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CANCER RESEARCH UK

Major resections by cancer site, in England; 2006 to 2010

National Cancer Intelligence Network short report

Produced in partnership with Cancer Research UK

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Cancer survival in the UK is lower than in many comparable countries. This difference may be caused by a number of factors, including later diagnosis and less access to optimal treatment. Although surgery can be used in combination with radiotherapy and/or chemotherapy, experts believe that it is responsible for around half of the cases where cancer is cured, making it the most effective form of treatment.

Key messages

- Most cancer sites had statistically significantly fewer major resections in the older age groups, compared with younger patients
- Kidney, breast and ovary had the biggest difference between the youngest (15-54) and oldest (85+) age groups

This report examines the variation in this key cancer treatment: it presents major surgical resections for 20 sites by sex and age-groups, using the most recently available data* in England.

Methods and references are contained in the appendix at the end of this report. Further details, alongside a glossary of statistical terms, as well as the lists of cancer sites and major resection procedures and codes, are available in the accompanying workbook. It should though be noted that the results here are not comparable to previous reports[1,2] as a different methodology was used.

Findings

Major resections varied with age. Overall, fewer patients in the older age-groups (75-84 and 85+) underwent surgery, compared to the younger ages, for both sexes.

* This report is based on 2006-2010 cancer registrations linked to hospital episode statistics (HES) data from the Health and Social Care Information Centre (HSCIC). At publication, linked HES data for more recent registrations, beyond 2010, had not yet been released by the HSCIC. Should more recent HES data become available, a more detailed and up-to-date analysis of surgical resections, including by stage, will be feasible.

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Breast cancer had the highest number of resections, with over two-thirds of both male and female patients undergoing surgery, all age-groups combined. This was followed by cancer of the colorectum, oral cavity, kidney (including unspecified urinary sites) and salivary glands, which had all-age resection rates of over 50% for both sexes. More than half of female patients, all ages combined, also underwent uterine (81%), vulval (71%) and ovarian (59%) resections. Fewer than 10% of male and female lung cancer patients, as well as those with cancer of the pancreas and liver, were treated with surgery, all ages combined. Figure 1 shows the percentage of resections by age-group, site and sex.

For one of the 15 male cancer sites (6.7%) and three of the 19 female sites (15.8%), the overall variation in resections between age-groups was not statistically significant: larynx in both males and females, and hypopharynx and vagina for females only. These sites are shown as dotted lines in Figure 1 and have been left out of Figure 2 and 3.

The difference in resection percentages between the youngest age group (15-54) and the oldest age group (85+), as shown in Figure 2 and Figure 3, varies by cancer site:

- the majority of cancer sites, with a significant variation between the age-groups, saw a statistically significant decrease in resections between the youngest and oldest age-groups (15-54 to 85+). Only in male hypopharynx and female oropharynx was the difference between these two age groups not significant
- kidney cancer showed the biggest fall in percentages for male and second largest fall for female patients aged 85+: whereas 72% of male and 78% of female 15-54 year-olds underwent a resection, this reduced to 13% in the oldest group, for both sexes.
- breast cancer resections had the third largest decrease in females and second largest decrease in males: over 82% of female 15-54 year-olds received a surgical resection, compared to less than 25% in the over-85 age group; in males resections dropped from 71% to 37%. For females and males combined (persons), breast cancer decreased by over 57%, between the youngest and oldest; the second largest reduction after kidney cancer
- the percentage of lung cancer resections for male and female patients aged 85+ was less than 1%, and less than 7% in the 75-84 age group. Low numbers of lung cancer resections overall meant the difference between the youngest and oldest age groups was small, at 12% lower in older males and 17% lower in older females. Only liver cancer had a smaller difference between the youngest and oldest groups

- the percentage of resections in ovarian cancer patients aged 15-54 was more than five times higher than those aged 85+, dropping from nearly 81% to 15%; this was the largest decrease between these age-groups for females.
- less than 0.2% of prostate cancer patients aged 75 and over underwent surgery; for those aged 65-74 the percentage was 8%
- differences in colorectal and salivary gland resections between 15-54 year-olds and age-groups 55-64, 65-74 and 75-84 were not statistically significant, for either males or females. Only resection rates of over-85 year-olds were statistically significant lower, compared to the 15-54 age group, for these sites. This also applied to vulval cancer and male breast and stomach cancer
- similarly, the differences in percentages of uterine resections between 15-54 year-olds and those of the 55-64 and 65-74 age groups (which appeared to be higher), were not statistically significant

Discussion

It is important to note that this analysis cannot differentiate between surgery with 'curative' and palliative intent; lower resection percentages in this report cannot be interpreted as a lesser intent to cure patients.

