

FORECASTING THE FUTURE CANCER POPULATION IN THE UK

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Background

Previous work suggested that there were two million people living with cancer in the UK in 2010, projected to increase to four million by 2030 and five million by 2040.¹

We aim to review and update this estimate, using the latest outputs from the Macmillan–National Cancer Registration and Analysis Service (NCRAS) UK Cancer Prevalence Project,² the most recently available public data, and clinical advice, to build a model of total cancer prevalence for the UK up to 2040.

Methods

Year-on-year cancer prevalence will be calculated for the four most commonly diagnosed cancers – breast (female), prostate, colorectal and lung – using aggregate and publicly available incidence and mortality figures for England, Wales, Scotland and N. Ireland sourced from each nation.³

Inputs are by age group, sex, nation, cancer site and stage. They include: historical incidence, survival, mortality (cancer and background), as well as underlying population.⁴

Examination of the historical trends, a literature review and discussions with site-specific clinicians and cancer registry experts were carried out to define an agreed set of assumptions and data inputs to be used in the model. Assumptions around changing diagnosis rates, patterns of stage and survival are applied to each year.

Results

Here we describe some of the key inputs and trends, and summarise the scenarios developed for each cancer site, which will be used to generate the model outputs.

The input data used in each nation will vary depending on availability of the data and trends but, where possible, we will use nation-specific data or assumptions agreed with

experts for each nation. Not all the data from the individual nations can be described here. Details can be made available on request.

Breast cancer

The incidence rates for breast cancer have seen a steady increase for all nations over the past 20 years. (Figure 1).³

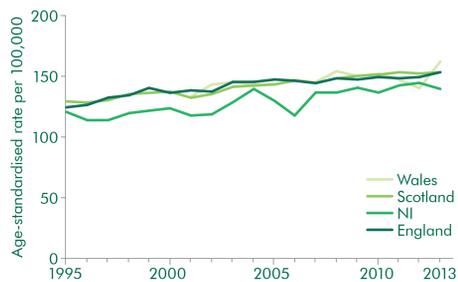


Figure 1: Incidence rate of female breast cancer by nation, 1995-2013

Survival rates across the UK have seen great improvement.^{5,6,7} In England and Wales, more than three-quarters of women diagnosed with breast cancer are now expected to survive for at least 10 years (Figure 2).⁵

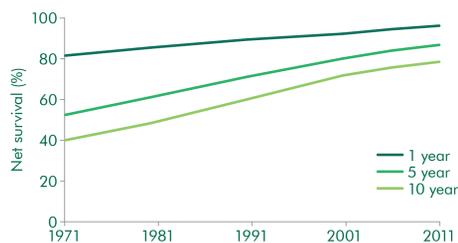


Figure 2: Survival trends for female breast cancer (England and Wales), 1971 - 2011

In England, 71% of all breast cancers were diagnosed at Stage 1 or 2 in 2013, which has the best survival outcomes.⁸ Similar stage mixes are seen in each nation – in Wales 68%⁹ of all cases are diagnosed Stage 1 or 2, Scotland 83%¹⁰, and in N. Ireland 71%.¹¹

Baseline scenario

Current trends of screening uptake will continue and will expand to the 47–49 and 71–73 age groups within 20 years. Survival will improve due to an earlier stage mix combined with more effective treatments. Improvement in survival will be most apparent for older patients and those diagnosed at Stage 4.

Improvement scenario

As for the baseline scenario, plus increasing awareness of breast cancer and requests for screening in the over-70s. There will be increased detection of early stage tumours in the 70–80 age group. Survival improvements are stronger than for the baseline scenario due to an even earlier stage mix.

Colorectal cancer

The incidence rates for colorectal cancer have not followed any clear trend over the past 20 years. (Figure 3).³

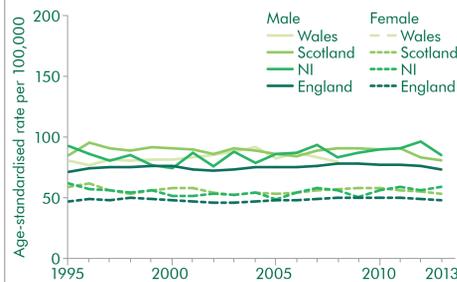


Figure 3: Incidence rate of colorectal cancer by sex and nation, 1995-2013

Survival rates in England and Wales have seen a gradual increase since 1971, with five-year and 10-year survival rates closely matched (Figure 4).⁵ Trends in the other nations for the last 20 years suggest a similar pattern.^{6,7}

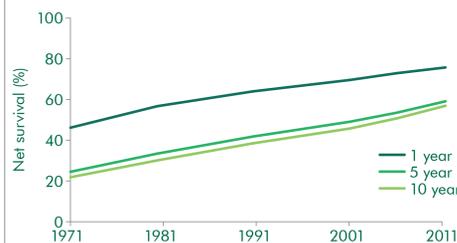


Figure 4: Survival trends for colorectal cancer (England and Wales), 1971 - 2011

In England, 22% of all colorectal cancers in 2013 were at Duke's Stage D, which has the poorest survival outcomes.⁸ Similar stage mixes are seen in each nation – in Wales 18% of all cases are diagnosed at Stage 4,⁹ in Scotland 23%¹⁰, and in N. Ireland 20%.¹¹

Baseline scenario

Introduction of screening will affect the stage mix of incidence among the older age group, and will improve overall survival. The age-specific historical incidence rates trends continue. Screening improves the stage at diagnosis mix for 60–74 year olds and increases the proportion of people diagnosed at Duke's Stages A and B.

