NY CRIS

CANCER OUTCOMES MONITORING

CANCER TREATMENT POLICIES & THEIR EFFECTS ON SURVIVAL

Cervix

KEY SITES STUDY 7

CANCER TREATMENT POLICIES & THEIR EFFECTS ON SURVIVAL

Cervix

Report Produced by

NY CRIS *Northern & Yorkshire* Cancer Registry & Information Service

The Leeds Teaching Hospitals NHS Trust

CANCER OUTCOMES MONITORING

in collaboration with the

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Key Sites Study Funded by the NHS R&D Program for Cancer

KEY SITES STUDY

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1	Central Nervous System		*Published 1998*
2	Lung		*Published 1999*
3	Melanoma		*Published 1999*
4	Pancreas	*Gastro-intestinal Cancers*	*Published 2000*
5	Colorectal	*Gastro-intestinal Cancers*	*Published 2000*
6	Breast		*Published 2001*
7	Cervix	*Gynaecological Cancers*	*Published 2002*

PLANNED FUTURE REPORTS

8	Oesophago-Gastric	*Gastro-intestinal Cancers*
9	Ovary	*Gynaecological Cancers*
10	Uterus	*Gynaecological Cancers*

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1 REPORT CONTENTS

2 INTRODUCTION

2.1 FOREWORD

2.1.1. Cervical Cancer

In the UK there are approximately 3,000 new diagnoses of cervical cancer each year, accounting for 2% of all malignancies for women. Cervical cancer is the eleventh most common cancer among women in the UK, although incidence is falling. In 1986 the incidence rate was 15.7 per 100,000 (ONS, 1991); in 1997 this had reduced to 11.0 per 100,000 (ONS, 2001). There are two main histological types of cervical cancer: squamous cell carcinoma which accounts for about 85% to 90% of invasive cervical cancers, and adenocarcinoma which accounts for most of the remainder. About 4.5 million cervical smear tests are performed in England each year and there is evidence that this programme has been responsible for reducing the incidence of invasive cervical cancer (Quinn *et al,* 1999). However, screening is not designed to detect adenocarcinoma; it is designed to detect pre-cancerous changes, the treatment of which prevents the development of cervical cancer. The current recommendations are for sexually active women aged 20 to 64 years (England and Wales) and 20 to 60 years (Scotland) to have a cervical smear every 3 to 5 years. Cervical cancer is often asymptomatic, but the prognosis is markedly affected by the extent of the disease at the time of diagnosis. Evidence indicates that the main cause of cervical cancer is cervical infection with certain types of human papillomavirus (HPV) that are transmitted sexually. It occurs in women of all ages, with most cases in the 35 to 39 year age group, and is more common in those women with an early onset of sexual intercourse, a large number of partners, among lower socio-economic groups and those who smoke.

2.1.2. Key Sites Study

This report contains the results of a retrospective study of population-based data collected by the Northern and Yorkshire Cancer Registry. The aim of this work was to investigate, as far as possible, the degree of variation in the management of patients with cervical cancer in the former Yorkshire Region between the years 1986 and 1994 and to determine the impact of any variation on subsequent survival. The Northern and Yorkshire Cancer Registries integrated in 1997 but only data collected by the former Yorkshire Cancer Registry have been used in this work. The cervical cancer study forms part of a larger project, funded by the NHS R&D programme for cancer, which investigates variation in the management of a number of common cancers managed between 1986 and 1994. Long term follow up (survival up to 5 years from diagnosis) was an important component of the analysis, and retrospective methodologies were essential. However, the results in this report should not necessarily be viewed as a reflection of current practices.

The Calman-Hine report (1995) has recommended a uniformly high standard of management for all patients with cancer, and the establishment of cancer centres and units requires evidence-based decision making, regarding optimal structuring for the provision of cancer services. The results of a study such as this, may provide both a valuable starting point for establishing standards to be achieved in a cancer centre,

and may also provide important evidence in the decision making surrounding the structuring of the provision of cancer services.

At the time of this study there were gynaecologists offering a tertiary referral facility, two of whom would now be classified as gynaecological oncologists, and two who were obstetricians and gynaecologists with a special interest in gynaecological surgery. The facility they offered was essentially that of radical cervical cancer surgery and therefore it was predominantly patients whose disease was amenable to surgery and who had presented at hospitals where such surgical expertise was not available who were referred. Gynaecological oncologists were preferentially treating patients with Stage IB and perhaps Stage IIA disease for whom the outcome is universally good. Higher stage disease was largely being referred direct to radiotherapists for radical radiotherapy, usually without any intervention from gynaecological oncologists. It is possible that the management of Stage IA disease during this time was extremely variable with most gynaecologists treating the disease locally but with some seeking tertiary referral because of their uncertainty of optimal management.

Clearly against this background, gynaecologists with a low workload were predominantly doctors working in district general hospitals who had not been trained in radical cervical cancer surgery. Gynaecologists with a higher workload were predominantly doctors working in the district general hospital who were competent in radical surgery. Gynaecological oncologists were managing all patients referred to them by local general practitioners which included all stages of disease and also patients with relatively early stage disease requiring surgery referred to them by gynaecologists with a low workload.

2.2. EXECUTIVE SUMMARY

2.2.1. Incidence

There were 3110 cases of cervical cancer registered between 1986-94, approximately 346 new cases per year. The age-standardised incidence decreased from 20 per 100,000 population in 1986-88 to about 14 cases in 1992-94. There was an inverse correlation between socio-economic status and incidence. There was considerable overall variation between district of residence, from 30 to 12 cases per 100,000 population.

2.2.2. Study Population

Exclusions

145 patients were excluded from the analysis because management data were routinely absent from certain groups of patients such as those managed privately, by GP, extra-regionally or were registered by death certificate only. There were 2965 cases in the analyses.

Age

Frequency was fairly equally divided among the five 10-year age groups from 30 years of age to 70+, although the 30 to 39 year-old group had the highest frequency in the study sample of 24.7% and the 50 to 59 year-old group had the lowest with 13.7%. The median age for cervical cancer was 49 years varying from 41 to 58 between districts.

Stage

Accurate staging information was available for 59% of cases. However, 8% had Stage IV or metastases at time of presentation and treatment, and a further 14% had Stage III or nodal involvement. This information was used as a proxy for stage in the multivariate analyses.

Histology

97.1% had their disease confirmed histologically. There were 13 different histological diagnoses overall but 86.8% were classed as squamous cell carcinoma in type, and 10.5% as adenocarcinoma.

2.2.3. Management & Treatment

Histological Confirmation Rates

Variation in histological confirmation rates in districts varied from 93.7% to 100%, with an average of 97.1% across Yorkshire.

Treatment

8% of cases had no treatment apart from supportive care. 41% had surgery only, 39% had radiotherapy only, and 12% had radiotherapy and surgery. The percentage of patients receiving surgery decreased with age, from 88% in the 20 to 29 year-old age group to 9.6% in patients over 70 years. There was no variation in treatment by socio-economic group. Districts varied in their surgery rate from 29.8% to 73.0%. Radiotherapy rates varied from 22.2% to 69.6% across districts.

There were some changes in treatment over time. There was a slight increase in patients undergoing surgery. Simple hysterectomies became slightly less common and radical hysterectomies became slightly more common. There was a slight decrease in the use of radiotherapy and also cone biopsies as the only treatment became less common. It may be noted that the study period was a period of transition during which radical surgery for Stage I disease became the norm as opposed to the earlier years where radiotherapy was used virtually as the sole treatment method for cervical cancer.

Specialist Management

97.2% of cases were managed by a gynaecologist and 57.1% were managed by either a medical or a clinical oncologist at some stage. 0.7% of cases were managed by a general surgeon alone, but these cases may have received a gynaecological opinion. 56.2% had input from both a gynaecologist and an oncologist.

Approximately 15% were managed by a specialist gynaecological oncologist. There were only 4 of these specialists in Yorkshire during this period. Only 26.2% of cases were managed by a gynaecologist who treated more than 8 cases a year. This proportion increased from 21.9% in 1986-88 to 34.1% in 1992-94.

Treatment varied between general surgeons and gynaecologists with the patients of surgeons receiving less surgical treatment. More radical hysterectomies were performed by gynaecologists with a higher workload, from 11.5% for those seeing less than 5 to 41.1% for those gynaecologists seeing more than 8 cases per year. Less patients received radiotherapy from gynaecologists with a higher workload.

Hospital workload

Just over a third of patients were managed at low workload hospitals seeing about one or less patients per month. Just over a quarter of patients were managed at higher workload hospitals seeing more than 2.5 new cases per month. Cases treated in hospitals with higher workload had more radical hysterectomies and simple hysterectomies and slightly less radiotherapy.

2.2.4. Referral

There was a range of time intervals between first symptom and first hospital visit in those cases where date of first symptom was recorded (n=1224). 6% of patients noticed symptoms more than 6 months before their first hospital visit, although 50% of cases were seen within 10 weeks of their first symptom. 50% of cases treated by surgery (n=1545) were operated on within 6 weeks of their first hospital visit. In cases who were treated by surgery and then radiotherapy (n=317), 75% of cases received radiotherapy within 8 weeks of operation.

2.2.5. Relative Survival

Relative survival was 84% at one year and 67% at five years. Survival varies with different types of tumour with squamous cell carcinoma having better prognosis than adenocarcinoma and mixed adeno/squamous cell carcinoma. It is usually only patients who prove to be node positive, or who have more extensive disease at surgery than had been recognised when the disease was staged, that are subsequently referred for adjuvant radiotherapy or chemotherapy. Inevitably these patients have a poorer prognosis.

Age

Survival was related to age at diagnosis, with younger patients having a better prognosis than older patients. 95% of patients aged under 40 years are alive after one year compared with 52% of those aged 75 years and over.

Stage

Survival was also related to stage at presentation. Patients who presented with lower stage disease had better prognosis. 99% of Stage I patients were still alive at 1 year, and 90% survived 5 years or more. Comparable figures for Stage IV's were 45% and 22%.

Surgery

Those cases which received no surgical treatment had a median survival of just over two years, with 40% alive at five years. About 98% of cases treated by surgery were alive at one year, and at 5 years more than 80% of those treated with surgery were alive. Survival also varied with type of surgery. Those receiving excision biopsy of a cervical lesion had 98% 5 year survival compared to 80% 5 year survival in those who received radical hysterectomy.

Radiotherapy and Chemotherapy

Cases treated by radiotherapy or chemotherapy in addition to surgery had poorer survival rates than those treated only with surgery. At 5 years 60% of those treated with radiotherapy/chemotherapy were alive compared to 95% of those who had surgery alone.

It is usually only patients who prove to be node positive, or who have more extensive disease at surgery than had been recognised when the disease was staged, that are subsequently referred for adjuvant radiotherapy or chemotherapy. Inevitably these patients have a poorer prognosis.

Hospital Workload

Hospitals treating more than 31 patients a year had a higher rate of survival. At one year this difference was 10%, but at 5 years this increased to 20%.

Gynaecologist

At one year those treated by gynaecologists were four times as likely to be alive compared to those not treated by gynaecologists (80% to 20%). Cases not treated by gynaecologists would include patients with advanced cancer referred directly to a clinical oncologist for radiotherapy. There was 15% difference in survival with

differing gynaecologist workload at one year. At five years this difference increased to 20% with those treating more than 8 cases per year having 80% survival compared to 60% in those treating 1-4 cases per year. When comparisons were made between those recognised as gynaecological oncologists and other gynaecologists, a similar difference was found. This was not surprising as there was a high overlap between high workload and gynaecological oncologists.

It was likely that some of these differences in survival were mainly caused by casemix. That is, stage at presentation was likely to be an important prognostic factor for survival. This was supported by the finding that, of those patients who had staging details recorded, more than 4 times as many presented with Stage III or IV disease to other gynaecologists than to the gynaecological oncologists.

Post-Operative Mortality

0.4% of cases treated by surgery died within 30 days of surgery.

2.2.6. Multivariate Relative Risk Analysis

Relative risk was examined by individual factors, then adjusted for casemix. Risk of death increased with age and stage, even when adjusting for casemix. The casemix factors used were patient age, socio-economic profile, histological type, time period and tumour stage.

Relative risk was lower in the time period 1989 to 1990 compared with 1986 to 1988.

Tumours of mixed or other histological types had increased risk, remaining significant when adjusting for casemix.

Risk of death was highest in those cases who received radiotherapy only, than those treated with surgery and radiotherapy, followed by surgery with no radiotherapy, with excision of lesion without radiotherapy having the lowest risk.

Risk of death decreased significantly with increased hospital workload. However, this difference disappeared when casemix was considered.

There were also significant differences in risk of death between gynaecologists with lower and higher workloads, remaining significant when adjusting for casemix.

2.2.7. Recommendations for Future Work

The analyses showed many variations in management and survival across Yorkshire over this period. It is often difficult to say whether these variations are due to differences in casemix or in management. The continuing improvement in staging data may clarify these issues in later time periods.

This work gives a baseline for observing the changes in treatment patterns and service organisation that arise from the national guidance and from medical progress.

2.3. ACKNOWLEDGEMENTS

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POPULATION DESCRIPTION

3

3.1. ALL CERVICAL CANCERS

3.1.1. New Registrations

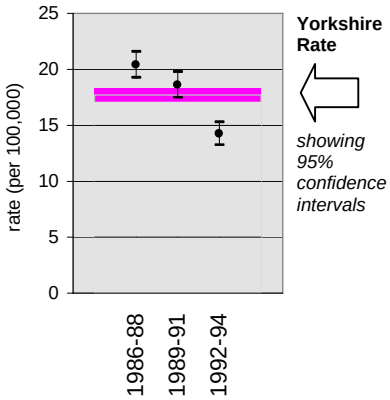
During the study period 1986-94, a total of 3110 patients were registered with invasive and micro-invasive cervical tumours (ICD9 Code 180) in the former Yorkshire region, averaging approximately 346 new cases per annum.