Similarly, there may be good clinical reasons why fewer patients undergo surgery in the older age groups: the risks of such operations, subsequent quality of life, as well as the availability of other cancer treatments, not included in this project, need to be taken into account. This can include:

- comorbidities: older patients have a greater number and range of comorbidities and these can significantly increase the risks associated with surgery and adversely affect outcomes. This is particularly the case for highly invasive resections, such as those for lung, ovarian and upper gastro-intestinal cancers
- clinical reasons: some cancer types (morphologies) are less aggressive in older patients so the risk-benefit assessment of a major resection, including the likely actuarial survival, may result in a decision that surgery would do more harm than good (eg prostate cancer, indolent adenocarcinomas of the lung)
- stage: a lower number of resections can be indicative of fewer patients diagnosed at an early stage; surgery is a less viable option for later stage cancers

Clinical experience also suggests that patient choice may play a part in older patients who may be more reluctant to undergo major surgery. Evidence for this, however, is largely anecdotal and such decisions depend on the nature of the conversations between the surgeon and the patient.

Conclusion

Major resections for most cancer sites remain significantly less common in older age groups compared to younger patients, and the above considerations may not fully explain this variation in surgery by age.

Further analysis is needed to answer some of the underlying uncertainties, particularly for sites with large age-related decreases, such as kidney, breast and ovarian cancers. There is already evidence that for some cancer sites, such as lung[3], resections have become more common in older patients in recent years. Once more up-to-date data become available, similar analyses could be extended to look at resections, including by cancer stage.

Some of the decrease in surgical treatment of older people with cancer may also stem from clinical decisions choosing non-surgical, potentially less hazardous treatment options, such as radical radiotherapy. This issue needs further work as a matter of some priority.

