Public Health England

Protecting and improving the nation's health

National Cancer Intelligence Network

Management of non-melanoma skin cancer in England – patient activity: 2010 data based on inpatient cancer hospital episode statistic

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Executive summary

Non-melanoma skin cancers (NMSC) are the most common group of cancers in England. [1] The most frequent types are basal cell and squamous cell carcinomas but the group also includes a number of rare cancers. The majority are managed as outpatients or day cases, others undergo procedures for extensive or invasive disease including reconstruction.

Hospital episode statistics (HES) data was used to identify NMSC (ICD10 C44) with an admission in 2010 (day and inpatient cases).

Data on procedures undertaken for skin cancer management including specialities involved, number of bed days for inpatients, age and first and second procedure codes were extracted. Cost assigned to healthcare resource groups (HRG) and cost of excess bed days were used to calculate total cost of spells.

The total number of admissions was 102,445. The average male to female case ratio was 1.4:1. The overall cost of NMSC management based on HES in 2010 was £80,092,999. Dermatology and plastic surgery services were associated with the highest cost for day and inpatient cases respectively but the recording of specialties involved in skin cancer care varied geographically in England. Sixty three per cent of excisions were for head and neck lesions. Fifty seven per cent of skin procedures (code prefix S) undertaken as a second procedure were related to reconstruction. The average inpatient stay in England was 4.3 days.

The use of HES data provided evidence of the amount of complex surgical repair and consequent cost taking place as part of the management of NMSC. Given the predicted increase in incidence of NMSC over the coming years in an ageing population it is essential that a better assessment of the level of care and cost involved, as well as public awareness of the disease, are achieved.

2 Introduction

NMSC is the most common cancer in England.[1] The main types of NMSCs are squamous cell carcinoma and basal cell carcinoma; they also include a number of rare cancers such as merkel cell carcinoma. Squamous cell carcinoma and basal cell carcinoma account for at least 20% of all new malignancies. Overall, 83,143 cases of squamous cell carcinoma and basal cell carcinoma were recorded in England in 2010. We know this is underestimated because the current United Kingdom and Ireland Association of Cancer Registries (UKIACR) rule recommends that only the first occurrence of squamous cell carcinoma or basal cell carcinoma in an individual be registered. In a project undertaken in the South West, based on 2009 data, 46% extra basal cell carcinoma and 28% extra squamous cell carcinoma were found in addition to those recorded using the UKIACR NMSC registration rule.[3] There is also variation in the registration process between registries. It has been estimated,[4] based on 2004-06 data, that if all English registries were applying the NMSC registration rule correctly, an additional 9,043 to 14,625 cases per year would be recorded.

We have also shown previously that there is significant geographical variation in the number of NMSC patients.[1] This variation has several contributory factors: an actual difference in incidence related to UV exposure; variation in the proportion of the population from black and minority ethnic groups, which are less genetically susceptible to skin cancer, and, as described above, diagnostic or registration policies.

NMSCs are often classified as low risk or high risk of recurring and this classification is based on histological features, anatomical sites (including head, neck and H zone for basal cell carcinoma) and factors such as size, immunosuppression, genetic disorders and previously treated lesion.[5]

Additional criteria that should be taken into account to define low and high risk NMSC are: risk of incomplete excision, skill and experience of the healthcare professional, and risks caused to underlying anatomical structures.[5]

Once a patient has been diagnosed with an NMSC they have an increased risk of developing further skin cancers of any type. This is because the skin has been subjected to widespread ultraviolet damage and other factors such as genetic predisposition and immunosuppression. Patients may also present with more than one skin cancer at first or subsequent presentation. The updated version of the NICE guidance ‘Improving Outcomes for People with Skin Tumours Including Melanoma’[5] concluded that only low risk basal cell carcinoma should be managed in primary care and all other skin cancers should be referred to secondary care for management. A high percentage of NMSCs occur on the head and neck, and many can therefore be considered as high risk. They can require extensive plastic repair procedures.

The true workload for managing NMSCs is not known. This study is the first to use HES data to evaluate the day case and inpatient management of NMSC. The aim of the project was to use HES data to investigate the pattern of day case and inpatient management of NMSC patients who underwent a procedure during 2010.

The following were of particular relevance:

- number of admissions, procedures and patients
- demography of patients being admitted
- variation by Cancer Networks
- specialties involved in the care of NMSC patient
- cost of procedures

3 Methodology

This study used the inpatient cancer HES dataset as our main source of data. This dataset included all cancer patients admitted to hospital and/or given a procedure as a day case or inpatient in 2010. It gave us access to a range of demographic, clinical and geographical data related to admission and day care, and associated costs. This analysis does not include outpatient data, which we did not have access to at the time of this project.

The inpatient HES data extract included records with a diagnosis of ICD10 code C44 ('other malignant neoplasm of skin'), which includes squamous and basal cell carcinoma as well as other rarer skin cancers such as Merkel cell carcinoma. Eight diagnosis fields (diag_01 to diag_08) were extracted although a previous examination of the data showed that for episodes involving a C44 code, this was recorded in the first diagnostic field (diag_01) in 94% of cases.

Day case and inpatient spells were analysed separately and defined by the spell duration. A spell is the duration of an admission in one hospital and can include one or more episodes. One episode is a period of care under one consultant. The latest episode of a spell was used to identify each spell. One patient can have more than one spell for skin cancer for example if they need to be readmitted for further treatment or reconstruction related to the same or an additional tumour.

The data were analysed by age group, sex, location of residence, specialty treating the patients and procedures. Office for National Statistics population estimates were used in rate calculations, and rates were directly age standardised using the European Standard Population (1976).

A second database was used in this project as a reference. All cases of NMSC recorded on the National Cancer Data Repository (NCDR) and diagnosed in 2010 were identified using ICD10 code C44.

NCDR data were also directly linked to the inpatient HES data. Each NHS number present on NCDR was matched with the NHS number from the inpatient HES data extract and the first 2010 admission for each squamous cell carcinoma and basal cell carcinoma diagnosed in 2010 per patient was then selected. These data therefore include patients with a squamous cell carcinoma and basal cell carcinoma but do not include patients with more than one squamous cell carcinoma or basal cell carcinoma due to the UKACR registration rule.[2] These linked data were used to estimate the morphological composition of the cohort.