3.1.2. Incidence in Yorkshire Over the Time Period 1986-94

Overall number of cases registered : 3110

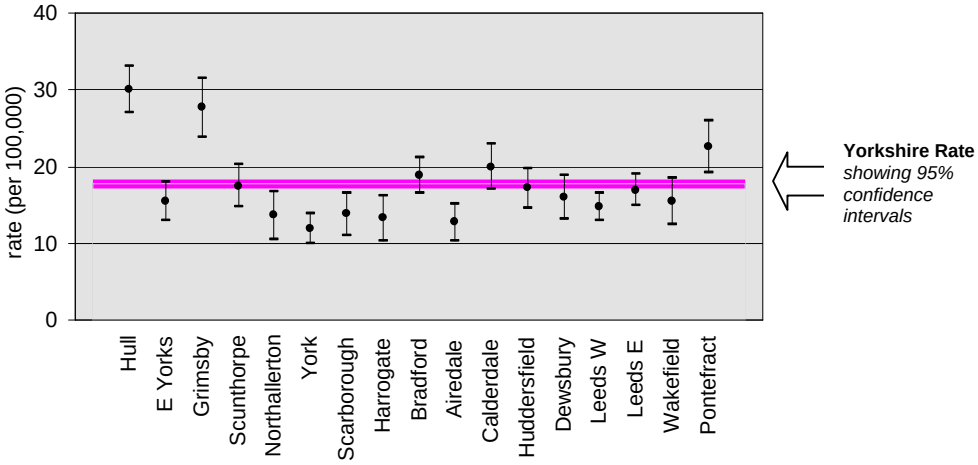
The age standardised incidence rates showed a downward trend across the time period from the Yorkshire mean of 17 per 100,000. The incidence was higher at the beginning (1986-88), averaging 20 per 100,000, than at the end of the study period (1992-4), when the average age standardised incidence rate was 14 per 100,000.

▼ **Age-Standardised Incidence by Time Period**



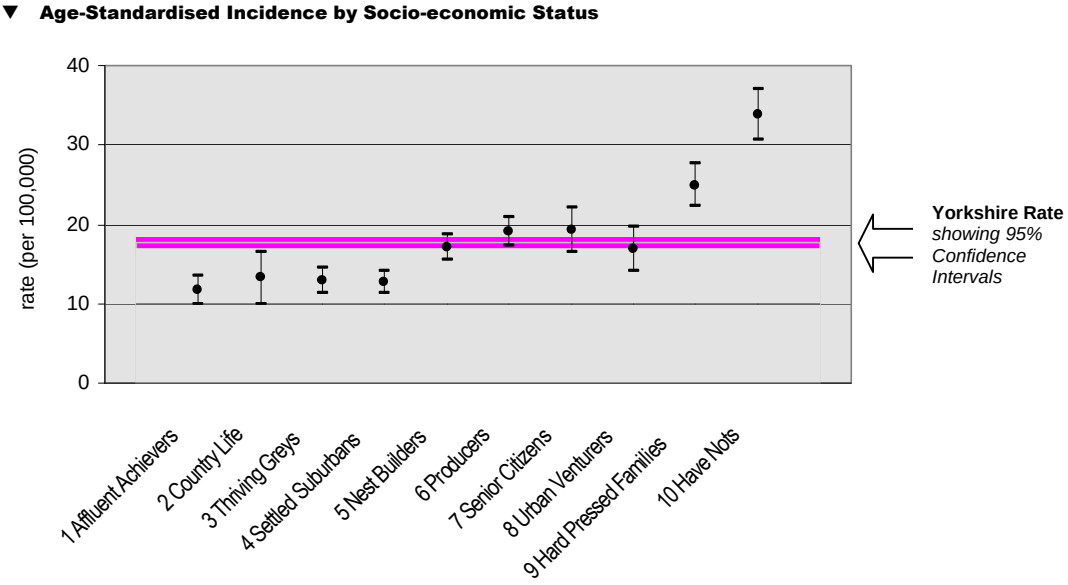
3.1.3. Incidence by District of Residence

▼ **Age-Standardised Incidence by District of Residence**



Overall there appeared to be large variation by district of residence from the Yorkshire mean of 17 per 100,000. The highest cervical cancer rates of 30 and 27 per 100,000 were found in Hull and Grimsby respectively and the lowest of 12 and 13 per 100,000 in York and Airedale respectively. This may be due to differences in definition of cervical cancer, with Hull and Grimsby including micro-invasives within their definition of cervical cancer.

3.1.4. Incidence by Socio-economic Status



Incidence of cervical cancer showed a clear inverse correlation with socio-economic status. The highest incidence rates were found in the most deprived groups (9 and 10), and the lowest incidence rates were found in the more affluent groups (1 to 4). Several studies have shown that cervical cancer predominantly affects women in lower social classes, as defined by levels of income and education (Brinton *et al*, 1987; Fasal *et al*, 1981; Jones *et al*, 1958; West *et al*, 1984). This may partly be explained by the observation that cervical HPV infections appear to be more prevalent in women of lower educational and income levels (Hildesheim *et al*, 1993).

3.2. STUDY POPULATION

3.2.1. Exclusions

A total of 3110 patients were registered with invasive and micro-invasive cervical tumours over the study period 1986-94. However, as one of the primary aims of this study was to assess variation in management, all groups for which management data were known to be absent or incomplete were excluded from the dataset. A total of 145 patients were, therefore, excluded. These included patients managed outside the region, privately treated patients, patients who were mainly managed by their GP or at GP-run hospitals, and death-certificate only (DCO) registrations and patients with rare tumour sub-types. Details of these exclusions are given below.

Extra-Regionally Managed Patients

In districts such as Northallerton, which are on the border of the study region, some patients would have been diagnosed, referred and managed outside the region. These Yorkshire residents would still have their disease registered in Yorkshire and could therefore be included in the analysis of incidence in Section 3.1. However, since the cancer registration staff only extracted management and treatment information from the case notes of Yorkshire hospitals at that time, the management details of these particular patients were not available for study if management was at

a non-Yorkshire hospital. Instead, management was often recorded by the cancer registry simply as "extra-regional". 24.8% of the 145 excluded cases were extra-regionally managed patients.

Private Patients

No management details were available for privately treated patients, and these patients were excluded from the study. 64.8% of the 145 excluded cases were private patients.

GP Managed Patients

A very small proportion of patients may remain solely under the management of their GP or are managed at a GP-run hospital. No further management details were available for these patients and they were therefore excluded from the study.

Death Certificate Only Registrations

These are patients for whom the only information registered was that given on their death certificate. No other details were available for these patients and they were therefore excluded from study. 18.6% of the 145 excluded cases were death certificate only registrations.

▼ **Exclusions**

Exclusion Type	n	Rate
Cases registered by death certificate only (DCO's)	27	***1.0%***
Extra regionally managed	36	***1.2%***
Privately treated	94	***3.2%***
GP managed	5	***0.2%***
GP only	1	***0.0%***
Histological type: small cell	5	***0.2%***
Total Excluded	145	***4.9%***

Total Eligible for study (following exclusions) = 2965

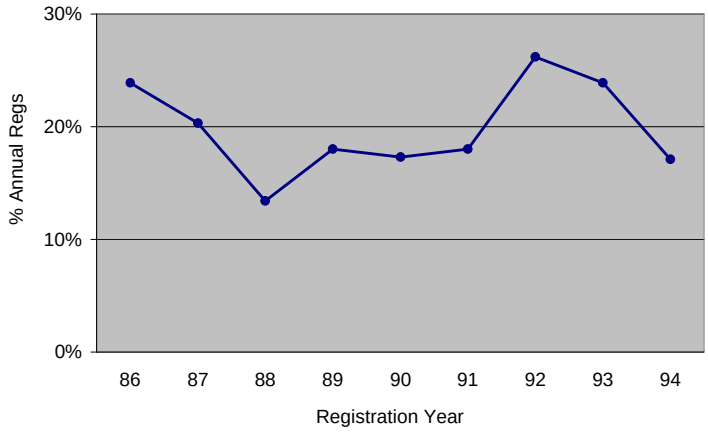
3.2.2. Cervical Cancer Types

▼ **Micro-invasives by District**

District of Residence	n	%
Hull	176	***42.6%***
East Yorkshire	55	***41.0%***
Northallerton	15	***23.8%***
Harrogate	20	***22.5%***
Huddersfield	31	***18.7%***
Grimsby	37	***18.5%***
York	25	***16.6%***
Airedale	18	***16.1%***
Calderdale	25	***15.3%***
Pontefract	26	***14.8%***
Leeds East	38	***13.8%***
Scarborough	12	***12.0%***
Leeds West	30	***11.9%***
Bradford	33	***11.8%***
Dewsbury	13	***10.5%***
Wakefield	10	***9.5%***
Scunthorpe	15	***9.3%***
Yorkshire	**579**	***19.5%***

Micro-invasive carcinoma accounted for 19.5% of the total study population. There was considerable variation in the frequency of micro-invasive carcinomas by district of residence, from 9.3% in Scunthorpe to 42.6% in Hull. The distinction between Stage I and micro-invasive cervical cancer was not made consistently across the districts of residence, and this may account in part for the variation.

▼ **Micro-invasives over Time**



There has been slight variation in the percentage of micro-invasive carcinomas registered each year, from 13.4% in 1988 to 26.2% in 1992, but there has not been any overall trend over time. It has been found that there is no uniformity in the management of micro-invasive cervical tumours, the frequency of recurrence, lymph metastases and death is low, and non-radical surgery appears to give satisfactory results (Morgan *et al*, 1993).

3.2.3. Age

▼ **Frequency by Age Groups**

Age Group	n	%
10 to 19	1	***0.0%***
20 to 29	200	***6.7%***
30 to 39	732	***24.7%***
40 to 49	587	***19.8%***
50 to 59	406	***13.7%***
60 to 69	487	***16.4%***
70 +	552	***18.6%***
Total	2965	***100%***

Patients with cancer of the cervix are relatively young. Nearly a third were in the 20 to 39 year-old age group, and a fifth were in the 40 to 49 year-old age group.

3.2.4. Socio-economic Status

▼ **Frequency by Socio-economic status**

Super Profile	n	%
1	154	***5.2%***
2	57	***1.9%***
3	247	***8.3%***
4	305	***10.3%***
5	461	***15.6%***
6	555	***18.7%***
7	234	***7.9%***
8	148	***5.0%***
9	342	***11.5%***
10	460	***15.5%***
Total	2965	***100.0%***

▼ **Frequency by Socio-economic status (groups)**

Super Profile	n	%
1 to 3	458	***15.5***
4 to 7	1555	***52.5***
8 to 10	950	***32.1***
Total	2965	***100.0***

There was higher frequency of cervical cancer in Super Profile groups 4 to 7 than in groups 8 to 10, with very few in groups 1 to 3.

3.2.5. District of Residence

▼ **Frequency by District of Residence**

District of Residence	n	%
Hull	413	***13.9%***
Bradford	279	***9.4%***
Leeds East	276	***9.3%***
Leeds West	253	***8.5%***
Grimsby	200	***6.7%***
Pontefract	176	***5.9%***
Huddersfield	166	***5.6%***
Calderdale	163	***5.5%***
Scunthorpe	161	***5.4%***
York	151	***5.1%***
East Yorkshire	134	***4.5%***
Dewsbury	124	***4.2%***
Airedale	112	***3.8%***
Wakefield	105	***3.5%***
Scarborough	100	***3.4%***
Harrogate	89	***3.0%***
Northallerton	63	***2.1%***
Yorkshire	**2965**	***100.0%***

▼ **Median Anniversary Age by District**

	Median	25%	75%
Hull	41	34	59
East Yorkshire	41	35	60
York	44	37	65
Pontefract	45	34	62
Grimsby	45	38	63
Northallerton	45	37	70
Harrogate	49	39	68
Leeds West	49	38	69
Bradford	50	38	69
Leeds East	51	39	66
Wakefield	52	37	65
Calderdale	53	38	64
Huddersfield	54	40	68
Scunthorpe	55	40	67
Airedale	56	36	71
Dewsbury	57	4	68
Scarborough	58	40	74
Yorkshire	**49**	**37**	**66**

There was a variation in patients' age at diagnosis between districts, with Dewsbury and Scarborough having the highest median ages of 57 and 58 years respectively, and Hull and East Yorkshire having the lowest median ages of 41 years. It is possible that these figures are distorted by the differences in the definition of micro-invasive carcinomas varying between the districts, as has been noted above (3.2.2).

3.2.6. Extent of Disease: Metastases and Nodal Involvement

▼ **Staging**

Stage	N	%
I	638	***21.5%***
II	460	***15.5%***
III or nodal involvement	415	***14.0%***
IV or metastases	237	***8.0%***
Unknown	1215	***41.0%***
Total	2965	***100.0%***

41% of the study sample did not have staging information recorded. There was some change in the recording of staging over the study time period. The percentage of staging information available for the earlier study years was around 50%. However, from 1993 onwards, staging data became part of the ONS core data set requirements for cervical cancer. Hence, in 1994, 84% of registrations had staging data recorded.

▼ **Median age by stage**

Stage	Median	25%	75%
I	45	36	60
II	61	45	70
III or nodal involvement	60	44	72
IV or metastases	56	40	70
unknown	42	35	60

Stage I cervical cancer occurred in younger patients, with a median age of 45 years. Stage II to IV occurred in older patients, with a range of median ages from 56 to 61 years. Dewsbury and Leeds West had the highest percentages of patients with staging information and Hull and East Yorkshire had the lowest.

