to each respondent using the 2006 census Australian population (by sex and 5-year age groups) as the standard population as a way of allowing comparisons between three populations from the NHS. The weights assigned were accounted for in the analysis of chronic conditions prevalence over time. Time trends in the chronic condition prevalence were assessed using Cochran-Armitage trend tests.

Logistic regression models were computed for the comparisons between cancer and non-cancer groups with the estimates expressed as odd ratios with 95% confidence intervals (CI). We adjusted for age, sex, selected sociodemographic and lifestyle risk factors in the logistic regression models, with the non-cancer group used as the reference class. Separate logistic regression models were computed for each survey (2007–08, 2011–12 and 2014–15) and the combination of three surveys where the year of survey was adjusted as the covariate. All statistical analyses were performed using SAS software version 9.4 (SAS Institute Inc., Cary, NC).

3. Results

3.1. Characteristics of the study population

A total of 13,824, 13,581 and 12,809 respondents aged 25 years and over from NHS 2007–08, 2011–12 and 2014–15 respectively, were included in our analysis (Table 1). Among these respondents, 2110, 2097 and 1622 were identified as having a history of cancer respectively. It is noted that the five-year relative survival from all cancers combined improved and we may expect a higher number of cancer