We used the first two procedures for analysis of all episodes. The main procedure code (ie most resource intensive) is listed first (oper_01)[6] in the inpatient HES dataset. The other fields contain secondary procedures. The procedure codes used in inpatient HES are based on the Classification of Surgical Operations and Procedures (OPCS) codes. OPCS codes classified as

primary codes are site specific and others are subsidiary codes. We identified primary codes with a prefix ‘S’ for all the main procedures related to skin. They are often used in conjunction with a subsidiary code related to the site of operation or mode of operation. Other primary codes related to skin procedures of the nose, eyebrow and lid, ear, lip and others were also used (see Table 1 below).

Table 1: Primary procedure code types related to skin procedures

Primary procedure code type
Skin (code prefix S)
Nose (code prefix E)
Eyebrow and lid (code prefix C)
Ear (code prefix D)
Lip (code prefix F)
Anus (code prefix H)
Orbit (code prefix C)
Vulva (code prefix P),
Rectum (code prefix H)
Penis (code prefix N)
Scrotum (code prefix N)

While dermatology and plastic surgery were the main specialties involved in skin cancer management others, such as maxillofacial, and ear, nose and throat (ENT), were also involved. This report explores the extent of service diversity across England.

Cost was calculated from a combination of healthcare resource group (HRG) and excess bed days. HRG is a code relating to a defined cost, and is derived from information about the admission, including whether it was elective or non-elective. The excess bed days is the number of days over a defined length of stay for each HRG code, which is based on the 25% best performing Trusts. These have a fixed daily cost.[8]

The geographic distribution of the cohort was restricted to English Cancer Networks and based on patient residence at diagnosis. At time of publication, Cancer Networks no longer existed but were still considered a useful geographical tool to assess diversity of services across England.

4 Results

4.1 Cohort details based on inpatient HES data

The total number of episodes with a C44 diagnosis among the eight diagnostic fields was 110,562 for patients resident in England. These included 103,550 episodes in residents of England given the C44 diagnosis as their first relevant diagnosis during an admission in 2010. Of the overall number of episodes: 293 records did not have an NHS number, 440 records had no discharge date and 485 episodes did not have a spell duration. Data on sex were not available for eight cases. The total number of episodes retained for analysis was 102,772. The number of spells/admissions was 102,445. The total number of patients with an NHS number was 84,470. Some patients had more than one admission and this could have been for a different tumour.

There were 96,240 day cases and 6,205 inpatient admissions based on the last episode of each spell. Overall there were 59,814 admissions for males and 42,623 for females. The male to female ratio of admissions was 1.4:1.

4.1.1 Estimation of the number of squamous cell carcinoma and basal cell carcinoma present on HES data extract using NCDR

A number of cases (n=502) from both HES and NCDR did not have a valid NHS number. In addition, some cases included on the NCDR had a diagnosis in 2009 but had a first admission in 2010, or they were diagnosed at the end of 2010 but did not have an admission before 2011. The total number of cases matched was 43,372. Table 2 shows the main types of NMSCs represented within the cohort.

Table 2: Morphology type distribution of HES-NCDR matched cases (2010 data)

Morphology types	% (n)
Basal cell carcinoma	73.3 (31,807)
Squamous cell carcinoma	23.3 (10,135)
Others	3.3 (1,430)
Total	100 (43,372)

Source: NCDR and HES

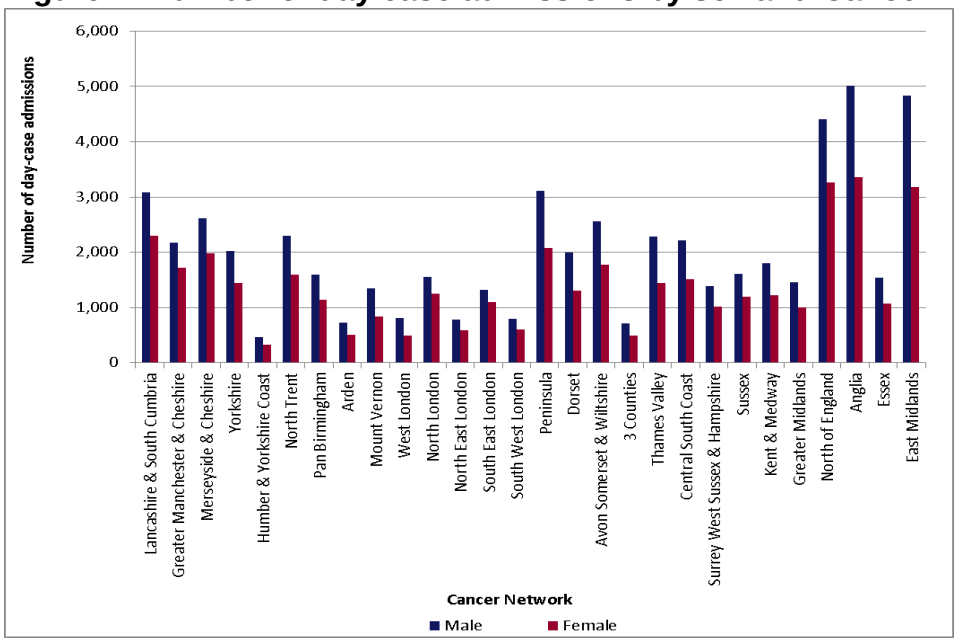
The data show that within the cohort almost three-quarters of NMSCs were basal cell carcinoma and almost one quarter were squamous cell carcinomas. Other NMSC accounted for 3.3%. These data are relevant for the interpretation of data on procedures later in the report.

4.2 Day case and inpatient activity

4.2.1 Number of day case admissions by sex and Cancer Network

Absolute numbers of day case admissions for 2010 broken down by sex and English Cancer Network are shown in Figure 1.