▼ **% of Known Staging Data by District**

District	% known staging data
Dewsbury	***78.2%***
Leeds West	***75.1%***
Calderdale	***70.6%***
Pontefract	***68.7%***
Leeds East	***68.1%***
York	***67.5%***
Airedale	***66.1%***
Bradford	***65.9%***
Wakefield	***65.7%***
Huddersfield	***59.0%***
Scarborough	***58.0%***
Harrogate	***57.3%***
Grimsby	***52.5%***
Northallerton	***50.8%***
Scunthorpe	***42.2%***
Hull	***36.8%***
East Yorkshire	***34.3%***

▼ **Stage as % of known stage by district**

District	Stage I		Stage II		Stage III or nodal involvement		Stage IV or metastases	
Dewsbury	38	***39.2%***	30	***30.9%***	21	***21.6%***	8	***8.2%***
Leeds West	87	***45.8%***	36	***18.9%***	43	***22.6%***	24	***12.6%***
Calderdale	42	***36.5%***	44	***38.3%***	16	***13.9%***	13	***11.3%***
Pontefract	42	***34.7%***	28	***23.1%***	31	***25.6%***	20	***16.5%***
Leeds East	62	***33.0%***	48	***25.5%***	54	***28.7%***	24	***12.8%***
York	37	***36.3%***	34	***33.3%***	23	***22.5%***	8	***7.8%***
Airedale	32	***43.2%***	18	***24.3%***	12	***16.2%***	12	***16.2%***
Bradford	54	***29.3%***	43	***23.4%***	67	***36.4%***	20	***10.9%***
Wakefield	32	***46.4%***	21	***30.4%***	10	***14.5%***	6	***8.7%***
Huddersfield	44	***44.9%***	27	***27.6%***	20	***20.4%***	7	***7.1%***
Scarborough	17	***29.3%***	14	***24.1%***	18	***31.0%***	9	***15.5%***
Harrogate	23	***45.1%***	9	***17.6%***	12	***23.5%***	7	***13.7%***
Grimsby	27	***25.7%***	28	***26.7%***	38	***36.2%***	12	***11.4%***
Northallerton	10	***31.3%***	7	***21.9%***	4	***12.5%***	11	***34.4%***
Scunthorpe	18	***26.5%***	24	***35.3%***	10	***14.7%***	16	***23.5%***
Hull	56	***36.8%***	41	***27.0%***	28	***18.4%***	27	***17.8%***
East Yorkshire	17	***37.0%***	8	***17.4%***	8	***17.4%***	13	***28.3%***

Wakefield, Leeds West and Harrogate had the highest percentages of patients with Stage I disease at diagnosis with over 45%, and Grimsby and Scunthorpe had the lowest, both with less than 27%. The percentage of patients in each district with Stage II disease varied from Calderdale and Scunthorpe which were both over 35%, and Harrogate and East Yorkshire both with less than 18%. Grimsby and Bradford had the most patients with Stage III disease or nodal involvement, both with more than 36%, and Calderdale and Northallerton had the lowest, with less than 14%. The percentage of patients in each district with Stage IV disease or metastases varied from Northallerton and East Yorkshire with over 28%, to York and Huddersfield with less than 8%.

MANAGEMENT & TREATMENT

4

National guidelines have recently been issued which set out recommendations for the management of cervical cancer (NHS Executive, 1999). These recommendations may not reflect the practices during the time period 1986 to 1994, but may be summarised as follows.

Women with post-coital or intra-menstrual bleeding, persistent vaginal discharge, or whose cervix looks or feels abnormal, should be referred to a gynaecologist. If the patient appears to have a superficial invasion, a loop or cone biopsy should reveal the histological type. Squamous cervical cancers at Stage IA or higher should be sent to a specialist pathologist at a Cancer Centre to check the accuracy of staging. All patients with tumours more advanced than stage IA and those with adenocarcinomas should be referred to the specialist gynaecological oncology team at the Cancer Centre. Magnetic resonance imaging should be available to assess the degree of spread (stage) of cervical cancer to determine appropriate treatment. It is important that women with early stage cancers are not over-treated, and that they are able to retain their sexual function and fertility. Early stage cancers may be treated equally effectively with radiotherapy or surgery, although surgery is associated with less morbidity than radiotherapy.

A cone biopsy may be sufficient treatment when there is no evidence of tumour at the margins of the biopsy sample. Surgery alone, i.e. simple hysterectomy, should be offered whenever possible for Stage IA tumours. Slightly more advanced tumours (Stages IB and IIA) should be treated with radical hysterectomy with pelvic lymphadectomy. Pelvic exenteration surgery should be offered to women with recurrent cancer confined to the central pelvis. As this is a difficult procedure, it should be performed at a Cancer Centre by the specialist gynaecological oncology team.

Radical radiotherapy should be offered for patients with Stage IA cervical cancer in the rare cases when surgery is unlikely to remove the tumour completely, or if the patient is unfit for surgery. Adjuvant (i.e. post-operative) radiotherapy should be avoided if possible, but if adverse prognostic factors are discovered at the time of surgery or subsequent histopathological review, may be appropriate. Radiotherapy may be suitable for women with recurrent cancer who have not previously had this treatment, and is effective for bulky later-stage cancers.

Chemotherapy should normally be offered only in the context of large-scale randomised controlled trials, although new studies from the US suggest that women with later-stage or bulky cervical cancers should be considered for chemotherapy using cisplatin given concurrently with radiotherapy.

4.1. MANAGEMENT

4.1.1. NYCRIS Cervical Cancer Management Data 1986-94

To facilitate understanding of the following analysis of management, the reader should consider the notes given below regarding the NYCRIS data set.

Presentation

We cannot distinguish between those patients who presented acutely and those who had their disease diagnosed at operation, or who were referred with symptoms by their GP.

Managing Hospitals and Consultants

During the study period, up to three managing hospitals could be recorded. The hospital of primary management (which for cervix cancer patients is defined as the place of surgery, otherwise the hospital where the primary treatment decision was made) was available for all patients. The trust analyses in Section 4.4 were based upon the hospital of primary management. Hospitals were not recorded if a patient was referred for example, for an assessment only, without formal transfer of management. This was also true of the recorded managing consultants. A consultant would only be recorded by NYCRIS if management of a patient was formally transferred to that consultant. Consultants giving an opinion only, with no transfer of management would not be recorded. Up to three managing consultants could be recorded by NYCRIS, but the actual order of referral between specialties was unclear from the available data. The first consultant is defined as the primary managing consultant and not the consultant to whom the patient was first referred. For patients who received surgery, the consultant who performed surgery would be classed as the primary managing consultant.

Histological Confirmation

Whenever a histological diagnosis of cancer is made for a resident of the former Yorkshire region, a copy of the pathology report is sent to NYCRIS, and the histological details recorded for that patient and the patient's disease is recorded as having been histologically confirmed.

Treatment

With respect to treatment, it should be noted that, until 1994, only treatment administered within nine weeks from diagnosis would have been routinely recorded. All definitive surgery is recorded by NYCRIS and whether or not a patient received chemotherapy. Details of the agents used for chemotherapy are not available however, nor can we ascertain whether a single agent or combination therapy was employed. During the study period the treatment given was not formally connected to any particular consultant or hospital, within the routine dataset.

All radiotherapy, regardless of its intent, was recorded. Details of investigations such as CA125 and ultrasound, and information regarding other supportive care was not recorded.

Treatment of Patients Residing on the Border of the Region

In districts such as Northallerton, which is on the border of the study region, it is acknowledged that some patients may have been diagnosed, referred or managed outside the region. These Yorkshire residents would have their disease registered in Yorkshire, but their management/treatment details were not available for study. This group of patients would have been excluded from study.

A summary of the relevant data items can be found in section (8.1.2.)

4.2. HISTOLOGICAL CONFIRMATION

4.2.1. Histological Confirmation Rates Overall 1986-94

▼ **Histological Confirmation**

Histological Confirmation	n	%
Yes	2879	***97.1%***
No	86	***2.9%***
Total	2965	***100%***

The majority of cervical cancer patients (97.1%) had their disease confirmed histologically. There was a number of different tumour types recorded and these are listed below.

▼ **Frequency by Histological Groups**

Histological Group	N	%	Histological Type	n
Squamous cell carcinoma	2575	***86.8%***	-	
Adenocarcinoma	310	***10.5%***	-	
Mixed	51	***1.7%***	Mixed adenocarcinoma & squamous cell	50
			Mesonephroma malignant	1
Other	29	***1.0%***	Clinical primary	17
			Carcinoma undifferentiated	2
			Leiomyosarcoma	2
			Tumour mullerian mixed	2
			Carcinoma mucoepidermoid	1
			Carcinosarcoma	1
			Leiomyosarcoma Epitheloid	1
			Tumour mesodermal mixed	1
			Tumour mixed malignant	1
Total	2965	***100%***		

The most common (86.8%) histological type was squamous cell carcinoma. 10.5% were adenocarcinoma, and 1.7% were mixed cell, with 1% of various other histological types.

4.2.2. Histological Confirmation Rates by District of Residence

▼ **Histological Confirmation Rate by District of Residence**

District	n	%
Pontefract	176	***100%***
York	150	***99.3%***
Wakefield	104	***99.0%***
East Yorkshire	132	***98.5%***
Airedale	110	***98.2%***
Scunthorpe	158	***98.1%***
Leeds East	270	***97.8%***
Dewsbury	121	***97.6%***
Calderdale	159	***97.5%***
Hull	402	***97.3%***
Grimsby	194	***97.0%***
Leeds West	244	***96.4%***
Huddersfield	159	***95.8%***
Harrogate	85	***95.5%***
Scarborough	94	***94.0%***
Bradford	262	***93.9%***
Northallerton	59	***93.7%***
Yorkshire	2879	***97.1%***

Histological confirmation rates (HCRs) varied slightly according to a patient's district of residence. HCRs were highest in Pontefract and York and lowest in Bradford and Northallerton.

4.3. TREATMENT

▼ **Treatment Option Overview**

Stage	Treatment Options	Recorded by NYCRIS as:
IA	Simple hysterectomy	S
	Adequate cone biopsy with careful observation	S
	Intracavity RT alone (if not fit for surgery?)	(RT)
IB / IIA	Radical hysterectomy with pelvic node dissection and RT (depending on nodal status)	S + RT
	External beam RT in patients unsuitable for surgery	RT
IIB / III / IVA	Radiation therapy (high rate of relapse if treated surgically)	RT
IVB	Palliative RT	RT

The table above summarises the current recommendations for treatment options which are determined by the stage of disease at presentation.

▼ **Overall Treatment Rates by Stage**

Stage	RT & Surgery		RT Only		Surgery Only		No Treatment		Total	
I	161	***22.3%***	233	***32.2%***	321	***44.4%***	8	***1.1%***	723	***24.4%***
II	61	***12.1%***	403	***80.0%***	26	***5.2%***	14	***2.8%***	504	***17.0%***
III	10	***3.0%***	304	***91.0%***	0	***0.0%***	20	***6.0%***	334	***11.3%***
IV	6	***0.7%***	41	***45.1%***	2	***2.2%***	42	***46.2%***	91	***3.1%***
Unknown	125	***9.5%***	187	***14.3%***	865	***66.2%***	136	***10.4%***	1312	***44.2%***
Total	363	***12.2%***	1168	***39.4%***	1214	***40.9%***	220	***7.4%***	2965	***100%***

As the staging information is not complete for all patients (41% unknown), conclusive statements cannot be made about the treatments received by patients with different stages of disease. However, a few generalisations can be made.

About half of all patients with Stage I disease were treated mainly with surgery only, 32.2% received radiotherapy only, and 22.3% received radiotherapy and surgery. 80.0% of patients with Stage II disease were generally treated with radiotherapy only, with 12.1% receiving radiotherapy and surgery, and 5.2% having surgery only.

Patients with Stage III and Stage IV disease were mainly treated with radiotherapy only, but 3.0% and 0.7% respectively also had surgery, and none and 2.2% respectively had surgery only.

The percentages of patients receiving no treatment increased with their stage of disease.

▼ **Overall Treatment Rates**

Type of Treatment	n	%
Surgery *	1565	*53.0%*
Radiotherapy	1531	*51.6%*
Chemotherapy	209	*7.0%*

Surgery does not include "Other" (pelvic exenteration, bilateral salpingo-oopherectomy or subtotal abdominal hysterectomy)

Overall, about half the total sample received some surgery and about half received some radiotherapy. Only 7% received chemotherapy.

▼ **Main Operation Types**

	% of surgical procedures			Tumour Stage (if present)							
Main Operation Type	**overall**		**n=1577**	**I**		**II**		**III**		**IV**	
None	1388	***46.8%***		241	***33.3%***	417	***82.7%***	324	***97.0%***	83	***91.2%***
Simple hysterectomy	648	***21.9%***	***41.1%***	144	***19.9%***	21	***4.2%***	4	***1.2%***	3	***3.3%***
Radical hysterectomy	605	***20.4%***	***38.4%***	287	***40.0%***	55	***10.9%***	3	***0.9%***	1	***1.1%***
Excision biopsy cervical lesion	237	***8.0%***	***15.0%***	34	***4.7%***	7	***1.4%***	0	***0.0%***	0	***0.0%***
Ablation cervical lesion	75	***2.5%***	***4.8%***	17	***2.4%***	3	***0.6%***	0	***0.0%***	0	***0.0%***
*Other	12	***0.4%***	***0.7%***	0	***0.0%***	1	***0.0%***	3	***0.9%***	4	***4.4%***
Total	2965	***100%***		723	***100%***	504	***100%***	334	***100%***	91	***100%***

Up to two surgical operations received by the patient may be recorded on the registry database. For example, a simple hysterectomy or a radical hysterectomy may be preceded by excision biopsy of a cervical lesion or ablation cervical lesion. Also,

some patients may receive both excision biopsy of a cervical lesion and ablation cervical lesion. The table above shows the main or least minor operation received by the study sample.

Of those who received surgery, about equal numbers of the patients underwent simple hysterectomy or radical hysterectomy. Most patients who had Stage I disease underwent simple hysterectomy (19.9%) or radical hysterectomy (40.0%), and some patients with Stage II disease also underwent these operations (4.2% and 10.9% respectively). The majority of patients with Stage II, III and IV disease and 33.3% of Stage I case did not have surgery. The "Other" category included pelvic exenteration, which was performed on just 7 patients, all of whom had Stage III or IV disease.

▼ **Biopsies**

Treatment	N	%
Biopsy	1290 / 2965	***43.5%***

Nearly half of the study sample had a biopsy to assess the stage and histological type of their disease. This may be sufficient to treat tumours which penetrate less than 3mm into the cervix.

4.3.1. Treatment by Age Group

Surgery

Surgery rates may vary in more elderly groups due to the presence of co-morbidity. Some patients may not receive surgery on the basis of their age alone. It may be noted that more recently there has been a trend to offer surgery to Stage I patients regardless of their age.