Improvement scenario

Introduction, and better uptake, of screening will affect the stage mix and overall survival. Incidence will fall over time due to greater polyp detection and removal of pre-cancerous cells. Screening improved stage at diagnosis mix will be seen for the over 60s. Bowel screening for men in their 50s reduces incidence rates for the 50–60 age group. Survival continues to increase at a slightly higher rate than the baseline.

Lung cancer

Over the past 20 years, there have been different trends of incidence for men and women, with rates for women increasing (Figure 5).³

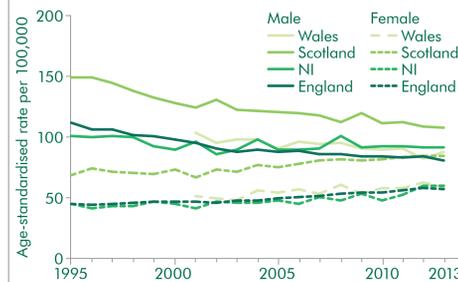


Figure 5: Incidence rate of lung cancer by sex and nation, 1995-2013

One-year survival rates in England and Wales have improved considerably yet survival for five years or more remains poor (Figure 6).⁵ Scotland and N. Ireland have also seen similar improvements over the past 20 years although five and ten year survival also remains poor.^{6,7}

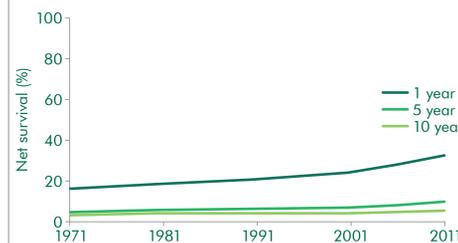


Figure 6: Survival trends for lung cancer (England and Wales), 1971 - 2011

For England, 47% of patients were diagnosed at Stage 4 with less than 15% of patients surviving more than one year⁸ (similar survival at Stage 4 is seen for Wales¹² and N. Ireland¹³). Other nations have a similar stage mix – in Wales 42%⁹ of cases were diagnosed at Stage 4; in Scotland 48%¹⁰; and N. Ireland 42%¹¹.

Baseline scenario

Incidence rates will evolve due to falls in smoking rates and introduction of CT screening, with the female trend beginning to plateau in the medium term and the male rate continuing to decline. Improved stage recording and the introduction of risk-stratified CT screening increase stage at diagnosis. Survival rates are expected to converge to rates similar to comparable nations outside the UK.¹⁴

Improvement scenario

Like the baseline scenario, incidence rates will evolve due to falls in smoking rates, but here the female trend begins to plateau in the short term. National stage at diagnosis mix will increase. Stronger improved access to treatment and increased treatment efficacy cause survival to more quickly converge with the ICBP best performers¹⁴ in the short term.

Prostate cancer

Since 1995, the incidence rate for prostate cancer has seen a steady increase. This is particularly apparent from the early 2000s due to PSA testing. (Figure 7).³

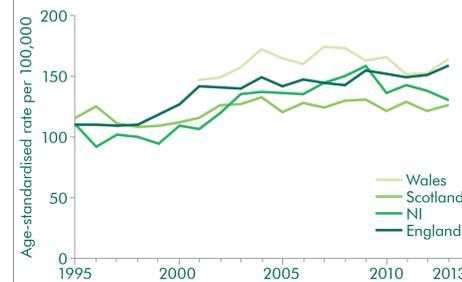


Figure 7: Incidence rate of prostate cancer, 1995-2013

Over the past 40 years, survival rates have continued to improve steadily. In England and Wales, five-year and 10-year survival rates have converged to close the gap on one-year survival (Figure 8).⁵ Survival in Scotland and N. Ireland have also seen similar improvement over the past 20 years.^{6,7}

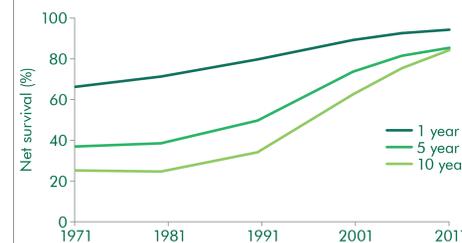


Figure 8: Survival trends for prostate cancer (England and Wales), 1971 - 2011

In England, Wales and N. Ireland, around half of all prostate cancer cases (48% in England, 47% in N. Ireland, and 45% in Wales) were at Stage 1 or Stage 2^{8,9,11} which have the best survival outcomes.⁸

Baseline scenario

Continued incremental uptake of PSA testing in men aged 50 and over, combined with population growth, will see an increase in incidence rates, which will stabilise over the long term. Survival will improve gradually due to more aggressive treatment, most notably for older patients and those at Stage 4.

Improvement scenario

Increased uptake of PSA testing, combined with STHLM3 risk stratification¹⁵ and population growth results in increased incidence but lower recording of non-clinically significant 'low risk' disease. Survival will improve strongly due to more aggressive treatment, with the majority of survival improvement for older and Stage 4 patients.

Conclusions

In addition to the baseline and improvement scenarios identified for each cancer, a 'no improvement' scenario – applicable to all cancer types – to allow for comparisons between other scenarios and a 'no change' future. We also include an 'other cancers' group in the model, in order to be able to forecast for all cancers (excluding non-melanoma skin cancer).

Historical incidence and survival rates, and a changing stage at diagnosis mix, are – along with underlying population changes – likely to be the biggest determinants in forecasting a future cancer population. By working closely with a range of cancer site-specific clinical experts, we have ensured that clinical insight has been combined with assessment of historical trends to draw up three scenarios for the future.

This research will allow us to update previous research and to understand how the cancer population may change over time according to likely scenarios and changing factors. This is essential to support the planning and development of new cancer services for the future as the cancer population continues to change.

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