Figure 1: Number of day case admissions by sex and Cancer Network for the year 2010



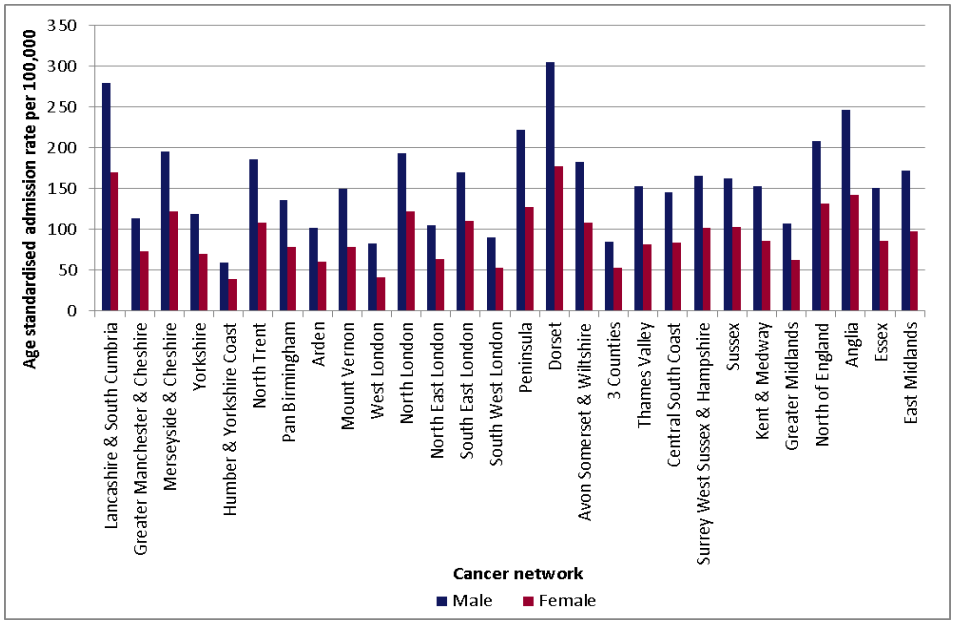
Source: HES data

Overall the number of male day case admissions for NMSC was higher than that for females in all Cancer Networks in England. The national average male-to-female ratio was 1.4:1 and varied between 1.2:1 (South East London) and 1.6:1 (West London).

4.2.2 Age standardised admission rates of NMSC day cases

The number of NMSC cases in Figures 1 (day cases) and 4 (inpatients) vary greatly between Cancer Networks. While factors such as ethnicity, geographical location and socio-economic background can influence the number of NMSC cases, age plays an important role in these variations. To adjust for the latter, the data for day cases (Figure 2) and inpatients (Figure 5) have been age standardised as described in the methods.

Figure 2: Age standardised admission rates of NMSC day cases by sex and Cancer Network based on HES data in 2010



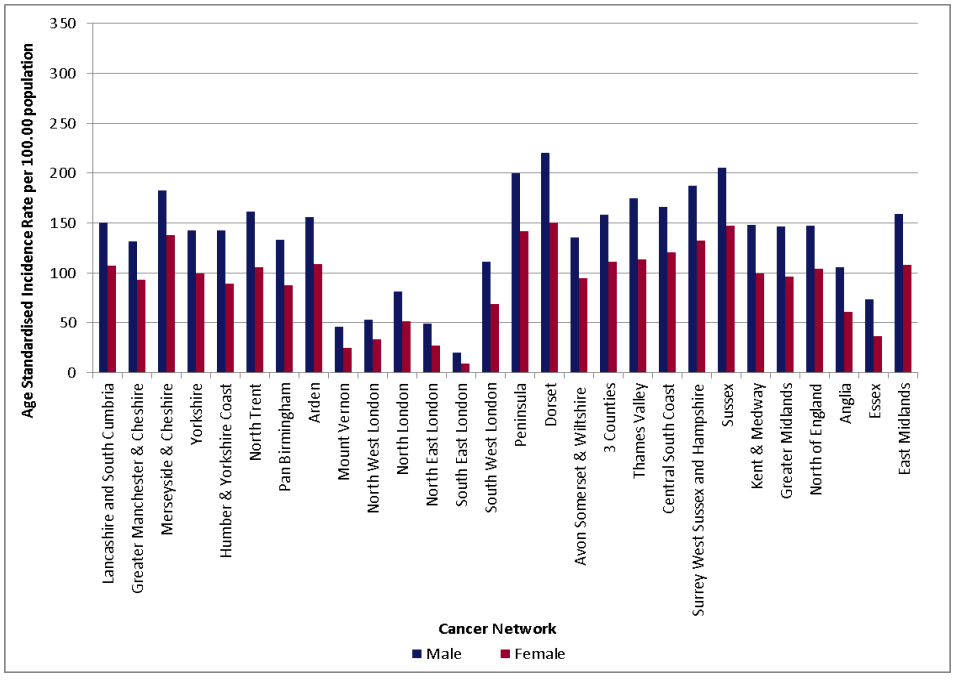
Source: HES data and UKACR population data

There is variation in the age standardised admission rates of day cases but overall there is a higher rate for males than females.

4.2.3 Age standardised incidence rates for NMSC based on NCDR

We are able to compare the pattern of day case admissions across the Cancer Networks with the age standardised incidence rates using NCDR, as described in the methods.

Figure 3: Age standardised incidence rates (ASR) of NMSC by Cancer Network based on NCDR data in 2010

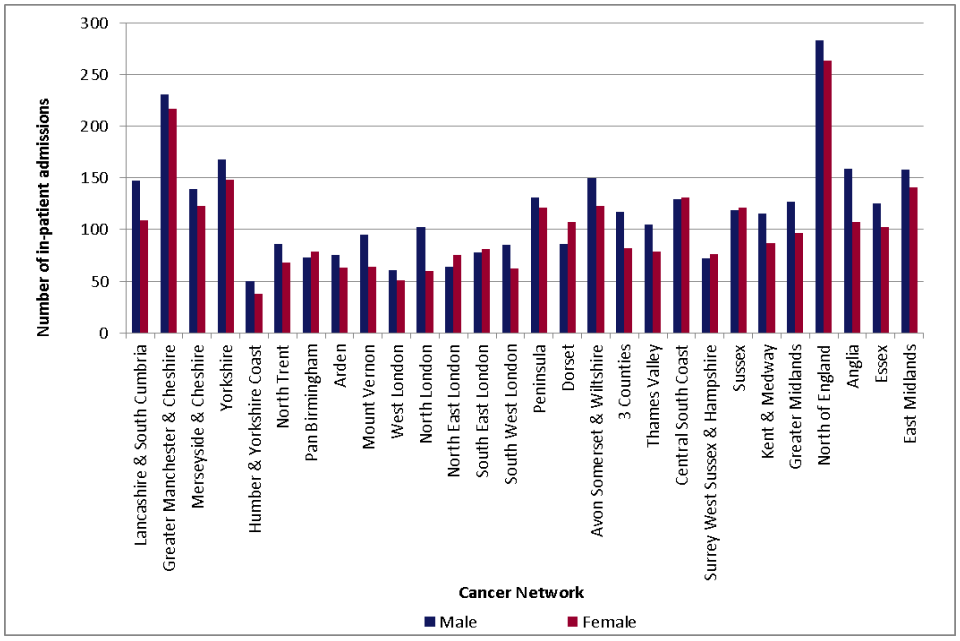


Source: NCDR data and ONS population data

The age standardised incidence rates based on the NCDR data are subject to the UKACR rules. However, variations in the registration process across England have historically occurred for the registration of basal cell carcinoma. The London and East of England region networks have a low NMSC registration rate due to data transfer issues from Trusts and low registration respectively. Consequently, the NCDR cannot unfortunately be used to describe the true pattern of incidence of NMSC across Cancer Networks.