▼ **Surgery by Age Group**

Age	n	Surgery
< 30	177	***88.0%***
30-39	627	***85.7%***
40-49	411	***70.0%***
50-59	170	***41.9%***
60-69	134	***27.5%***
70+	53	***9.6%***
Total	1572	***53.0%***

Surgery was commonest in those aged under 30 years. The percentage of cases who received surgery decreased with age, decreasing to 9.6% in the over 70s. This may be due to patients' fitness for surgery decreasing with age, as well as the lower stage at presentation associated with the younger patients.

▼ **Operation Type by Age Group**

Age	Ablative cervical lesion		Excision biopsy cervical lesion		Simple hysterectomy		Radical hysterectomy		Pelvic Exenteration	
<30	24	***13.6%***	50	***28.2%***	40	***22.6%***	62	***35.0%***	1	***0.6%***
30-39	29	***4.6%***	108	***17.2%***	224	***35.7%***	264	***42.1%***	2	***0.3%***
40-49	15	***3.6%***	39	***9.5%***	181	***44.0%***	174	***42.3%***	2	***0.5%***
50-59	2	***1.2%***	15	***8.8%***	90	***52.9%***	62	***36.5%***	1	***0.6%***
60-69	3	***2.2%***	21	***15.7%***	78	***58.2%***	32	***23.9%***	0	***0.0%***
70+	2	***3.8%***	4	***7.5%***	35	***66.0%***	11	***20.8%***	1	***1.9%***
Total	75	***4.8%***	237	***15.1%***	648	***41.2%***	605	***38.5%***	7	***0.4%***

Ablative cervical lesion and excision biopsy of a cervical lesion are both performed more frequently in the under 30 year-old age group. Simple hysterectomy rates increased with age and radical hysterectomy rates decreased with age. This is probably related to the stage of disease, which is lower in the younger patients.

Radiotherapy

▼ **Radiotherapy by Age Group**

Age	Receiving radiotherapy	
< 30	58	***29.0%***
30-39	218	***29.8%***
40-49	255	***43.4%***
50-59	273	***67.2%***
60-69	356	***73.1%***
70+	371	***67.2%***
Total	1531	***51.6%***

During the study period 1986-94 the use of radiotherapy increased with age up to 60-69 years then decreased in the 70+ age group. In more recent years radiotherapy has become the treatment of choice for all patients with Stage 2b or worse disease, it is not a function of the patient's age and is equally applicable to younger patients as well as older patients. Stage I patients may be treated by either surgery or radiotherapy. In the younger age group, it is now the practice to offer surgery rather than radiotherapy as the principle treatment, although in the last decade there has been an increasing tendency to offer surgery for all patients with Stage I disease, reserving radiotherapy for those with more advanced disease or who are unfit for a radical hysterectomy.

▼ **Overall Treatment Rates by Stage and Age**

Stage	Age	N	RT & Surgery		RT Only		Surgery Only		No Treatment	
I	<30	**64**	18	***28.1%***	4	***6.3%***	42	***65.6%***	0	***0.0%***
	30-49	**376**	93	***24.7%***	46	***12.2%***	235	***62.5%***	2	***0.5%***
	>49	**283**	50	***17.7%***	183	***64.7%***	44	***15.6%***	6	***2.1%***
II	<30	**15**	7	***46.7%***	6	***40.0%***	2	***13.3%***	0	***0.0%***
	30-49	**152**	35	***23.0%***	104	***68.4%***	9	***5.9%***	4	***2.6%***
	>49	**337**	19	***5.6%***	293	***86.9%***	15	***4.5%***	10	***3.0%***
III	<30	**12**	1	***8.3%***	11	***91.7%***	0	***0.0%***	0	***0.0%***
	30-49	**72**	7	***9.7%***	65	***90.3%***	0	***0.0%***	0	***0.0%***
	>49	**250**	2	***0.8%***	228	***91.2%***	0	***0.0%***	20	***8.0%***
IV	30-49	**22**	6	***27.3%***	14	***63.6%***	1	***4.6%***	1	***4.6%***
	>49	**69**	0	***0.0%***	27	***39.1%***	1	***1.5%***	41	***59.4%***

The above table shows the percentage of cases within each stage and age group. This shows that most of the younger two age groups with Stage I tumours had surgery only (65.6% and 62.5%), whereas most of the over 49 year-old age group had radiotherapy only. Radiotherapy and surgery for Stage I cases decreased with increasing age, from 28.1% in the under 30s to 17.7% in the over 49s. Most of Stage II cases in the over 49 and 30 to 49 year-old age groups had radiotherapy only (86.9% and 68.4% respectively), but the largest percentage of under 30 year-olds with a Stage II tumour had radiotherapy and surgery (46.7%), closely followed by radiotherapy only (40.0%). The majority of patients (90.3% to 91.7%) with Stage III tumours in all age groups had radiotherapy only, with a very small percentage having radiotherapy and surgery (0.8% to 9.7%). Very few of any cases with Stage I, II and III tumours had no treatment. However, 59.4% of Stage IV cases aged over 49 years had no treatment, and all but 1 of the remainder in this stage/age group had radiotherapy only. Radiotherapy and surgery and radiotherapy was the most common treatment received by 30 to 49 year-old cases with Stage IV tumours (27.3% and 63.6% respectively), with only 4.6% receiving no treatment.

4.3.2. Treatment by Socio-Economic Group

▼ **Surgery by SuperProfile Category**

SuperProfile	Surgery	
1 to 3	255	***55.7%***
4 to 7	818	***52.6%***
8 to 10	498	***52.4%***
Missing	1	
Total	1572	***53.0%***

▼ **Operation Type by Socio-Economic Group**

SuperProfile	Ablative cervical lesion		Excision biopsy cervical lesion		Simple hysterectomy		Radical hysterectomy		Pelvic Exenteration	
1 to 3	14	***5.5%***	42	***16.5%***	95	***37.3%***	104	***40.8%***	0	***0.0%***
4 to 7	37	***4.5%***	117	***14.3%***	330	***40.3%***	330	***40.3%***	4	***0.5%***
8 to 10	24	***4.8%***	77	***15.5%***	223	***44.8%***	171	***34.3%***	3	***0.6%***
Total	75	***4.8%***	236	***15.0%***	648	***41.2%***	605	***38.5%***	7	***0.4%***

NB 1 missing

▼ **Radiotherapy by Socio-Economic Group**

SuperProfile	Receiving radiotherapy	
1 to 3	229	***50.0%***
4 to 7	801	***51.5%***
8 to 10	500	***52.6%***
Total	1530	***51.6%***

NB 2 missing observations

SuperProfiles represent the relative affluence of the sample population, from most affluent (1) to least affluent (10). There would appear to be no difference in treatment rates according to SuperProfile category.

4.3.3. Treatment by District of Residence

Before interpreting the district treatment data, it is recommended that the reader has referred to the notes at the beginning of Chapter 4 on patients residing on the border of the region. These notes may apply in this case to the district of Northallerton. Treatment rates for Northallerton residents have been quoted in the district tables, but because of the high proportion of extra-regional treatment for patients in this district, Northallerton patients have been omitted from all the district comparisons made in the text.

▼ **Surgery and Tumour Stages having Surgery by District of Residence**

	Surgery		Stage I and II having Surgery	
Northallerton	46	***73.0%***	15	***32.6%***
East Yorkshire	95	***70.9%***	16	***16.8%***
Hull	282	***68.3%***	49	***17.4%***
Grimsby	112	***56.0%***	25	***22.3%***
Airedale	70	***62.5%***	38	***54.3%***
Leeds West	139	***54.9%***	87	***62.6%***
Harrogate	48	***53.9%***	16	***33.3%***
York	80	***53.0%***	37	***46.3%***
Huddersfield	84	***50.6%***	40	***47.6%***
Pontefract	88	***50.0%***	37	***42.0%***
Leeds East	135	***48.9%***	51	***37.8%***
Bradford	132	***47.3%***	51	***38.6%***
Scarborough	47	***47.0%***	22	***46.8%***
Wakefield	45	***42.9%***	16	***35.6%***
Calderdale	69	***42.3%***	31	***44.9%***
Dewsbury	52	***41.9%***	30	***57.7%***
Scunthorpe	48	***29.8%***	7	***14.6%***
	1572	***53.0%***	568	***38.3%***

The overall rates of surgery for all cervical cancers varied by district from 29.8% in Scunthorpe to 70.9% in East Yorkshire. Of the 59.0% of the study sample with staging information available, the mean percentage of Stage I's and II's who had surgery was 38.3%, with a variation of 14.6% in Scunthorpe and 62.6% in Leeds West. This wide variation may be due to Stage Ia disease being classified differently in different districts; in some as micro-invasive disease and in others as Stage I. Very few Stage III's and IV's had surgery; the mean was 1.1%.

▼ **Operation Type by District of Residence**

District	Ablative cervical lesion		Excision biopsy cervical lesion		Simple hysterectomy		Radical hysterectomy	
Hull	37	***13.1%***	65	***23.0%***	99	***35.1%***	81	***28.7%***
East Yorkshire	10	***10.5%***	27	***28.4%***	35	***36.8%***	22	***23.2%***
Grimsby	4	***3.6%***	11	***9.8%***	49	***43.8%***	48	***42.9%***
Scunthorpe	1	***2.1%***	12	***25.0%***	30	***62.5%***	5	***10.4%***
Northallerton	1	***2.2%***	4	***8.7%***	21	***45.7%***	20	***43.5%***
York	1	***1.3%***	17	***21.3%***	20	***25.0%***	42	***52.5%***
Scarborough	0	***0.0%***	4	***8.5%***	27	***57.4%***	16	***34.0%***
Harrogate	1	***2.1%***	13	***27.1%***	20	***41.7%***	13	***27.1%***
Bradford	0	***0.0%***	14	***10.6%***	58	***43.9%***	59	***44.7%***
Airedale	5	***7.1%***	7	***10.0%***	22	***31.4%***	36	***51.4%***
Calderdale	1	***1.4%***	14	***20.3%***	24	***34.8%***	30	***43.5%***
Huddersfield	0	***0.0%***	14	***16.7%***	43	***51.2%***	27	***32.1%***
Dewsbury	0	***0.0%***	4	***7.7%***	33	***63.5%***	15	***28.8%***
Leeds West	1	***0.7%***	8	***5.8%***	49	***35.3%***	80	***57.6%***
Leeds East	11	***8.1%***	10	***7.4%***	46	***34.1%***	65	***48.1%***
Wakefield	0	***0.0%***	5	***11.1%***	29	***64.4%***	11	***24.4%***
Pontefract	2	***2.3%***	8	***9.1%***	43	***48.9%***	35	***39.8%***
Total	75	***4.8%***	45	***15.1%***	648	***41.2%***	605	***38.5%***

Ablative cervical lesion rates varied from 0% in Wakefield, Dewsbury, Huddersfield, Bradford and Scarborough to 13.1% in Hull. Excision biopsy of a cervical lesion rates varied from 5.8% in Leeds West to 27.1% in Harrogate. Simple hysterectomy rates varied from 25% in York to 64.4% in Wakefield. Radical hysterectomy rates varied from 23.2% in East Yorkshire to 57.6% in Leeds West.

▼ **Radiotherapy and Tumour Stages having Radiotherapy by District of Residence**

District	Receiving radiotherapy		Stage I and II receiving radiotherapy		Stage III and IV receiving radiotherapy	
Scunthorpe	112	***69.6%***	34	***30.4%***	10	***8.9%***
Dewsbury	82	***66.1%***	53	***64.6%***	20	***24.4%***
Wakefield	69	***65.7%***	50	***72.5%***	10	***14.5%***
Calderdale	100	***61.3%***	73	***73.0%***	13	***13.0%***
Scarborough	61	***61.0%***	26	***42.6%***	14	***23.0%***
Leeds East	156	***56.5%***	88	***53.0%***	51	***30.7%***
Bradford	166	***59.5%***	90	***57.7%***	52	***33.3%***
Pontefract	95	***54.0%***	54	***56.8%***	34	***35.8%***
York	80	***53.0%***	53	***66.3%***	16	***20.0%***
Huddersfield	85	***51.2%***	53	***62.4%***	16	***18.8%***
Leeds West	121	***47.8%***	78	***64.5%***	32	***26.4%***
Airedale	53	***47.3%***	39	***73.6%***	10	***18.9%***
Harrogate	42	***47.2%***	24	***57.1%***	11	***26.2%***
Grimsby	87	***43.5%***	41	***47.1%***	30	***34.5%***
Hull	158	***38.3%***	76	***48.1%***	29	***18.4%***
East Yorkshire	50	***37.3%***	19	***38.0%***	7	***14.0%***
Northallerton	14	***22.2%***	7	***50.0%***	6	***42.9%***
Total	1531	***51.6%***	858	***56.3%***	361	***23.7%***

Radiotherapy use varied by district, almost 70% of patients in Scunthorpe receiving radiotherapy compared to 37.3% in East Yorkshire. Of the 59.0% of the study sample with staging information available, the mean percentage of Stage I's and II's who had radiotherapy was 56.3%, with a variation of 30.4% in Scunthorpe to 73.6% in Airedale. Fewer Stage III's and IV's had surgery; the mean was 23.7% and the variation was 8.9% in Scunthorpe to 35.8% in Pontefract.

4.3.4. Treatment by Time Period

▼ **Surgery by Time Period**

	Overall 86-94		1986-88		1989-91		1992-94	
Surgery	1572	***53.0%***	564	***50.7%***	546	***52.9%***	462	***56.3%***
Total	2965	***100.0%***	1113	***37.5%***	1032	***34.8%***	820	***27.7%***

There has been a slight increase in the number of patients undergoing surgery over the study period.

▼ **Operation Type by Time Period**

Operation Type	Overall		1986-88		1989-91		1992-94	
Ablative cervical lesion	75	***4.8%***	9	***1.6%***	11	***2.0%***	55	***11.9%***
Excision biopsy cervical lesion	237	***15.1%***	89	***15.8%***	90	***16.5%***	58	***12.6%***
Simple hysterectomy	648	***41.2%***	281	***49.8%***	207	***37.9%***	160	***34.6%***
Radical hysterectomy	605	***38.5%***	183	***32.4%***	234	***42.9%***	188	***40.7%***
Pelvic exenteration	7	***0.4%***	2	***0.4%***	4	***0.7%***	1	***0.2%***
Total	1572	***100%***	564	***35.9%***	546	***34.7%***	462	***29.4%***

During the time period there has been a decrease in the number of simple hysterectomies and an increase in the number of radical hysterectomies performed.