Figure 1

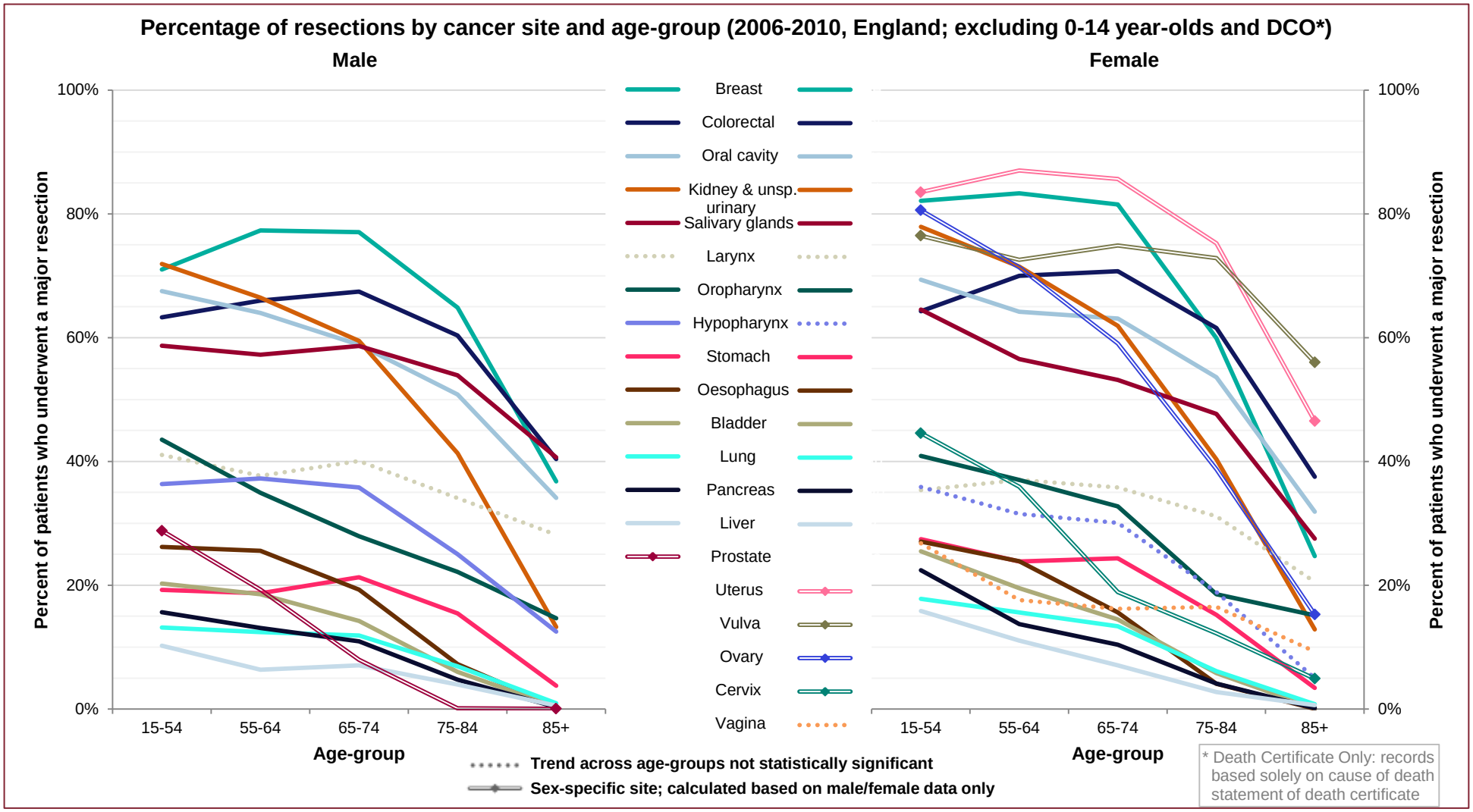

Percentage of resections by cancer site and age-group (2006-2010, England; excluding 0-14 year-olds and DCO*)
Male
Female
Percent of patients who underwent a major resection
100%
80%
60%
40%
20%
0%
15-54
55-64
65-74
75-84
85+
Age-group
Breast
Colorectal
Oral cavity
Kidney & unsp. urinary
Salivary glands
Larynx
Oropharynx
Hypopharynx
Stomach
Oesophagus
Bladder
Lung
Pancreas
Liver
Prostate
Uterus
Vulva
Ovary
Cervix
Vagina
Trend across age-groups not statistically significant
Sex-specific site; calculated based on male/female data only
* Death Certificate Only: records based solely on cause of death statement of death certificate