4.2.4 Number of inpatient admissions by sex and Cancer Network

Figure 4: Number of inpatient admissions by sex and Cancer Network for the year 2010

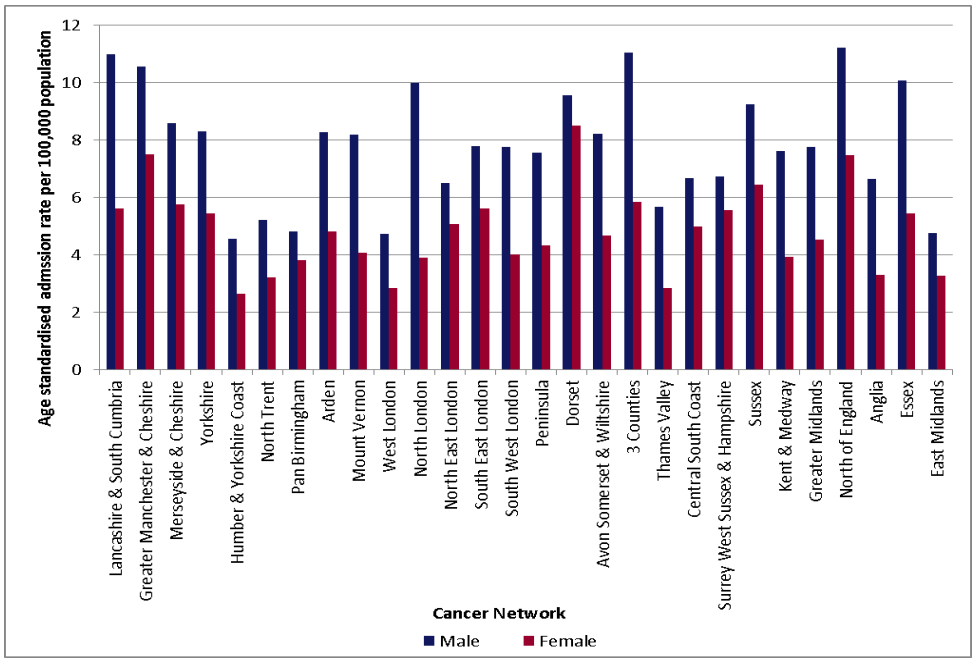


Source: HES data

The number of male inpatient admissions for NMSC was higher than that of females in many Cancer Networks but equal to or even lower than that of females in others. The national average male to female ratio was 1.2:1 and varied from 0.8:1 (Dorset) to 1.7:1 (North London).

4.2.5 Age standardised admission rates for inpatient NMSC cases

Figure 5: Age standardised admission rates of NMSC inpatient cases by sex and Cancer Network based on inpatient HES data in 2010



Source: HES data and UKACR population data

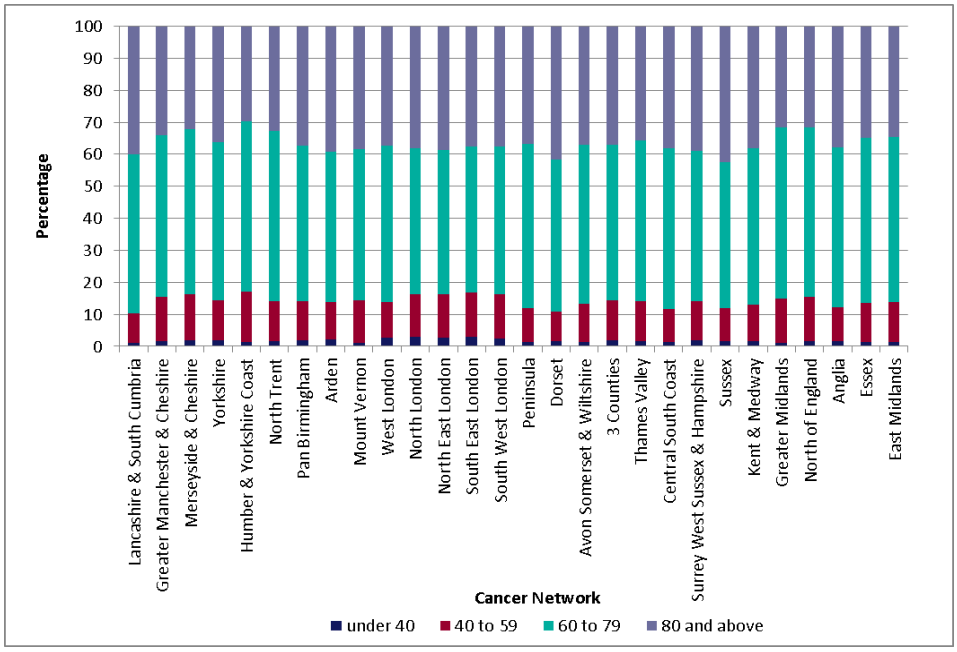
Age standardised admission rates for inpatient cases were variable, as were those for day cases (Figure 5). Caution should be taken in comparing these results with those of day cases as the y-axis is different from that of Figure 2. Overall admission rates were very low.

4.3 Age distribution

4.3.1 Age groups for NMSC cases by Cancer Network

The total number of day case admissions recorded for each Cancer Network broken down by age group is shown in Figure 6 to illustrate the age composition of cases in the networks.

Figure 6: Percentage of day case admissions by age group and Cancer Network in 2010



Source: HES data

The largest age group in all Cancer Networks was the 60- to 79-year-olds but it should be noted that 1.1% (Greater Midlands) to 2.9% (South East London) of day case patients in each Cancer Network cohort were under 40 years old and 9.4% (Lancashire and South Cumbria) to 17% (Humber and Yorkshire Coast) were between 40 and 59 years old.

4.3.2 Percentage of day cases and inpatient cases by age group and sex

Overall day case and inpatient admissions for NMSC were broken down by age group and sex, and presented as proportions in Tables 3, 4 and 5.