▼ **Radiotherapy by Time Period**

Overall		1986-88		1989-91		1992-94	
1531	***51.6%***	599	***53.8%***	530	***51.4%***	402	***49.0%***

There has been a slight decrease in the use of radiotherapy over time. Over the study period radiotherapy has been used less for early stage disease, its use is reserved for those who have later stage disease or are unfit for a radical hysterectomy.

4.3.5. Cone Biopsies

Cone biopsies may, in some cases, be enough to remove the tumour and a subsequent hysterectomy may be unnecessary. Thus, cone biopsies are regarded as treatment.

▼ **Cone Biopsies**

Any Cone Biopsy		1986-88		1989-91		1992-94	
295	***9.9%***	104	***9.3%***	113	***10.9%***	78	***9.5%***

▼ **Cone Biopsies Only**

Cone Biopsy Only		1986-88		1989-91		1992-94	
190	***6.4%***	84	***7.5%***	72	***7.0%***	34	***4.1%***

Cone biopsies only became less common over the study time period.

4.4. SPECIALIST MANAGEMENT

In the previous section (4.2), substantial variation in treatment by age group and by district of residence has been demonstrated. This may be attributable to both variations in patient casemix and also in the degree of management by clinicians with a specialist interest in gynaecological cancer.

It is likely that optimal care is most likely to be given by specialists in a particular field, and specialisation has also been shown to improve outcomes (Selby *et al*, 1996;

Stiller, 1988). This chapter will investigate variation in the degree of specialist management of cervical cancer patients in relation to a number of factors.

Before interpreting the data, it is recommended that the reader refers to the notes at the beginning of Chapter 4 on hospital and consultant data and the notes regarding patients who resided on the border of the region. Although NYCRIS recorded up to three consultants who may have taken over the management of a patient, it was difficult to determine the exact referral pathway of a patient's management from these data alone. Hence we could not ascertain which patients were referred directly to a specialist or which patients were referred to a specialist for opinion only, without formal transfer of management. In this report, therefore, each patient was allocated to one consultant, who was referred to as the "primary managing consultant". In cases where a decision was made not to treat, the individual responsible for that decision was classified as the managing consultant. However, in cases where treatment was given, the individual responsible for administering the first episode of treatment was defined as the managing consultant.

Two variables were calculated to represent specialist management: Gynaecologist Workload and Hospital Workload.

Patients under the management of a general surgeon can also be operated upon by a gynaecologist, without transfer of management. In this instance, the gynaecologist would not have been recorded by the registry.

4.4.1. Combination of Specialties

▼ **Combination of specialities**

	Specialty	n	%
Any	Gynaecologist	2881	**97.2%**
	General Surgeon	28	**0.9%**
	Medical Oncologist	17	**0.6%**
	Clinical Oncologist	1676	**56.5%**
	General Physician	23	**0.8%**
Combination	Gynaecologist & Clinical Oncologist	1650	***55.6%***
	Gynaecologist & General Medicine	4	***0.1%***
	Gynaecologist & Medical Oncologist	17	***0.6%***
	Others	180	***6.1%***
Only	General Surgeon Only	21	**0.7%**
	Gynaecologist Alone	1114	***37.6%***

97.2% of cases were managed by a gynaecologist and 57.1% of cases were managed by an oncologist at some stage. 58.6% of cases were managed by two consultants and 5.6% by three consultants.

▼ **Recognised specialist gynaecological oncologists**

Degree of specialism	n	%
No gynaecologist	84	***2.8%***
Specialist gynaecological oncologist	451	***15.2%***
Other gynaecologist	2430	***82.0%***
Total	2965	***100.0%***

Approximately 15% of patients were seen by a gynaecological oncologist. A 'specialist gynaecological oncologist' was defined as a gynaecological oncologist or director of training (for the Royal College of Obstetricians and Gynaecologists) who had a recognised tertiary practice. Over this period of time in Yorkshire only four specialist gynaecological oncologists as defined above were identified.

▼ **Specialties Over Time**

Time Period	86 - 88		89 - 91		92 - 94	
Any Medical Oncologist	0	***0.0%***	0	***0.0%***	17	***2.1%***
Any Clinical Oncologist	660	***59.3%***	585	***56.7%***	431	***52.6%***
Any General Physician	13	***1.2%***	5	***0.5%***	5	***0.6%***
Gynaecological Oncologist	109	***9.8%***	162	***15.7%***	180	***22.0%***
Other Gynaecologist	964	***86.6%***	845	***81.9%***	621	***75.7%***
Any General Surgeon	8	***0.7%***	11	***1.1%***	9	***1.1%***

There would appear to be more specialist management over time, from 9.8% of cervical cancer patients seeing a gynaecological oncologist in the first period (1986-88), to 22.0% seeing a gynaecological oncologist in the last period (1992-94).

▼ **Specialties Over Time - Combination**

Patient seen by a combination of gynaecologist and other non surgical oncologist	Over-all		86 - 88		89 - 91		92 - 94	
	1665	***56.2%***	644	***57.9%***	581	***56.3%***	440	***53.7%***

The percentage of patients seeing a combination of gynaecologist and oncologist decreased over time, from 57.9% to 53.7%, indicating that the type of gynaecologist seen increasingly was a gynaecological oncologist.

4.4.2. Gynaecologist Workload

The degree of specialist management was estimated on a median annual workload basis. Workloads were calculated according to practising years, to account for any new posts and retirements.

▼ **Frequency of Gynaecologist Workload (number of new cases per year)**

Gynaecologist Workload	Overall		Over Time					
	N		86 - 88		89 - 91		92 - 94	
Non Gynaecological	84	***2.8%***	40	***3.6%***	25	***2.4%***	19	***2.3%***
1 to 4	977	***33.0%***	399	***35.8%***	347	***33.6%***	231	***28.2%***
5 to 8	1126	***38.0%***	430	***38.6%***	406	***39.3%***	290	***35.4%***
> 8	778	***26.2%***	244	***21.9%***	254	***24.6%***	280	***34.1%***
1986 - 1994	2965	***100%***	1113	***37.5%***	1032	***34.8%***	820	***27.7%***

Overall, 2.8% of patients with cervical cancer were not seen at some point in their treatment pathway by a gynaecologist, and this percentage decreased over the study time period from 3.6% to 2.3%. A third of patients were treated by a gynaecologist who saw less than five cervical cancer cases per year. This proportion decreased from 35.8% in 1986-88 to 28.2% in 1992-94. 71% of patients were treated by a gynaecologist who saw less than 9 cervical cancer cases per year. This proportion also decreased from 74.4% in 1986-88 to 63.6% in 1992-94. At the same time, the percentage of patients seen by a gynaecologist with a workload of more than 8 cervical cancer patients per year increased from 21.9% in 1986-88 to 34.1% in 1992-94.

▼ **Operation Type by Gynaecologist Workload (number of new cases per year)**

Gynaecologist Workload	None		Simple hysterectomy		Radical hysterectomy		Other Operation	
Non Gynaecological	78	***92.9%***	3	***3.6%***	1	***1.2%***	2	***2.4%***
1 - 4	549	***56.2%***	209	***21.4%***	112	***11.5%***	107	***11.0%***
5 - 8	584	***51.9%***	244	***21.7%***	172	***15.3%***	126	***11.2%***
> 8	177	***22.8%***	149	***19.2%***	320	***41.1%***	132	***17.0%***
Total	1388	***46.8%***	605	***20.4%***	605	***20.4%***	367	***12.4%***

The majority of patients who were not seen at some part of their treatment pathway by a gynaecologist did not receive any surgery. This may be due to the casemix not seeing a gynaecologist which may differ to that of patients who did see a gynaecologist. There was an increase in the number of procedures carried out with increased gynaecologist workload. A higher proportion of radical hysterectomies

were carried out by gynaecologists with a higher workload, from 11.5% for those seeing less than 5, to 41.1% for those gynaecologists seeing more than 8 cervical cancer patients per year.

▼ **Radiotherapy by Gynaecologist Workload (mean number of new cases per year)**

Gynaecologist Workload	Receiving radiotherapy	
Non Gynaecological	24	***28.6%***
1 - 4	569	***58.2%***
5 - 8	643	***57.1%***
> 8	295	***37.9%***
Total	1531	***51.6%***

There was a decrease in radiotherapy rates with increased gynaecological workload, from 58.2% for those seeing less than 5 cervical patients per year, to 37.9% for those gynaecologists seeing more than 8 per year. It is likely to be due to the greater referral of patients to a gynaecological oncologist with early stage disease suitable for radical hysterectomy, most of these patients do not need to have radiotherapy.

▼ **Procedures carried out for patients managed by a general surgeon only**

Procedure	n	%
None	18	***85.7%***
Simple Hysterectomy	2	***9.5%***
Radical Hysterectomy	1	***4.8%***
Total	21	***100%***

Very low rates of simple and radical hysterectomies were associated with patients being managed only by a general surgeon, compared with those patients who saw a gynaecologist.

4.4.3. Hospital Workload

▼ **Frequency of Hospital Workload (mean number of new cases per year)**

Hospital Workload	n	%
1- 13	1057	***35.6%***
14 - 31	1078	***36.4%***
> 31	830	***28.0%***
Total	2965	***100%***

35.6% of patients were seen at hospitals with less than 14 cervical cancer cases per year and a further 36.4% of patients were dealt with by hospitals with 14-31 cases. Just over a quarter of patients were seen at hospitals with a workload of more than 31 cases per year.

▼ **Operation Type by Hospital Workload (mean number of new cases per year)**

Hospital Workload		*None*	Simple hysterectomy		Radical hysterectomy		Other Operation	
1 - 13	599	***56.7%***	212	***20.1%***	107	***10.1%***	139	***13.2%***
14 - 31	558	***51.8%***	222	***20.6%***	199	***18.5%***	99	***9.2%***
>31	231	***27.8%***	171	***28.3%***	299	***36.0%***	129	***15.5%***
Total	1388	***46.8%***	605	***20.4%***	605	***20.4%***	367	***12.4%***

There was an increase in the number of all procedures carried out with increased hospital workload, particularly radical hysterectomies, which varied from 10.1% with a lower workload compared with 36.0% in those with a higher workload. No surgery was undertaken by 56.7% of hospitals with a lower workload which contrasts with 27.8% in those with a higher workload.

▼ **Radiotherapy by Hospital Workload (mean number of new cases per year)**

Hospital Workload	Receiving radiotherapy	
1 - 13	616	***58.3%***
14 - 31	575	***53.3%***
> 31	340	***41.0%***
Total	1531	***51.6%***

There was a slight decrease in radiotherapy rates as hospital workload increased, from 58.3% in the lower workload hospitals to 41.0% in the higher workload hospitals.

4.4.4. Staging Details

▼ **Staging Details by Specialty**

	Stage I or II		Stage III or IV		Unknown to NYCRIS		Total
No Gynaecologist	8	***9.6%***	21	***25.0%***	55	***65.5%***	***84***
Gynaecological Oncologist	290	***64.4%***	42	***9.3%***	119	***26.4%***	***451***
Other Gynaecologist	929	***38.2%***	362	***14.9%***	1139	***46.9%***	***2430***
All	1227	***41.4%***	425	***14.3%***	1313	***44.3%***	***2965***

More staging data was available with increasing specialisation of the managing consultant; the cases with unknown stage (i.e. no staging information available to NYCRIS) varied from 26.4% for gynaecological oncologist to 65.5% for no gynaecologist. Although it is difficult to make conclusive statements about staging details with the high rate of unknowns, gynaecological oncologists' workload included proportionally far more Stage I's and II's and less Stage III's and IV's than the other managing specialties. This may be due to the referral process from the screening programme, by which patients with lower stage disease are referred to the gynaecological oncologists.

4.5. MANAGEMENT AT INDIVIDUAL TRUSTS

4.5.1. Cervical Cancer by Trust

▼ **Number of patients with cervical cancer by NHS Trust**

NHS Trust	n	%
United Leeds Teaching Hospitals	432	***14.6%***
Royal Hull Hospitals	431	***14.5%***
St James's & Seacroft University Hospitals	287	***9.7%***
Bradford Hospitals	260	***8.8%***
North East Lincolnshire	203	***6.8%***
Pontefract Hospitals	151	***5.1%***
York Health Services	139	***4.7%***
Calderdale Healthcare	138	***4.7%***
Pinderfields Hospitals	136	***4.6%***
Huddersfield Healthcare	134	***4.5%***
Scunthorpe & Goole Hospitals	133	***4.5%***
Dewsbury Health Care	96	***3.2%***
Scarborough & North East Yorkshire Healthcare	89	***3.0%***
Harrogate Health Care	85	***2.9%***
Airedale	80	***2.7%***
East Yorkshire Hospitals	66	***2.2%***
Northallerton Health Services	61	***2.1%***
Community Trusts	36	***1.2%***
Others	8	***0.3%***
Total	2965	***100%***

There was a large variation in the number of patients with cervical cancer by Trust, from 2.1% at Northallerton Health Services Trust to 14.6% at United Leeds Teaching Hospitals NHS Trust.

4.5.2. Age Variation by Trust

▼ **Median Anniversary Age by NHS Trust**

		Quartiles	
Trust	Median	1st	3rd
East Yorkshire Hospitals	38	33	46
Royal Hull Hospitals	41	34	59
United Leeds Teaching Hospitals	43	35	59
North East Lincolnshire	45	38	62
York Health Services	45	37	65
Pontefract Hospitals	45	36	66
Northallerton Health Services	47	38	70
St James's & Seacroft University Hospitals	49	38	66
Pinderfields Hospitals	52	37	65
Bradford Hospitals	53	38	70
Harrogate Health Care	54	40	70
Scunthorpe & Goole Hospitals	57	42	70
Calderdale Healthcare	58	41	65
Airedale	58	36	72
Huddersfield Healthcare	60	45	69
Dewsbury Health Care	62	50	74
Scarborough & North East Yorkshire Healthcare	62	50	74
Community Trusts	50	36	67
Others	60	47	72
Yorkshire	**49**	**37**	**66**

There was a large variation in the median age of patients by Trust, from 38 years in East Yorkshire Hospitals NHS Trust to 62 years in Dewsbury Health Care NHS Trust and Scarborough and North East Yorkshire Healthcare NHS Trust. The Trusts seeing younger patients tend to be those with a higher workload. A possible explanation for this may be differences in referral, with the higher workload hospitals managing more asymptomatic cases referred from the screening programme.