Figure 2

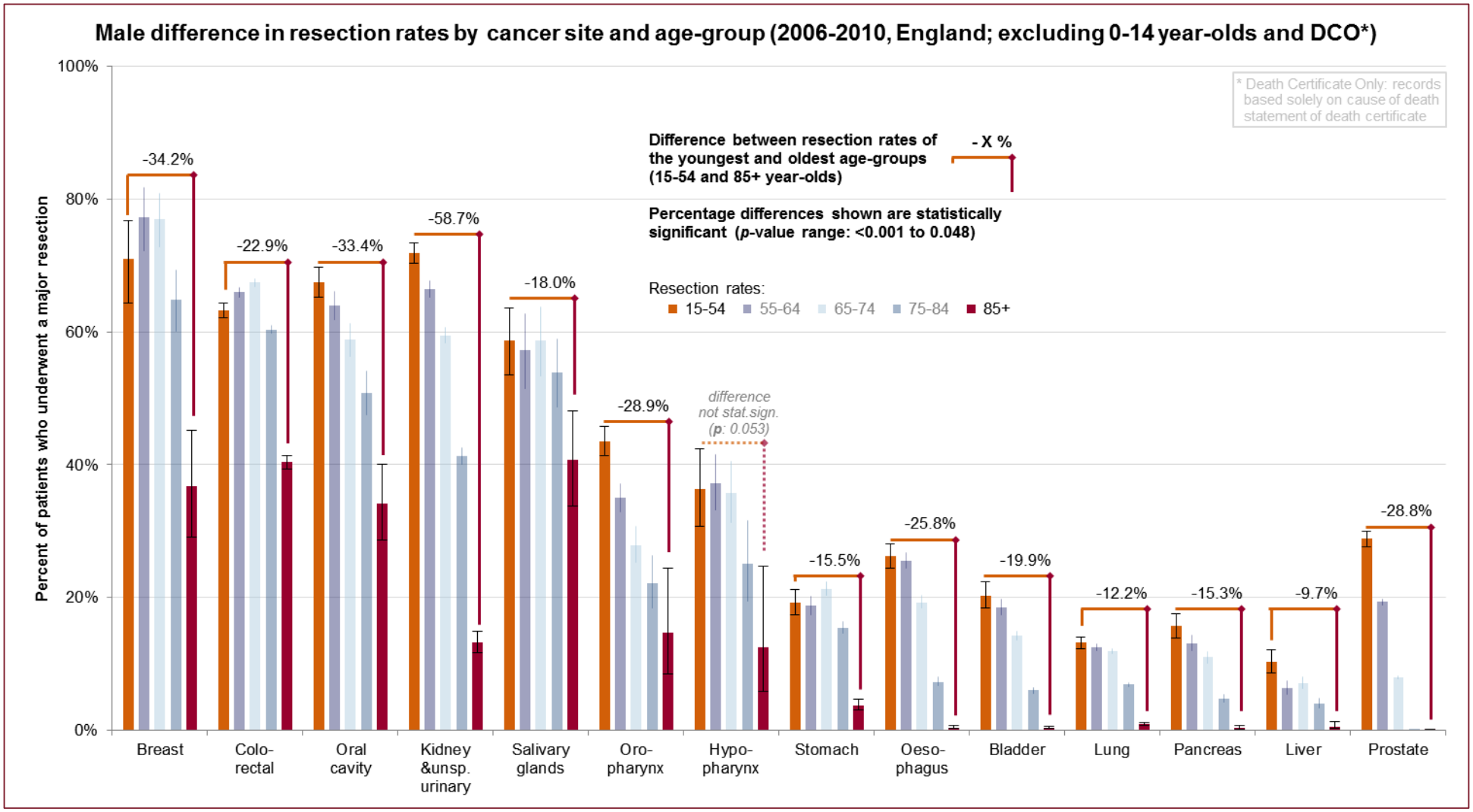
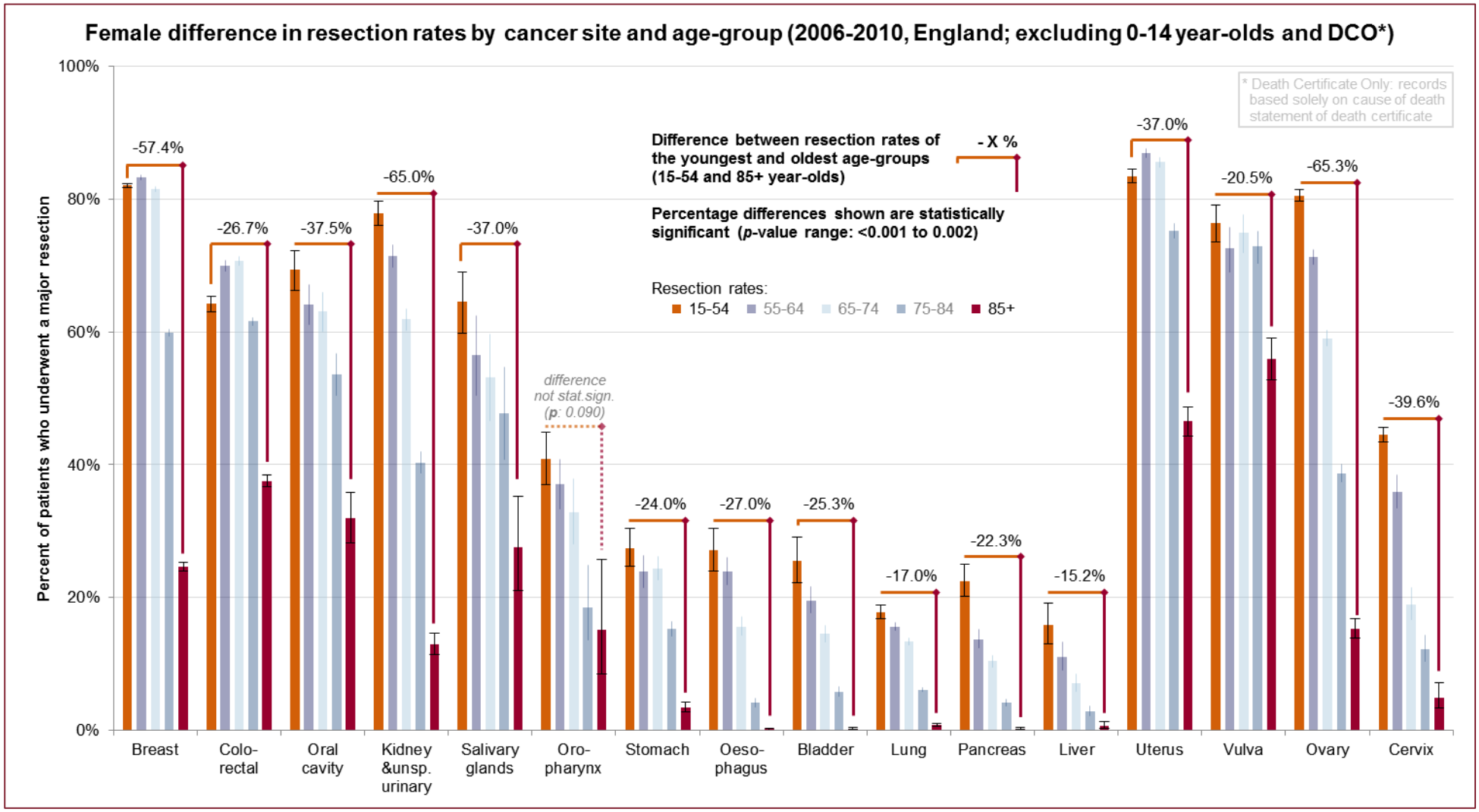