Table 3: Percentage of day cases and inpatient cases in each age group by sex

Admission type	Age group (%)				
	Under 40	40 to 59	60 to 79	80 and above	Overall
Male day case	41.4	47.5	58.9	53.1	55.1
Female day case	51.6	47.7	36.3	38.7	38.8
Male inpatient	3.6	2.5	2.9	4.0	3.3
Female inpatient	3.5	2.3	1.9	4.1	2.8
Total	100	100	100	100	100

Source: HES data

Data were analysed within each age group. There was a higher percentage of females than males under 40 years of age as day cases , whereas there was a higher percentage of male than female day cases in the 60 to 79 and the 80 and above age groups (Table 3).

Table 4: Percentage of day cases and inpatient cases in each sex by age group

Admission type	Age group (%)				
	Under 40	40 to 59	60 to 79	80 and above	Total
Male day case	1.2	10.5	53.3	35.0	100
Female day case	2.2	14.9	46.7	36.2	100
Male inpatient	1.8	9.2	43.9	45.1	100
Female inpatient	2.0	10.1	34.5	53.4	100

Source: HES data

Data analysed within day case and inpatient cohorts showed that there was a higher percentage of female than male day cases in the younger age groups (under 40 and 40 to 59 year olds). A higher percentage of females than males was found in the 80 and above age group both for day cases and inpatients (Table 4).

Table 5: Numbers and ratios of day cases vs inpatients in each age group by sex

	Male		Female	
Age groups	No of day case/inpatient	ratio	No of day case/inpatient	ratio
under 40	694/60	11.6	865/58	14.9
40 to 59	5,913/306	19.3	5,933/290	20.5
60 to 79	30,090/1,462	20.6	18,543/992	18.7
80 and above	19,787/1,502	13.2	14,407/1,535	9.4
Total	56,484/3,330	17.0	39,748/2,875	13.8

Source: HES data

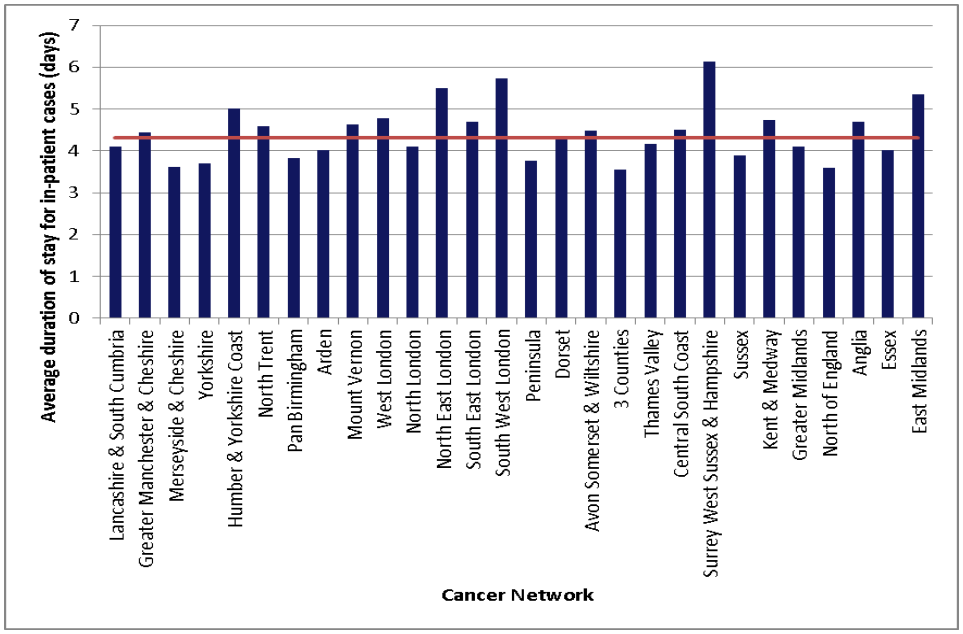
The ratio of day case to inpatient admission varied according to age group and sex. The ratio was much lower in the youngest and oldest patients.

4.4 Time spent in hospital

4.4.1 Length of stay for NMSC patients admitted as inpatients by Cancer Network

The average duration of stay was calculated using inpatient stays in hospital for cases diagnosed with ICD10 code C44 as their first diagnosis, divided by the total number of such inpatient admissions.

Figure 7: Average duration of inpatient stays for NMSC care by Cancer Network in 2010



Source : HES data

The average duration of inpatient stay across the Cancer Networks in England was 4.3 days (shown as a red line in Figure 7). The range was 3.5 days in the 3 Counties Cancer Network to 6.1 days in the Surrey West Sussex & Hampshire Cancer Network.

4.4.2 Inpatient excess bed days

Inpatient excess bed days were calculated as described in the methods section. This represents the number of additional bed days spent in hospital above the recommended number of days associated with a specific procedure (HRG).

Overall, 23% (1438/6205) of inpatients had a total of 8,529 excess bed days as part of their admission.

4.5 Procedures undertaken and specialties involved in the management of NMSC

A total of 2,118 episodes (2% of all NMSC admissions) had no procedure recorded as a first procedure (oper_01) and 5,898 episodes (6%) had no procedure recorded as a secondary procedure (oper_02). Unless specified, all episodes were used for the analysis of procedures.

4.5.1 Main procedure with a primary OPCS code by sex

Among the first procedure fields listed in the HES data based on OPCS codes and considered as the main procedure (oper_01) were primary codes with a code prefix S and other primary codes based on anatomical sites but with a specifically skin related procedure with a code prefix E, C, D, F, H, P or N. The distribution of episodes for day cases and inpatients by these categories of procedure codes is shown in Tables 6 and 7.

Table 6: Total episodes of main operation types based on the first procedure field for day cases

Primary OPCS code	Sex		
	Male	Female	Total
Skin operation (code prefix S)	35,987	25,531	61,518
Nose (code prefix E)	6,298	5,856	12,154
Eyebrow and lid (code prefix C)	4,530	4,789	9,319
Ear (code prefix D)	6,410	760	7,170
Lip (code prefix F)	822	1,062	1,884
Anus (code prefix H)	42	53	95
Orbit (code prefix C)	26	9	35
Vulva (code prefix P)	-	13	13
Rectum (code prefix H)	3	7	10
Penis (code prefix N)	4	-	4
Scrotum (code prefix N)	2	-	2
Total	54,124	38,080	92,204

Source : HES data

Table 7: Total episodes of main operation types based on first procedure field for inpatient cases

Primary OPCS code	Sex		
	Male	Female	Total
Skin operation (code prefix S)	1,712	1,629	3,341
Nose (code prefix E)	364	392	756
Eyebrow and lid (code prefix C)	270	322	592
Ear (code prefix D)	351	52	403
Lip (code prefix F)	80	72	152
Anus (code prefix H)	14	22	36
Orbit (code prefix C)	13	13	26
Vulva (code prefix P)	-	4	4
Rectum (code prefix H)	1	4	5
Scrotum (code prefix N)	1	-	1
Total	2,806	2,510	5,316

Source : HES data

67% of procedures undertaken as main operation, day cases and 63% undertaken as inpatients were coded using the skin primary code (code prefix S). There was a clear difference between males and females in the number of day cases and inpatients with ear procedures. Overall, 12% of males presented with ear related procedures as opposed to 2% of females, while the latter had a higher proportion of procedures of the nose, eyebrow and lip (31% female vs 21.5% male).