▼ **Surgery rate by NHS Trust (i.e. how many patients in each trust received surgery)**

NHS Trust	N		Surgery
United Leeds Teaching Hospitals	**432**	311	***72.0%***
Royal Hull Hospitals	**431**	294	***68.2%***
St James's & Seacroft University Hospitals	**287**	152	***53.0%***
Bradford Hospitals	**260**	114	***43.8%***
North East Lincolnshire	**203**	114	***56.2%***
Pontefract Hospitals	**151**	75	***49.7%***
York Health Services	**139**	67	***48.2%***
Calderdale Healthcare	**138**	45	***32.6%***
Pinderfields Hospitals	**136**	52	***38.2%***
Huddersfield Healthcare	**134**	53	***39.6%***
Scunthorpe & Goole Hospitals	**133**	30	***22.6%***
Dewsbury Health Care	**96**	30	***31.3%***
Scarborough & North East Yorkshire Healthcare	**89**	33	***37.0%***
Harrogate Health Care	**85**	37	***43.5%***
Airedale	**80**	42	***52.5%***
East Yorkshire Hospitals	**66**	56	***84.8%***
Northallerton Health Services	**61**	43	***70.5%***
Community Trusts	**36**	21	***86.1%***
Others	**8**	3	**37.8%**
Total	**2965**	1572	**53.0%**

The highest rate of surgery occurred with East Yorkshire Hospitals with 84.8% and United Leeds with 72%. The lowest rates occurred at Scunthorpe and Goole Hospitals NHS Trust with 22.6% and Dewsbury Health Care NHS Trust with 31.3%. This concurs with the finding that radical hysterectomy for cervical cancer in South East England is more frequent at teaching hospitals (Wolfe *et al,* 1996).

▼ **Surgery by NHS Trust**

NHS Trust	N	Ablative cervical lesion		Excision biopsy cervical lesion		Simple hysterectomy		Radical hysterectomy		Pelvic Exenteration	
United Leeds Teaching Hospitals	**311**	2	***0.6%***	8	***2.6%***	82	***26.4%***	218	***70.1%***	1	***0.3%***
Royal Hull Hospitals	**294**	39	***13.3%***	63	***21.4%***	107	***36.4%***	85	***28.9%***	0	***0.0%***
St James's & Seacroft Univ. Hosp.	**152**	11	***7.2%***	11	***7.2%***	51	***33.6%***	76	***50.0%***	3	***2.0%***
Bradford Hospitals	**114**	0	***0.0%***	16	***14.0%***	55	***48.2%***	42	***36.8%***	1	***0.9%***
North East Lincolnshire	**114**	4	***3.5%***	11	***9.6%***	49	***43.0%***	50	***43.9%***	0	***0.0%***
Pontefract Hospitals	**75**	1	***1.3%***	6	***8.0%***	36	***48.0%***	32	***42.7%***	0	***0.0%***
York Health Services	**67**	1	***1.5%***	16	***23.9%***	20	***29.9%***	30	***44.8%***	0	***0.0%***
Calderdale Healthcare	**45**	1	***2.2%***	14	***31.1%***	24	***53.3%***	6	***13.3%***	0	***0.0%***
Pinderfields Hospitals	**52**	1	***1.9%***	8	***15.4%***	33	***63.5%***	10	***19.2%***	0	***0.0%***
Huddersfield Healthcare	**53**	0	***0.0%***	14	***26.4%***	34	***64.2%***	5	***9.4%***	0	***0.0%***
Scunthorpe & Goole Hospitals	**30**	1	***3.3%***	6	***20.0%***	23	***76.7%***	0	***0.0%***	0	***0.0%***
Dewsbury Health Care NHS Trust	**30**	0	***0.0%***	3	***10.0%***	25	***83.3%***	2	***6.7%***	0	***0.0%***
Scarorough & NE Yorks Healthcare	**33**	2	***6.1%***	4	***12.1%***	25	***75.8%***	2	***6.1%***	0	***0.0%***
Harrogate Health Care	**37**	1	***2.7%***	12	***32.4%***	22	***59.5%***	1	***2.7%***	1	***2.7%***
Airedale	**42**	4	***9.5%***	6	***14.3%***	16	***38.1%***	16	***38.1%***	0	***0.0%***
East Yorkshire Hospitals	**56**	6	***10.7%***	27	***48.2%***	14	***25.0%***	8	***14.3%***	1	***1.8%***
Northallerton Health Services	**43**	1	***2.3%***	4	***9.3%***	21	***48.8%***	17	***39.5%***	0	***0.0%***
Community Trusts	**21**	0	***0.0%***	8	***38.1%***	9	***42.9%***	4	***19.0%***	0	***0.0%***
Others	**3**	0	***0.0%***	0	***0.0%***	2	***66.7%***	1	***33.3%***	0	***0.0%***
Total	**1572**	75	***4.8%***	237	***15.1%***	648	***41.2%***	605	***38.5%***	7	***0.4%***

The largest percentage of radical hysterectomies was undertaken by United Leeds Teaching Hospitals NHS Trust (70.1%), and none were performed by Scunthorpe and Goole Hospitals NHS Trust. Dewsbury Health Care NHS Trust performed the largest number of simple hysterectomies (83.3%) and East Yorkshire performed the least (25%). The highest rate of excision biopsy cervical lesions were at East Yorkshire Hospitals (48.2%), and the lowest at United Leeds Teaching Hospitals (2.6%). Ablative cervical lesion was not performed at all in three Trusts (Huddersfield, Dewsbury and Bradford), but 13.3% of patients at Royal Hull Hospitals NHS Trust received this treatment.

▼ **Radiotherapy Rate by NHS Trust**

NHS Trust	N	Receiving radiotherapy	
United Leeds Teaching Hospitals	432	194	***44.9%***
Royal Hull Hospitals	431	164	***38.1%***
St James's & Seacroft University Hospitals	287	149	***51.9%***
Bradford Hospitals	260	157	***60.4%***
North East Lincolnshire	203	90	***44.3%***
Pontefract Hospitals	151	76	***50.3%***
York Health Services	139	76	***54.7%***
Calderdale Healthcare	138	89	***64.5%***
Pinderfields Hospitals	136	96	***70.6%***
Huddersfield Healthcare	134	75	***56.0%***
Scunthorpe & Goole Hospitals	133	100	***75.2%***
Dewsbury Health Care	96	70	***72.9%***
Scarborough & North East Yorkshire Healthcare	89	54	***60.7%***
Harrogate Health Care	85	44	***51.8%***
Airedale	80	44	***55.0%***
East Yorkshire Hospitals	66	19	***28.8%***
Northallerton Health Services	61	14	***23.0%***
Community Trusts	36	14	***38.9%***
Others	8	6	***75.0%***
Total	2965	1531	***51.6%***

Excluding Northallerton, the lowest radiotherapy rate was 38.1% by Royal Hull Hospitals NHS Trust, and the highest was 75.2% by Scunthorpe and Goole Hospitals NHS Trust.

▼ **Known Staging Data by NHS Trust**

NHS Trust	% known staging data
United Leeds Teaching Hospitals NHS Trust	***77.3%***
Royal Hull Hospitals NHS Trust	***36.7%***
St James's & Seacroft University Hospitals NHS Trust	***70.4%***
Bradford Hospitals NHS Trust	***63.8%***
North East Lincolnshire NHS Trust	***52.7%***
Pontefract Hospitals NHS Trust	***65.6%***
York Health Services NHS Trust	***67.6%***
Calderdale Healthcare NHS Trust	***66.7%***
Pinderfields Hospitals NHS Trust	***70.6%***
Huddersfield Healthcare NHS Trust	***53.7%***
Scunthorpe & Goole Hospitals NHS Trust	***42.9%***
Dewsbury Health Care NHS Trust	***75.0%***
Scarborough & North East Yorkshire Healthcare NHS Trust	***49.4%***
Harrogate Health Care NHS Trust	***55.3%***
Airedale NHS Trust	***61.2%***
East Yorkshire Hospitals NHS Trust	***27.3%***
Northallerton Health Services NHS Trust	***49.2%***
Others	***37.5%***
Community Trusts	***27.8%***

East Yorkshire Hospitals NHS Trust had the lowest known staging data, with 27.3%, and United Leeds Teaching Hospitals NHS Trust had the highest, with 77.3%.

▼ **Stage as % of Known Stage by NHS Trust**

NHS Trust	Stage I		Stage II		Stage III or nodal involvement		Stage IV or metastases	
United Leeds Teaching Hospitals	165	***49.4%***	45	***13.5%***	77	***23.1%***	47	***14.1%***
Royal Hull Hospitals	60	***38.0%***	41	***25.9%***	26	***16.5%***	31	***19.6%***
St James's & Seacroft University Hospitals	76	***37.6%***	48	***23.8%***	51	***25.2%***	27	***13.4%***
Bradford Hospitals	45	***27.1%***	46	***27.7%***	59	***35.5%***	16	***9.6%***
North East Lincolnshire	28	***26.2%***	28	***26.2%***	37	***34.6%***	14	***13.1%***
Pontefract Hospitals	29	***29.3%***	27	***27.3%***	28	***28.3%***	15	***15.2%***
York Health Services	29	***30.9%***	36	***38.3%***	21	***22.3%***	8	***8.5%***
Calderdale Healthcare	31	***33.7%***	39	***42.4%***	12	***13.0%***	10	***10.9%***
Pinderfields Hospitals	44	***45.8%***	27	***28.1%***	16	***16.7%***	9	***9.4%***
Huddersfield Healthcare	28	***38.9%***	26	***36.1%***	16	***22.2%***	2	***2.8%***
Scunthorpe & Goole Hospitals	14	***24.6%***	22	***38.6%***	9	***15.8%***	12	***21.1%***
Dewsbury Health Care	24	***33.3%***	25	***34.7%***	18	***25.0%***	5	***6.9%***
Scarborough & North East Yorkshire Healthcare	11	***25.0%***	12	***27.3%***	16	***36.4%***	5	***11.4%***
Harrogate Health Care	20	***42.6%***	11	***23.4%***	10	***21.3%***	6	***12.8%***
Airedale	17	***34.7%***	14	***28.6%***	8	***16.3%***	10	***20.4%***
East Yorkshire Hospitals	6	***33.3%***	4	***22.2%***	4	***22.2%***	4	***22.2%***
Northallerton Health Services	8	***26.7%***	7	***23.3%***	4	***13.3%***	11	***36.7%***
Community Trusts	2	***20.0%***	1	***10.0%***	3	***30.0%***	4	***40.0%***
Others	1	***33.3%***	1	***33.3%***	1	***33.3%***	1	***33.3%***

Stage of presentation also varied considerably between Trusts. United Leeds Teaching Hospitals NHS Trust had the highest percentage of Stage I's, with 49.4%, Calderdale Healthcare NHS Trust had the highest number of Stage II's, with 42.4%, Bradford Hospitals NHS Trust had the highest number of Stage III's, with 35.5%, and Northallerton Health Services had the highest number of Stage IV's, with 36.7%.

REFERRAL 5

5.1. PRESENTATION & GP REFERRAL

There would appear to be few studies or guidelines regarding referral times for cervical cancer. Stage at diagnosis has been found to be more dependent upon the biological behaviour of the tumour than delay in presentation (Symonds *et al*, 2000). D'Arcy *et al* (2000) compared the management of women with cervical and vulval cancer in a London Gynaecological Oncology Centre with local consensus guidelines. Their guidelines recommended no more than 7 days between receipt of referral and the first visit at the Cancer centre, and 20 days from first clinic appointment to surgical treatment. Jackson *et al* (1997) found a mean delay of 17 days (range 0 – 66) from cervical smear to cytology report and 34 days (range 1 – 380) from GP referral to attendance at hospital clinic.

5.2. NYCRIS REFERRAL DATA 1986-94

5.2.1. Symptom to 1st Hospital Visit Interval

Completeness: Analysis of the interval between symptom to first hospital visit was based upon 1224 patients, 41.3% of all cases.

50% of patients were seen at the hospital up to 10 weeks after their first symptom. 175 (6%) were seen at the hospital more than 6 months after first symptom.

▼ **Symptom to 1st Hospital Visit Interval by District**

		Quartiles	
District	Median	1st	3rd
Scunthorpe	44	33	95
Harrogate	44	22	106
Airedale	49	35	101
Pontefract	50	25	108
Leeds East	58	31	102
Bradford	65	41	99
East Yorkshire	70	46	123
Scarborough	70	30	143
Dewsbury	71	41	113
Hull	74	45	111
Grimsby	74	36	126
Huddersfield	76	34	137
Leeds West	78	37	190
Wakefield	84	33	178
York	85	40	172
Calderdale	86	42	185
Northallerton	115	70	221
All Yorkshire	70	38	121

The median hospital to surgery interval ranged from 44 to 86 days across Yorkshire, with an overall median of 70 and mean of 114 days.

5.2.2. Hospital to Surgery Interval

Completeness: Analysis of the interval between first hospital visit and surgery was based upon 1545 patients, 52.1% of all cases. A few of the 1572 (53.0%) cases who received surgery did not have all of their dates complete, so could not be included in the analyses.

50% of cases received surgery up to about 6 weeks after their first hospital visit. 36 patients (1%) had waited 6 months or more for their surgery.

The median hospital to surgery interval ranged from 23 to 52 days across Yorkshire, with an overall median of 43 and a mean of 57.5 days.

