Deprivation and Survival from Prostate Cancer in Scotland

February 2017

Introduction

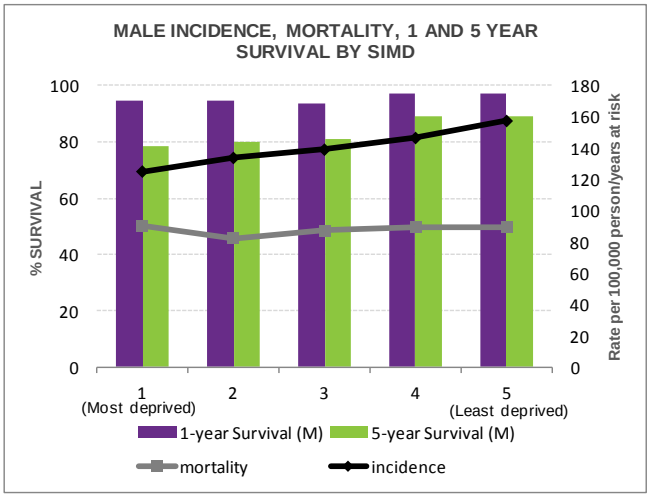
Addressing health inequalities is a priority across Scotland's health and social care agenda. The impact of deprivation on people's survival of cancer is complex. This can make it difficult to understand the relationships between socio-economic factors and how they relate to patient and tumour characteristics at the time of diagnosis.

The Scottish Cancer Pathways partnership between Macmillan Cancer Support and NHS Scotland's Information Services Division (ISD) investigated the relationship between net survival and deprivation in the twenty most common cancers in Scotland. Cancer types were identified for further investigation due to significant variation in survival between people living in the most deprived areas (Scottish Index of Multiple Deprivation (SIMD) 1) and those living in the least deprived areas (SIMD 5)[1].

Prostate cancer is defined by the ICD-10 code C61, and is the most commonly diagnosed cancer in men. It accounts for 21% of all cancers[2] diagnosed in men.

Based on current rates of disease, an estimated **1 in 10 men** develop prostate cancer during their lifetime. Of these, approximately **1 in 7** (15%) are from the most deprived quintile (20% of the population).

Results



Survival for those diagnosed in 2004-2008 followed up to 2013, Incidence: combined period 2010-2014; mortality: 2011-2015. Macmillan Cancer Support and ISD, NHS Scotland: February 2017.

The chart, left, shows rates of prostate cancer by deprivation quintile. It includes bars for 1-year survival (purple) and 5-year survival (green), with lines for incidence (black) and mortality (grey) overlaid.

The chart demonstrates the trends in the relationship between survival, incidence, mortality, and deprivation. Incidence decreases with levels of deprivation but mortality does not appear to vary by deprivation.

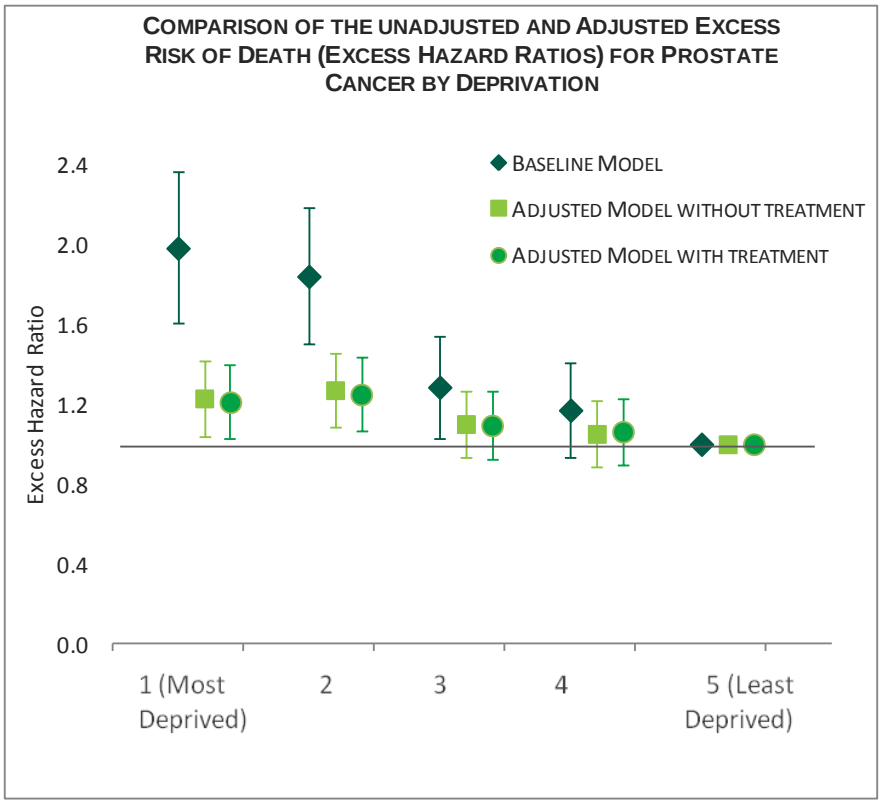
Looking at net survival[5], **95%** of men from the most deprived group are estimated to be alive one year after diagnosis compared with **97%** in the least deprived group (a difference of 2%). At five years, this difference in net survival increases to 10% (**79% in the most deprived group vs 89% in the least deprived group**).