4.5.2 Details of procedures undertaken as a main procedure by specialties

Procedures coded with a skin primary OPCS code (code prefix S) were examined for the consultant specialty in the HES record. Detailed procedure data was split by specialties such as dermatology, plastic surgery and other specialties with an involvement in skin cancer (maxillofacial, ENT, oral and general surgery). Other specialties with some involvement in the patient pathway but without a special interest in skin cancer management undertook a small number of episodes with a skin primary OPCS code (code prefix S). Data are presented for day cases and inpatients.

Table 8: Details of main procedures with a primary code (OPCS) for skin procedures (prefix code S) for day cases by main specialties involved in NMSC management in 2010

Procedure type	Dermatology		Plastic surgery		Maxillofacial, ENT, oral and general surgery		Specialties without a special interest in skin		Total
	No of episodes	%	No of episodes	%	No of episodes	%	No of episodes	%	
Other excision of lesion of skin	23,106	45.1	19,640	38.4	7,947	15.5	515	1.0	51,208
Punch biopsy of skin	2,800	82.4	287	8.5	277	8.2	32	0.9	3,396
Curettage of lesion of skin	1,935	96.5	35	1.7	15	0.7	21	1.0	2,006
Other biopsy of skin	604	54.4	350	31.5	133	12.0	24	2.2	1,111
Microscopically controlled excision of lesion of skin	925	97.1	11	1.2	8	0.8	9	0.9	953
Photodynamic therapy of skin	920	97.1	5	0.5	14	1.5	8	0.8	947
Other autograft of skin	57	10.8	373	70.5	86	16.3	13	2.5	529
Others	173	36.3	142	29.8	110	23.1	52	10.9	477
Other local flap of skin	74	16.6	233	52.1	129	28.9	11	2.5	447
Split autograft of skin	8	2.9	255	93.4	8	2.9	2	0.7	273
Shave biopsy of skin	158	90.3	12	6.9	5	2.9	0	0.0	175
Total	30,760	50.0	21,343	34.7	8,732	14.2	687	1.1	61,522

Source : HES data

‘Other excision of lesions of skin’ (OPCS code: S06), which dermatologists have suggested equates with wide local excision, represents the majority of the procedures and was undertaken mostly by dermatologists and plastic surgeons (Table 8). 63% of the S06 procedure codes in Table 9 were specific to head and neck (S065).

Dermatologists did 96.5% of the curettages of the skin, 82.4% of punch biopsies and most other procedures such as microscopically controlled excisions of skin lesions (Mohs surgery),

photodynamic and shave biopsies. Plastic surgeons undertook most of the graft and flap-related procedures. However the other skin-related specialties (maxillofacial, ENT, oral and general surgery) also performed flap procedures.

Table 9: Details of main procedures with a primary code (OPCS) for skin procedures (prefix code S) for inpatient cases by main specialties involved in NMSC management in 2010

Procedure type	Dermatology		Plastic surgery		Maxillofacial, ENT, oral and general surgery		Specialties without a special interest in skin		Total
	No of episodes	%	No of episodes	%	No of episodes	%	No of episodes	%	
Other excision of lesion of skin	90	3.1	1,998	68.2	785	26.8	58	2.0	2,931
Others	16	15.8	39	38.6	35	34.7	11	10.9	101
Split autograft of skin	1	1.0	84	84.8	14	14.1	0	0.0	99
Other autograft of skin	0	0.0	34	60.7	20	35.7	2	3.6	56
Other local flap of skin	0	0.0	26	49.1	27	50.9	0	0.0	53
Other biopsy of skin	4	11.1	12	33.3	14	38.9	6	16.7	36
Punch biopsy of skin	19	55.9	5	14.7	4	11.8	6	17.6	34
Microscopically controlled excision of lesion of skin	15	50.0	8	26.7	6	20.0	1	3.3	30
Total	145	4.3	2,206	66.0	905	27.1	84	2.5	3,340

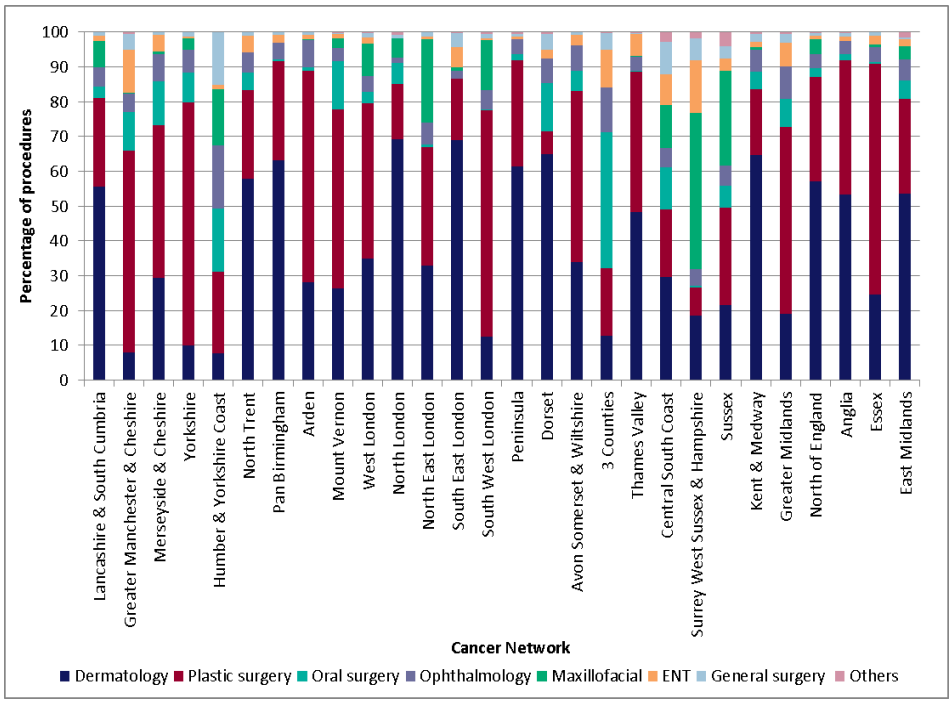
Source : HES data

Details of inpatient procedures showed that although ‘Other excision of lesions of skin’ constituted, as for day cases, the majority of the procedures, plastic surgeons undertook 68.2% while dermatologists performed only 3.1%. Overall plastic surgeons performed two-thirds of the procedures undertaken as inpatient episodes.