▼ **Hospital to Surgery Interval by District of Residence (Days)**

		Quartiles	
District	Median	1st	3rd
Northallerton	23	15	51
Leeds West	29	17	49
Dewsbury	41	20	64
Leeds East	41	21	94
York	44	18	71
Airedale	44	19	74
Huddersfield	46	24	72
East Yorkshire	47	27	82
Grimsby	47	26	81
Scunthorpe	47	21	80
Pontefract	47	23	88
Wakefield	47	21	88
Hull	48	25	80
Scarborough	49	29	71
Harrogate	49	20	90
Calderdale	50	27	75
Braford	52	27	75
All Yorkshire	43	23	77

5.2.3. Surgery to Radiotherapy Interval

Completeness: Analysis of the interval between surgery to radiotherapy interval was based upon 363 patients, 12.2% of all cases. None of the 363 cases who received radiotherapy were excluded in the analyses.

▼ **Surgery to radiotherapy interval (days)**

Mean	Median	Range	1st Quartile	3rd Quartile
47	38	1325	26	53

▼ **Radiotherapy to surgery interval (days) if radiotherapy occurred *before* surgery (patients)**

Mean	Median	Range	1st Quartile	3rd Quartile
55	48	135	59	33

In cases who were treated by surgery and then radiotherapy (n=317), 75% of cases received radiotherapy within 8 weeks of operation. Radiotherapy occurring after surgery is more than likely to be adjuvant radiotherapy given because of adverse prognostic factors discovered at surgery, whereas surgery after radiotherapy is likely to be for persistent disease which has responded poorly to the initial radiotherapy.

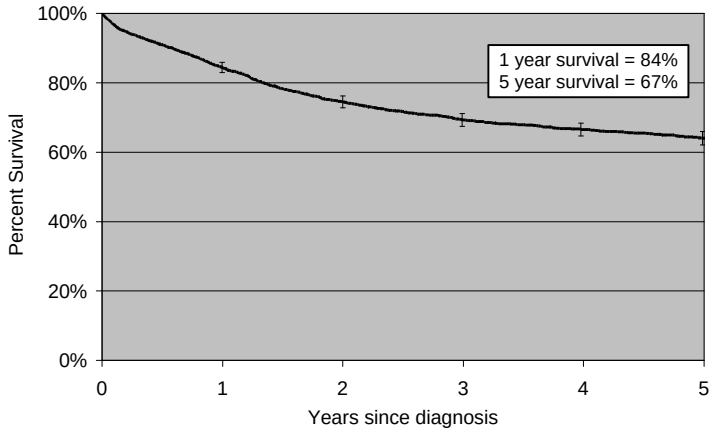
▼ **Surgery to radiotherapy interval (days)) if radiotherapy occurred *after* surgery (1 patients)**

District	Median	1st Quartile	3rd Quartile
Wakefield	30	26	46
Huddersfield	32	27	53
Scarborough	33	23	45
Hull	33	26	50
York	35	24	42
Calderdale	36	30	46
Pontefract	36	26	54
East Yorkshire	37	28	65
Airedale	39	31	48
Leeds West	39	31	55
Scunthorpe	40	27	82
Northallerton	40	34	.
Harrogate	41	32	66
Dewsbury	44	25	52
Leeds East	48	36	104
Bradford	53	40	81
Grimsby	57	45	82
All Yorkshire	40	30	55

District variation in surgery to radiotherapy interval is restricted to those cases where radiotherapy occurred after surgery, i.e. 317 patients.

6.1. OVERALL RELATIVE SURVIVAL 1986-94

▼ **Overall Survival**



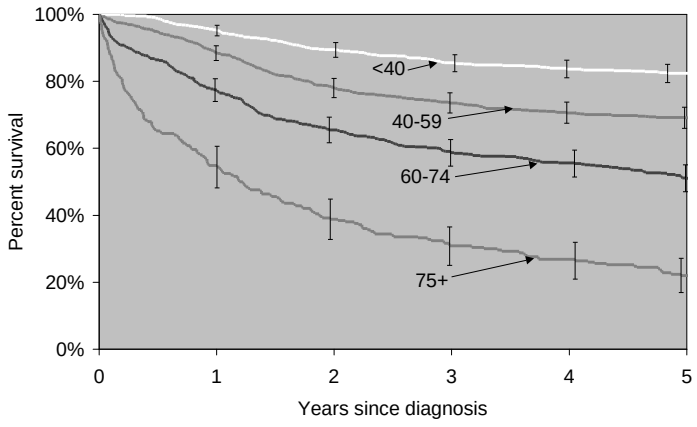
In Yorkshire 1986 to 1994, 1 year survival from cervical cancer is 84%, and 5 year survival is 67%. Survival data (1985-89) is also available from EUROCARE. All England age standardised 1 year survival is 83% (84% for all Europe) and 5 year survival is 63% (62% for all Europe).

Therefore, Yorkshire 5 year survival rates are slightly better than all England survival rates, and 1 year survival rates are very similar.

Similar 5 year survival figures from the US SEER programme 1983-1990 (Ries *et al*, 1994) were 91% for localised disease, 52.7% for regional disease and 11.8% for distant disease. Survival from cervical cancer in the US was therefore associated with stage at presentation in the US, and was also associated with age at presentation (81.1% for under 45s, decreasing to 42.5% for over 75s).

6.1.1. Survival by Age

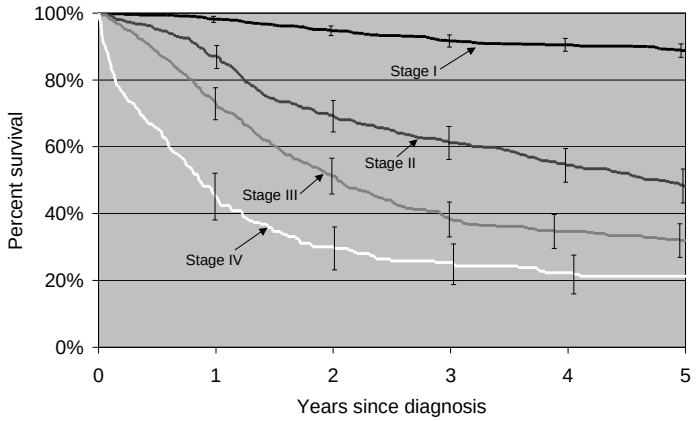
▼ **Survival by Age**



Younger patients have better prognosis than older patients. 95% of patients aged under 40 years are alive after 1 year compared with 52% of those aged 75 years and over. After 5 years 82% of the under 40 years-old group survive, compared with 20% of the over 75 year-olds. The comparable figures for the 40 to 59 year-old group are 90% and 70%, and for the 60 to 64 year-old group, 78% and 50%.

6.1.2. Survival by Stage

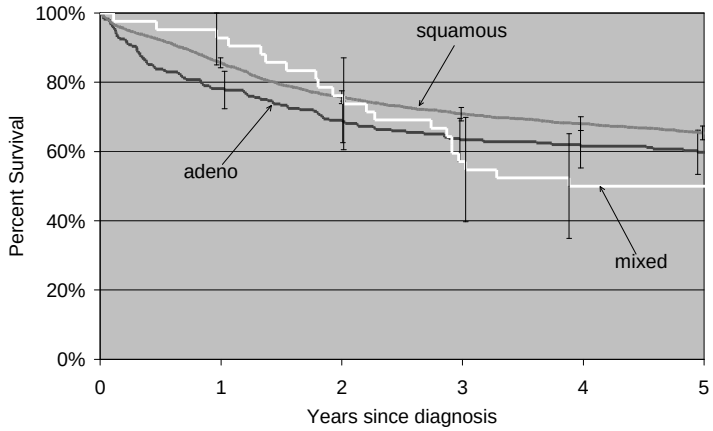
▼ **Survival by Stage**



Patients who present with lower stage disease also have better prognosis. 99% of Stage I patients are still alive at 1 year, and 90% survive 5 years or more. 87% of Stage II's survive 1 year or more, and 50% survive 5 years or more. Stage III's and Stage IV's have poorer prognosis, with 73% and 45% alive at 1 year and 33% and 22% alive at 5 years respectively.

6.1.3. Survival by Type

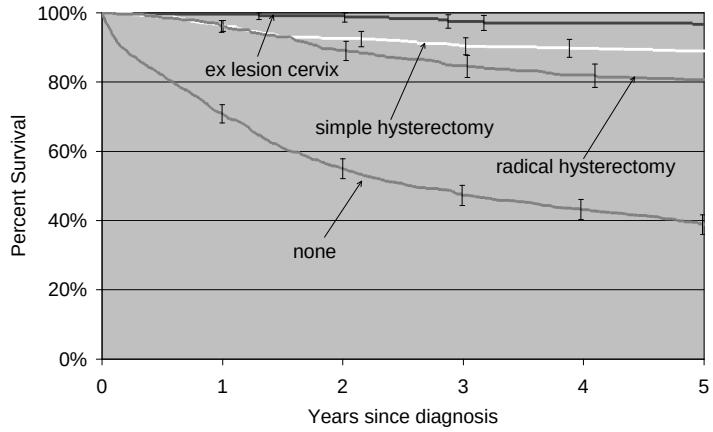
▼ **Survival by Type**



This graph shows that different types of cervical tumour have different prognoses. Squamous cell carcinoma had the better prognosis of approximately 70% survival at 5 years. Adenocarcinoma had the next best survival of approximately 60% at 5 years. Mixed adeno/squamous cell carcinoma had the worst prognosis, of less than 50% survival at 5 years.

6.1.4. Survival by Operation Group

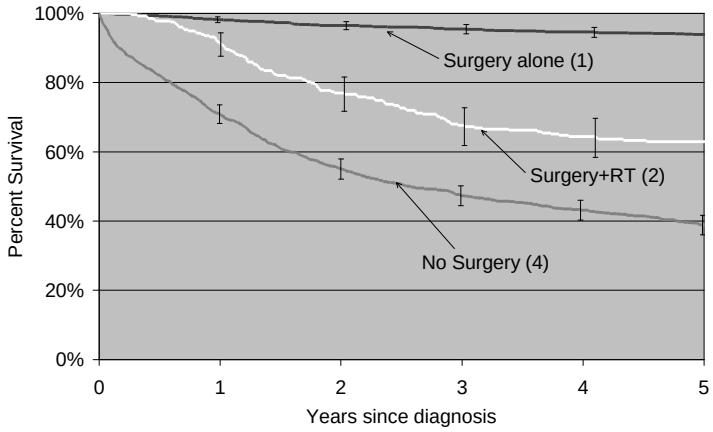
▼ **Survival by Operation Group**



Over 95% of all patients receiving treatment are alive at one year whereas about 70% of no treatment cases are alive at one year. About 95% of excision biopsy of a cervical lesion patients survive 5 years, 90% of simple hysterectomy patients survive 5 years, and 80% of radical hysterectomy patients survive 5 years. It should be noted that the type of operation is determined by the stage of disease, and the stage of disease would determine prognosis rather than the type of operation.

6.1.5. Survival by Surgery

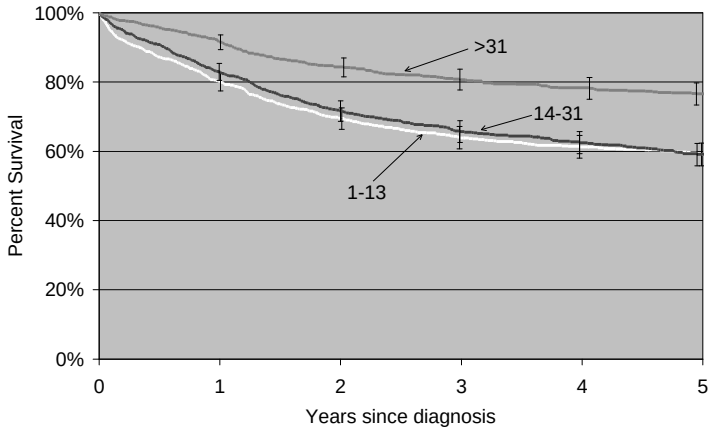
▼ **Survival by Surgery**



98% of patients who receive surgery only are alive at one year and 93% are still alive at 5 years. 90% of surgery and radiotherapy cases survive one year and 62% survive 5 years. Those who have no surgery have poorer survival curves, with 70% survival at one year, decreasing to 40% at five years.

6.1.6. Survival by Hospital Workload

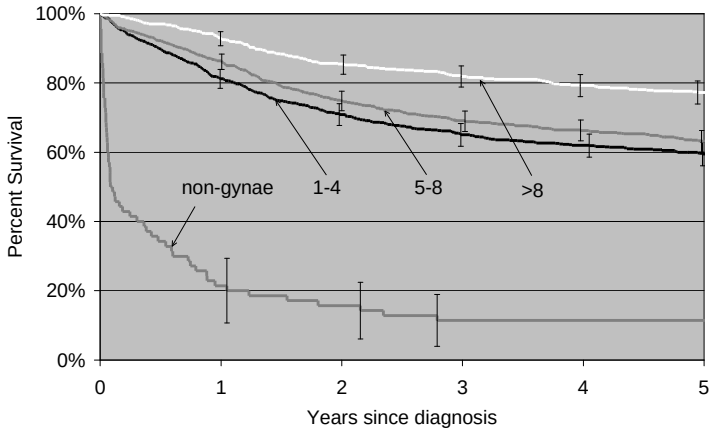
▼ **Survival by Hospital Workload (mean number of new cases per year)**



Cases at those hospitals which deal with more than 31 patients a year have better survival outcomes. At one year this difference is about 10% and at 5 years this increases to about 20%. There is about a 3% difference in survival outcomes for patients treated at hospitals which deal with less than 14 and less than 32 patients per year in the first 4 years; thereafter there is no difference.