Male difference in resection rates by cancer site and age-group (2006-2010, England; excluding 0-14 year-olds and DCO*)
* Death Certificate Only: records based solely on cause of death statement of death certificate
Difference between resection rates of the youngest and oldest age-groups (15-54 and 85+ year-olds)
- X %
Percentage differences shown are statistically significant (p-value range: <0.001 to 0.048)
Resection rates:
15-54
55-64
65-74
75-84
85+
Percent of patients who underwent a major resection
100%
80%
60%
40%
20%
0%
-34.2%
-22.9%
-33.4%
-58.7%
-18.0%
-28.9%
difference not stat.sign. (p: 0.053)
-15.5%
-25.8%
-19.9%
-12.2%
-15.3%
-9.7%
-28.8%
Breast
Colo-rectal
Oral cavity
Kidney &unsp. urinary
Salivary glands
Oro-pharynx
Hypo-pharynx
Stomach
Oeso-phagus
Bladder
Lung
Pancreas
Liver
Prostate

Figure 3


Female difference in resection rates by cancer site and age-group (2006-2010, England; excluding 0-14 year-olds and DCO*)
* Death Certificate Only: records based solely on cause of death statement of death certificate
Difference between resection rates of the youngest and oldest age-groups (15-54 and 85+ year-olds)
- X %
Percentage differences shown are statistically significant (p-value range: <0.001 to 0.002)
Resection rates:
15-54
55-64
65-74
75-84
85+
Percent of patients who underwent a major resection
100%
80%
60%
40%
20%
0%
-57.4%
-26.7%
-37.5%
-65.0%
-37.0%
difference not stat.sign. (p: 0.090)
-24.0%
-27.0%
-25.3%
-17.0%
-22.3%
-15.2%
-37.0%
-20.5%
-65.3%
-39.6%
Breast
Colo-rectal
Oral cavity
Kidney &unsp. urinary
Salivary glands
Oro-pharynx
Stomach
Oeso-phagus
Bladder
Lung
Pancreas
Liver
Uterus
Vulva
Ovary
Cervix

Appendix: methods, references and notes

Methods

National Cancer Data Repository (NCDR2010) data from 2006 to 2010 was analysed for 20 cancer sites, grouped using ICD10[4] codes. Sites exceeding 1,000 male or female cases over the five-year cohort were included. Major resection procedures (based on OPCS4[5] codes) for cancer sites, for which major surgical removal of the tumour is a viable form of treatment, were agreed with the NCIN Site-Specific Clinical Reference Groups (SSCRGs).