4.5.3 Percentages of main specialties involved in NMSC management

Data presented in Figures 8 and 9 were based on the proportions of main procedures with a primary code (OPCS) specific for skin (code prefix S) or skin related (code prefix E, C, D, F, H, P, N) undertaken by specialties involved in the care of NMSCs and split by Cancer Network. Data are presented by day cases and inpatient cases.

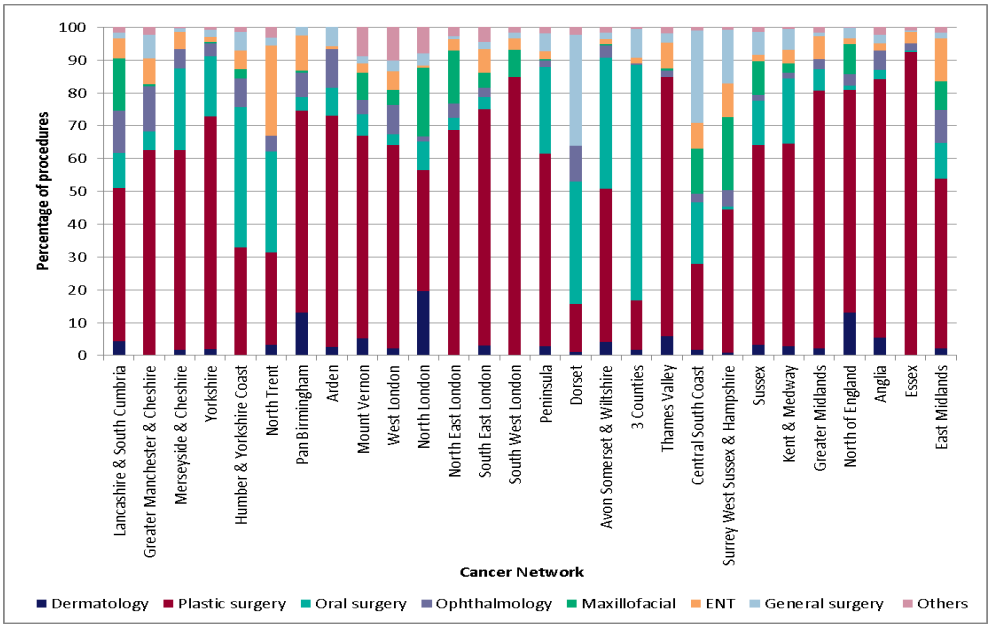
Figure 8: Percentage of specialties involved in day case NMSC management by Cancer Network in 2010 based on primary codes (OPCS) for skin procedures (code prefix S) and skin related procedures (code prefix E, C,D, F, H, P, N) recorded on HES as main procedure



Source : HES data

Dermatology and plastic surgery were the main specialties involved in the management of NMSC across Cancer Networks. However there was variation in the organisation of services and specialties involved. The data reflect those presented previously in Table 8.

Figure 9: Percentages of specialties involved in inpatient NMSC management by Cancer Network in 2010 based on primary codes (OPCS) for skin procedures (code prefix S) and skin related procedures (code prefix E, C, D, F, H, P, N) recorded on HES as main procedure



Source : HES data

Figure 9 shows a greater involvement of surgical specialties in the management of skin cancer. As in Figure 8 there was variation by Cancer Network of specialties involved in skin cancer management.

4.5.4 Comparison of main procedures by specialties for skin and other skin procedures

A summary of the proportions of the main procedures based on skin (code prefix S) or other primary codes related to skin procedures of the nose, eyebrow and lid, ear, lip and others (code prefix E, C, D, F, H, P, N) is given below (Table 10).

Table 10: Overall percentages of skin and skin related procedures undertaken as main procedures for day cases by specialties in England in 2010

	Main procedures (%) *('skin' procedure alone prefix S)*[1]	**Main procedures (%)** *(other skin procedure prefix:* E, C,D, F, H, P, N)[1]
Dermatology	50	29.6
Plastic surgery	34.7	34.9
Ophthalmology	-	15.8
Oral surgery	5	7.1
Oral & maxillofacial	4.5	5.2
General surgery	2.7	0.7
ENT	2.1	6.1
Others	1.1	0.4

Source: HES data,
Note: [1] see prefix definition in Tables 6 and 7

The procedures coded with a skin procedure primary code were more often undertaken by dermatologists.

4.6 Secondary procedures (oper_02)

4.6.1 Secondary procedures (oper_02) undertaken for NMSC management within an episode

As explained in the methodology the first two procedures recorded in one episode were analysed. The first procedure recorded was considered as the main procedure (see 4.5.1) and the first of the secondary procedures (oper_02) undertaken for the NMSC management was referred as the secondary procedure in this analysis. Only primary skin codes (code prefix S) or other skin related (nose, eyelid, ear, lip and other (code prefix E, C, D, F, H, P, N)) procedures were considered.

Table 11: Number of episodes with a mention of a skin code procedure as secondary procedure having had a skin or skin related procedure as a main day case procedure

Secondary skin procedure (code prefix S)	Main procedure (skin or skin related)						
	Skin operation	Nose operation	Eyebrow and lid operation	Ear operation	Lip operation	Other operation[2]	Total
Other local flap of skin	3,875	1,803	479	489	141	0	6,787
Other autograft of skin	2,838	1,593	299	449	31	0	5,210
Other excision of lesion of skin	476	876	341	379	173	0	2,245
Split autograft of skin	1,993	36	7	17	2	0	2,055
Microscopically controlled excision of lesion of skin	50	1,060	591	175	108	0	1,984
Others (including additional flap and graft procedures)	956	506	264	123	58	1	1,908
Punch biopsy of skin	153	912	331	278	103	3	1,780
Curettage of lesion of skin	254	343	43	126	29	1	796
Flap operations to relax contracture of skin	122	12	23	7	8	1	173
Total	10,717	7,141	2,378	2,043	653	6	22,938

Source: HES data

[2] Other operation sites: anus operation (prefix H), penis operation (prefix N) and vulva operation (prefix P) other procedures

Although the field (oper_02) should contain secondary procedures, it did also contain procedures with a primary skin code such as punch biopsy and curettage. Those were often used in parallel with a subsidiary code related to the site of operation recorded in the first procedure field (oper_01).