6.1.7. Survival by Gynaecologist Workload

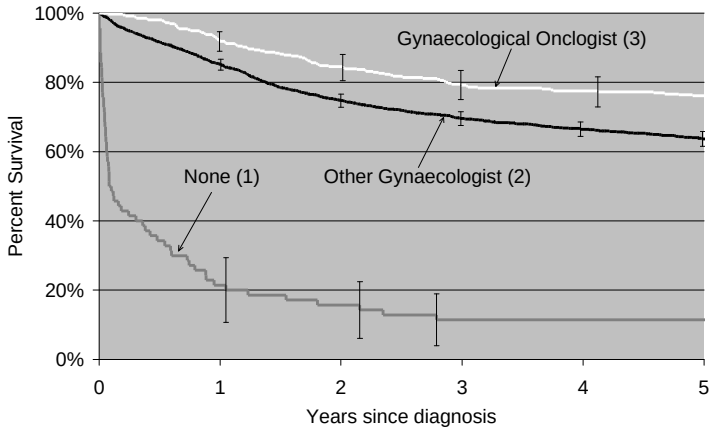
▼ **Survival by Gynaecologist Workload (mean number of new cases per year)**



Cases not treated by gynaecologists have a far poorer outcome than those treated by gynaecologists with only 20% alive at one year compared to at least 80%. Cases not treated by gynaecologists would include patients with advanced cancer referred directly to a clinical oncologist for radiotherapy, so the poorer outcome would be caused by the stage of their disease rather than incompetent clinical management. There is a 15% difference in survival with differing gynaecologist workload at one year; 80% for gynaecologists seeing 1-4 patients per year compared to 95% for gynaecologists seeing more than 8 patients per year. This difference increases to 20% at 5 years. There is about a 5% difference in survival between patients treated by gynaecologists who see 1-4 patients per year compared to those who see 5-8 patients per year.

6.1.8. Survival by Gynaecological Oncologist Group

▼ **Survival by Gynaecological Oncologist Group**



This graph shows that those treated by any gynaecologist are more than four times likely to be alive at one year (20% to 85%) than those not treated by gynaecologists. Those treated by the specialist gynaecological oncologists also have a better survival curve than the other gynaecologists so that at one year the difference is 10% and this increases to 15% at five years. This may be due to treatment received or to casemix; specialist gynaecological oncologists see more Stage I's and II's and less Stage III's and IV's than other gynaecologists.

6.1.9. Post-operative Mortality

Post-operative mortality is defined as % of definitive surgical cases where death occurred within 30 days from operation. In the Yorkshire region 0.4% of cases treated by surgery died within 30 days of surgery.

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7 MULTIVARIATE ANALYSES

7.1. RELATIVE RISK

7.1.1. Relative Risk 1986-94

▼ **Relative Risk**

Factors		Factors Alone		Relative Risk Allowing Casemix	
Casemix					
Age (yrs)	<40	1.00		1.00	
	40-59	2.08	(1.69 , 2.55)	1.62	(1.31 , 1.99)
	60-74	3.78	(3.09 , 4.64)	2.48	(2.00 , 3.06)
	75+	7.80	(6.16 , 9.89)	4.16	(3.25 , 5.32)
Socio-economic Profile	1-3	1.00		1.00	
	4-7	1.03	(0.85 , 1.26)	0.96	(0.79 , 1.18)
	8-10	1.00	(0.81 , 1.24)	0.97	(0.78 , 1.20)
Type	adeno	1.00		1.00	
	squamous	0.95	(0.75 , 1.21)	0.84	(0.66 , 1.07)
	Mixed/others	1.70	(1.09 , 2.64)	1.59	(1.02 , 2.48)
Period	1986-88	1.00		1.00	
	1989-90	0.85	(0.72 , 1.00)	0.82	(0.69 , 0.96)
	1991-92	0.97	(0.82 , 1.16)	0.99	(0.83 , 1.18)
Stage	I	1.00		1.00	
	II	5.16	(4.19 , 6.34)	3.61	(2.91 , 4.48)
	III / IV (nodal involvement or metastases)	7.86	(6.46 , 9.55)	6.11	(5.00 , 7.47)
	Unknown	1.71	(1.35 , 2.15)	1.54	(1.21 , 1.95)
Treatment	Ex lesion, no RT	1.00		1.00	
	Hysterectomy, no RT	3.65	(1.69 , 7.89)	2.97	(1.37 , 6.47)
	Ex lesion & RT	13.59	(4.57 , 40.43)	10.13	(3.36 , 30.58)
	Hysterectomy & RT	17.56	(8.18 , 37.71)	8.58	(3.93 , 18.71)
	RT, no surgery	32.60	(15.47 , 68.68)	15.37	(7.13 , 33.14)
Workload					
Hospital	1 - 13	1.00		1.00	
	14 - 31	1.09	(0.94 , 1.28)	1.09	(0.93 , 1.28)
	> 31	0.64	(0.53 , 0.77)	0.86	(0.71 , 1.04)
Gynaecologist	1 - 4	1.00		1.00	
	5 - 8	0.89	(0.76 , 1.03)	0.94	(0.81 , 1.10)
	> 8	0.56	(0.47 , 0.68)	0.80	(0.66 , 0.98)

The relative risk table presented above shows results from a univariate analysis and after adjustment for casemix variables: age, socio-economic profile, histological type, time period and stage. The relative risk estimates adjusted for all factors (i.e. also including treatment and workload variables) have not been presented, as the analysis was not statistically reliable. Although this could have been overcome, the resulting tabulations would have been extremely complex to present.

The relative risks increased as the age of the patients increased. Patients aged 40-59 had a univariate risk twice that of patients aged <40 years. For those aged 60-74, the relative risk was nearly 4 times greater than those aged <40 years (3.78); while in the over 75s, the relative risk was nearly 8 times larger (7.8). Once casemix factors had been adjusted for, the magnitude of these relative risks were reduced (although all the age categories remained statistically different from the baseline age group (<40 years) and from each other, with 95% confidence intervals that did not overlap.

There were no statistically significant differences by superprofile category, but for time period, there was a statistically significant difference between the baseline period (1986-88) and 1989-90, which remained when adjusted for other casemix factors (RR 0.82, 95% CI 0.69 to 0.96).

Squamous cell carcinomas had a reduced relative risk compared to adenocarcinomas, although this difference was not statistically significant. Those tumours that were mixed or of other types had an increased relative risk, remaining significant when adjusting for casemix (RR 1.59, 95% CI 1.02 to 2.48).

For stage, the relative risks were significantly different both from baseline (Stage I) and from each other (with 95% confidence intervals that did not cross). This remained when adjusting for casemix. The relative risks for those with unknown stage fell between those for Stage I and II tumours, suggesting that most of these unknown tumours were in fact Stage I or Stage II.

For treatment, there were increased relative risks for all treatments when compared to the baseline treatment of excision of lesion without radiotherapy. The relative risks for patients who received surgery with radiotherapy were larger than those who received surgery without radiotherapy. The relative risk for those who received radiotherapy and no surgery were much larger at 32.6 (15.37 casemix-adjusted). The relative risks were reduced when adjusting for casemix, but remained statistically significant in each case.

For workload, when considering factors alone, there was a benefit in being treated in a high volume hospital, >31 cases (RR 0.64, 95% CI 0.53 to 0.77), or by a high workload gynaecologist, >8 cases (RR 0.56, 95% CI 0.47 to 0.68). However, when these estimates are adjusted for casemix factors, the advantage for high volume hospitals was no longer statistically significant (RR 0.86, 95% CI 0.71 to 1.10), while the advantage to high workload gynaecologists was reduced (RR 0.80, 95% CI 0.66 to 0.98) but remains statistically significant. This reduction in advantage due to high workload suggests that many of the cases with a poor prognosis were treated in high volume centres, or by high workload gynaecologists.

APPENDIX 8

8.1. REFERENCES

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8.2. DATA & METHODS

8.2.1. Data Quality

In addition to the routine data quality assurance mechanisms which are maintained by NYCRIS, the dataset used in this particular study was subject to a specifically developed programme of quality control, prior to analysis.

8.2.2. Overview of Study Dataset

Data held by the Northern and Yorkshire Cancer Registry and Information Service (NYCRIS) have been analysed in this report. The results presented are applicable to the population of the former Yorkshire Regional Health Authority, a socially diverse yet relatively stable population of 3.6 million. In total, approximately 17,500 new malignant cancer patients are registered annually within that region, the details being extracted from hospital clinical notes by trained cancer registration staff.

The data collected by the former Yorkshire Cancer Registry have been analysed in this report. Data include information regarding tumour histology and definitive treatment within the first 9 weeks of diagnosis of a primary tumour. Treatment modalities; definitive surgery (not biopsies or palliative procedures), radiotherapy and chemotherapy have been routinely recorded, along with managing hospitals, managing consultants and specialties and corresponding treatment starting dates. Investigations, drug types and dosage information and consultants providing opinion, without the actual transfer of management were not recorded. The dataset also included patient information such as age at diagnosis, and district of residence.

▼ **Availability of Relevant Data Items**

Data Type	Available	Not Available
Patient	Age	
	Sex	Presentation (eg Acute)
	District of residence	Performance status
	Socio-economic status	Symptoms
	Year of diagnosis	
	Date of birth & death	
Tumour	Site of Tumour	Staging data for all cases
	Histology of tumour	
	Grade of tumour	
	Lymph node involvement & metastases	
Management	Managing consultant & specialty	Consultants providing opinion only
	Managing hospital & trust	Consultants administering each treatment
	Radiotherapy hospital	Multidisciplinary management
Treatment	Definitive surgical procedures	Biopsies and investigative procedures
	Radiotherapy (where given)	
	Chemotherapy	Drugs used & dosage
	Dates of treatment	Other palliative care
Referral	Date of first hospital visit	Presentation Pathway- GP/Acute/Other
	Dates of Surgery, RT, Chemotherapy	Chronological referral pathway
Outcome	Survival	Quality of Life
		Recurrences
		Other Quality of Care

8.3. STATISTICAL METHODS

Definitions

For the purposes of this report, the region studied was that of the former Yorkshire Regional Health Authority, and districts studied were the districts of residence, and corresponds to the District Health Authority of the period. Data were presented for patients who were resident within the Yorkshire Health region at the time of diagnosis and treated within the region.

All populations referred to in the methodology are the ONS mid-year population estimates based on the 1981 or 1991 censuses.

Registrations and Deaths

A registration is any new case of primary invasive cancer, identified by the Northern and Yorkshire Cancer Registry, arising in the population under study. The incidence rate gives the annual number of new patients registered with an invasive tumour per 100,000 population.

Age-Standardised Rate

Age-standardised registration rates (ASRs) have been calculated where the comparison of incidence between groups was of interest. This rate enables such comparisons to be made allowing for differences in their population structures, and is equivalent to the rate that would be seen if the standard population were subject to the same rates as that of the group. ASRs have been standardised against the European standard population.

To obtain the observed annual rate by five-year age groups for each area, the total number of registrations in the time period was divided by the area population for that period. The ASR was then calculated by multiplying the standard population for the five-year period by the observed rate, within each age group. The result was summed to give a rate per 100,000 population. This is known as the direct method of age standardisation.

The charts show the ASR as a dot, with the 95% Confidence Interval for the ASR as an error line around it. The Yorkshire rate is shown as a double line, the middle representing the rate and the line thickness depicting the confidence interval.

Survival

Survival times were calculated from date of diagnosis (taken as date of first hospital visit) to date of death or censoring. Death certificate only registrations were excluded, as their survival times were unknown, so they could not contribute to any survival analysis. Patients were deemed to be alive if no death certificate had been received by the time the analysis was undertaken. They were censored at the 1st January 1997.

Survival distributions were estimated for each variable separately using the Kaplan-Meier method. These were presented as curves.

Multivariate Relative Risk Analysis

Multivariate survival comparisons were made by Cox's Proportional Hazards regression. For each histological type, age, period of diagnosis, treatment and hospital centre were entered into the model. The results were presented as relative risk estimates, compared to a base category (value 1.00). Estimates were presented for each factor separately, for each factor allowing for case mix and for all factors together. Interactions between factors were also examined, but where insignificant they were omitted from the results tables.

Socio-economic Profile Classification

This was based on an analysis of 120 original census variables, at Enumeration District (ED) level, many of which are highly correlated. A transformation was applied to these variables by Principal Components Analysis to create uncorrelated derived variables. The EDs were then grouped together using Cluster Analysis based on the new derived variables or principal component scores.

Initially there were 160 relatively homogenous profile groups. These were further aggregated by cluster analysis into 40 groups and then into 10 groups, or 'Super Profiles'. The names attached to the different Super Profiles are an attempt to capture the wider characteristics of the groups in a name that can be easily referred to. A summary and characteristic description of the 10 Super Profile groups and the 40 groups contained within them is given below.

▼ **Socio-economic Profile Classification**

Super Profile Group		Description
I	'Affluent Achievers'	Very high income professionals in exclusive areas. Mature families with large detached properties in 'stockbroker belts'. Mature families in select suburban properties.
II	'Country Life'	Prosperous and farming communities. Small holders and rural workers (mainly Scotland)
III	'Thriving Greys'	High income households in genteel neighbourhoods. Affluent ageing couples, many in purchased property. Older professionals in retirement areas. Comfortably well off older owner occupiers. Affluent ageing couples in rural areas.
IV	'Settled Suburbans'	White collar families in owner occupied suburban semis. Mature white collar couples in established suburban semis. White collar couples in mixed suburban housing.
V	'Nest Builders'	Mortgaged commuting professionals with children in detached properties. Double income young families in select properties. Military families. Young white collar families in small semis and terraces. Young white collar families in smaller semis. Young blue and white collar families in semis and terraces. Young families in terraces, mainly council.
VI	'Producers'	Older blue collar owner occupiers in semis. Older workers established in semis and terraces. Older and retired blue collar workers in small council properties.
VII	'Senior Citizens'	Retired white collar workers in owner occupied flats. Older residents and young transient singles many in seaside towns. Old and young buying terraces and flats. Retired blue collar workers in council flats, mainly in Scotland.
VIII	'Urban Venturers'	High income young professionals mainly renting (mainly Greater London). Young white collar workers in multi racial areas (mainly London). Young professionals buying property. Young families buying terraces in multi racial areas. Young families renting basic accommodation. Young white collar singles sharing city centre accommodation.
IX	'Hard Pressed Families'	Blue collar families in council properties. Young blue collar families in council terraces. Manufacturing workers in terraced housing.
X	'Have Nots'	Families in council flats in multiracial areas with high unemployment. Blue collar young families in council properties with high unemployment. Young families, many single parent, with high unemployment. Young singles and pensioners in council flats with high unemployment.