By fitting a baseline model[6], we can say that the excess risk of death[7] from prostate cancer in the most deprived group is **98%** higher than those in the least deprived group. The model indicates that, at best, the difference in excess mortality between the most and least deprived is 60%, and at worst, it could be as much as 136% (confidence interval (CI) is 1.60 – 2.36[8]).

To explore why the most deprived group had a higher rate of death from prostate cancer, other factors such as patient characteristics, tumour and health service factors were added to this model[9]. The addition of these factors, including age, co-morbidities and Gleason score (a way to describe how aggressive a prostate cancer tumour is, and how likely it is to spread) did little to explain the higher risk of death independently. When metastases at four months is added to the model, the excess risk of death is greatly reduced.

When treatments (Surgery – Yes/No, Radiotherapy –Yes/No and Hormonal therapy – Yes/No) are added to the model to determine their impact on survival, surgery and hormonal therapy have the greatest effect of the treatments on reducing the excess risk of death between the most and least deprived.

The final model (adjusted model with treatment) in the chart below includes all the factors added during this analysis, and shows an excess risk of death of **1.21** (CI 1.02 - 1.40) which is still statistically significant. This suggests that the excess risk of death from prostate cancer is **21% higher in the most deprived** compared to the least deprived, and therefore the deprivation gap is not explained completely by the included factors.



Macmillan Cancer Support and ISD, NHS Scotland: February 2017

Implications and next steps

In the baseline model (with no explanatory factors added), those living in the most deprived areas were found to have a 98% higher risk of death from prostate cancer than those in the least deprived areas. Metastatic disease within four months of diagnosis seemed to explain some of the deprivation-associated survival gap in prostate cancer, and this might be amenable to early diagnosis initiatives.

However, further analysis showed that even when all potential explanatory factors (see the Methods brief for further details) were added to the model, there remained some variation across the deprivation groups in survival from prostate cancer.

The remaining unexplained variation is likely to be due to factors not accounted for in the model (such as full staging information and smoking status), measurement error, and a range of other issues, such as differing expectations of health services and support. To further reduce health inequalities, we need to better understand the factors at play not included in this model and their impact on survival.

Further work across health and social care partners is warranted to:

- achieve earlier diagnosis, where possible
- investigate other factors, such as smoking, that may contribute to the gap in survival between the least and most deprived
- widen the reach and action on public health messages

Through partnership-working and engagement, evidence-based action can help to influence policies that reduce health inequalities and improve equity and access of services and support for people living with cancer.

Notes

[1] Scottish Index of Multiple Deprivation 2009.

[2] In calculating all cancers in Scotland, non-melanoma skin cancer has been excluded.

[3] Linear test for trend (Poisson regression) for both incidence and mortality rates by deprivation – source ISD website (http://www.isdscotland.org/Health-Topics/Cancer/Cancer-Statistics/Male-Genital-Organs/#prostate).

[4] Incidence and mortality rates presented are age-standardised.

[5] Considered as a person's survival from the cancer of interest (eg prostate cancer) after adjustment for other causes of death. This is age-standardised to allow comparisons across different populations which may have differing population structures

[6] A baseline model compares the excess risk of death by deprivation groups only with no other factors included. The adjusted model has the other factors added in (as detailed in the table) so the effects of these other factors can be compared relative to the baseline. For more details about the models, please consult the Methods and Technical Reports links to be included).

[7] Excess risk of death (excess mortality) is a way of measuring how many deaths are caused by a specific disease within a given population. It shows the number of extra deaths which occurred over and above the number that would be predicted in the absence of that disease.

[8] A Confidence Interval (CI) gives an indication of the amount of variability around the estimate. The wider the CI, the less robust the estimate. On the risk of death chart shown above, if the CI lines cross the horizontal line at 1.0 then this suggests that the result is not statistically significant in comparison with the

least deprived group.

[9] For more details, please consult the Methods Brief and Full Technical Report.

To access the Technical Report and other cancer site and Methods briefs, please follow this link: http://www.macmillan.org.uk/about-us/what-we-do/evidence/research-funding/our-partnerships/information-services-division-scotland.html#271894

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