Inpatient Hospital Episode Statistics (HES)[6] data up to 2011 had previously been linked to cancer registrations. To avoid missing out on resections due to date discrepancies between HES and NCDR2010, operation dates up to one month before the date of diagnosis were taken into account for all cancer sites. Cases in the breast and gynaecological† cancer sites, whose pathway can include substantial pre-operative chemo- or radiotherapy, were followed up for 12 months after the date of diagnosis. All other cancer sites were followed up for six months after diagnosis. Consequently, 2010 cases were followed up for procedures up to the end of 2011.

A major resection was considered to be the first match of any agreed OPCS4 procedure code in the HES data. The resection percentage was calculated by dividing the cases with a matched resection in HES data (the numerator), by the total number of cases recorded on NCDR2010 for a given diagnosis, sex and age combination (the denominator). It represents the number of patients who underwent a resection for every 100 patients who might have been eligible for the surgery.

An analysis of variance (ANOVA) with a Bonferroni post-hoc t-test was performed to assess the statistical significance of the variation in resection rates between age-groups (by cancer site and sex).

Children aged 0-14 years were excluded from the analysis as their cancer types for these sites often differ markedly from adult cancers, and can be subject to different and more complex treatments and pathways. Cancer registrations based solely on the cause of death statement of the death certificate were also excluded from the overall sample: death certificate only (DCO) cases were, by definition, not diagnosed prior to death and would thus not have been considered for surgical treatment. Including either group in this analysis would have adversely affected the results by increasing the denominator, thus making resection percentages look unnecessarily low.

† Ovary, uterus, cervix, vagina and vulva

References and notes

[1] *Major surgical resections England, 2004-2006*. National Cancer Intelligence Network (2011). www.ncin.org.uk/view?rid=540

[2] *Major surgical resections in England: head and neck cancers, 2004-2008*. Oxford Cancer Intelligence Unit (2012). www.ncin.org.uk/view?rid=1393

[3] *Recent trends in resection rates among non-small cell lung cancer patients in England*. SP Riaz, KM Linklater, R Page, MD Peake, H Møller, M Lüchtenborg. Thorax, 2012;67(9):811-4. A summary databriefing of this paper is available here: http://www.ncin.org.uk/publications/data_briefings/recent_trends_in_resection_rates__among_non_small_cell_lung_cancer__patients_in_england

[4] *International Statistical Classification of Diseases and Related Health Problems 10th Revision*. World Health Organisation (2010). apps.who.int/classifications/icd10/browse/2010/

[5] *Office of Population Censuses and Surveys Classification of Surgical Operations and Procedures (4th revision)*. Clinical Classifications Service, Health and Social Care Information Centre. systems.hscic.gov.uk/data/clinicalcoding/codingstandards/opcs4/background

[6] Hospital Episode Statistics data for inpatient and day-care admissions, containing procedures and diagnoses coded by NHS trusts in England, are held at the Health and Social Care Information Centre. www.hscic.gov.uk/hes

The linked HES extract consisted of inpatient and daycase episodes containing a malignant or benign/uncertain cancer ICD10 code in the diagnosis string.

This is a CRUK-NCIN Partnership report.

For more information, including other publications, see the partnership page: www.ncin.org.uk/about_ncin/the_cruk_ncin_partnership_improving_outcomes_through_cancer_intelligence

Public Health England's National Cancer Intelligence Network (NCIN) is a UK-wide initiative, working to drive improvements in cancer awareness, prevention, diagnosis and clinical outcomes by improving and using the information collected about cancer patients for analysis, publication and research.

Cancer Research UK is the world's leading cancer charity dedicated to saving lives through research. CRUK has been at the heart of the progress that has already seen survival rates in the UK double in the last forty years. CRUK supports research into all aspects of cancer through the work of over 4,000 scientists, doctors and nurses. For further information on Cancer Research UK visit the CRUK website, www.cruk.org/cancerstats.