The overall number of operations for flaps and grafts was 15,252. 86% (13,140) were undertaken as secondary procedures for head and neck lesions (DIAG_01: C440, C441, C442, C443 and C444). Of those 4,341 were ‘full thickness autografts of skin to head and neck’ (S361) and 5,032 were ’local flaps of skin to head and neck (S275)’.

Table 12: Percentage of head and neck day cases who had a flap or graft as a secondary procedure recorded (oper_02) during the episode by age group and sex

Sex	Age group (%)				
	under 40	40 to 59	60 to 79	80 and above	total
Male	0.7	8.3	50.8	40.2	100
Female	1.0	11.8	47.1	40.2	100

Source: HES data

In the younger age group, females had a higher percentage of flaps and grafts than males; an equal percentage of males and females in the oldest age group had such procedures.

4.7 Estimation of NMSC treatment cost in England in 2010

The overall cost associated with HRGs plus excess bed costs in England in 2010 was £80,092,999. Day cases represented the majority of the cost associated with the care of NMSCs (£70,000,738) while inpatient costs were lower (£10,092,261). This is consistent with day cases accounting for the majority of admissions.

4.7.1 Breakdown of specialties and costs related to the management of NMSC

Table 13: Total of HRG based costs plus cost of excess bed days by main specialties in England in 2010

Day cases		Inpatient cases	
Specialties	Overall cost (£)	Specialties	Overall cost (£)
Dermatology	26,989,652	Plastic surgery	5,354,492
Plastic surgery	26,584,491	Oral surgery	1,051,227
Oral Surgery	3,952,719	General surgery	781,178
Ophthalmology	3,559,762	ENT surgery	566,280
Oral & maxillofacial surgery	3,256,879	Oral & maxillofacial surgery	408,845
ENT surgery	2,503,524	General medicine	341,518
General surgery	1,355,672	Ophthalmology	297,284
Clinical oncology	1,292,314	Geriatric medicine	272,354
General medicine	132,292	Dermatology	255,700
Trauma and orthopaedic	92,677	Clinical oncology	215,995
Allied health profession	76,732	Trauma and orthopaedic	97,613
Medical oncology	71,572	Medical oncology	93,898
Clinical Haematology	31,418	Palliative medicine	74,651
Others	101,034	Others	281,226
Total	70,000,738	Total	10,092,261

Source: HES data

Dermatology was the specialty associated with the highest cost day cases while plastic surgery was the specialty associated with the highest cost for inpatients. Other specialties likely to be involved in procedures requiring hospitalisation were also associated with high costs. Oral surgery was assigned high costs but this might be as a result of coding issues with head and neck or maxillofacial operations being entered in an overall category of oral surgery in some Trusts.

4.7.2 Estimated costs by Cancer Networks in England in 2010

The total cost of day cases and inpatients for each Cancer Network varied across England (see Table 14) and is linked to the number of admissions in each Cancer Network.

Figures 10 and 11 show the average costs per admission by Cancer Network for day cases and inpatients respectively. The large number of day cases and type of procedures undertaken is likely to explain the small variation in the average cost of day cases compared to inpatient cost.

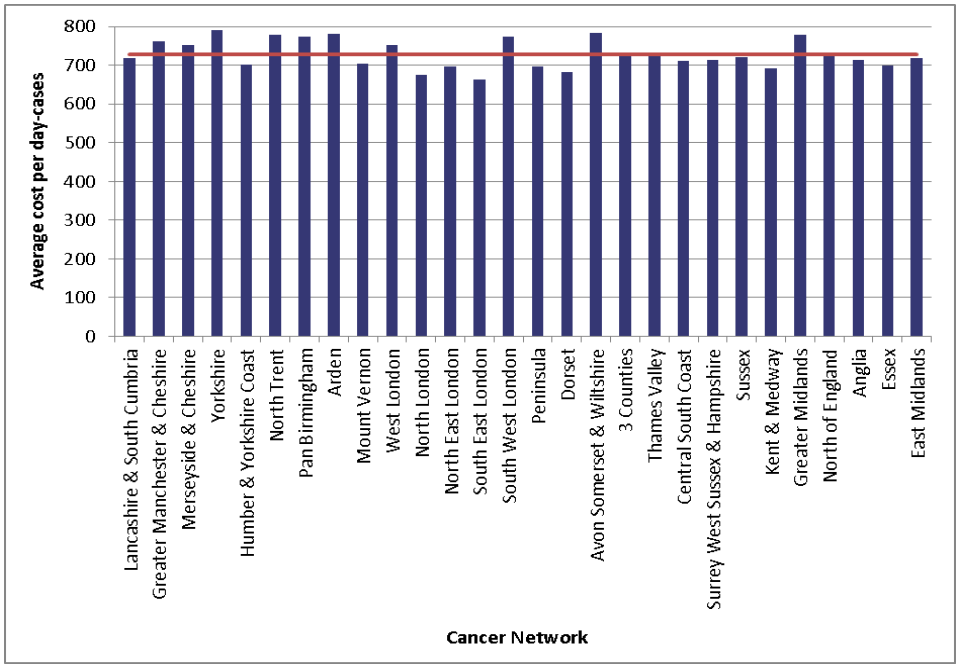
The average costs per case in England were: £727 for a day case admission (Figure 10) and £1,626 for an inpatient admission (Figure 11). The average cost per case in England by sex was £730 for male day cases, £724 for female day cases, £1,622 for male inpatients and £1,632 for female inpatients.

Table 14: Total costs for all admissions by Cancer Network in 2010

Cancer Network	Cost (£)		
	Day case	Inpatient	Total
Lancashire and South Cumbria	3,862,619	400,593	4,263,212
Greater Manchester and Cheshire	2,956,266	733,738	3,690,004
Merseyside and Cheshire	3,463,391	393,963	3,857,354
Yorkshire	2,736,259	452,035	3,188,294
Humber and Yorkshire Coast	555,574	151,584	707,158
North Trent	3,026,222	261,425	3,287,647
Pan Birmingham	2,111,868	274,788	2,386,656
Arden	953,377	231,691	1,185,068
Mount Vernon	1,533,158	264,800	1,797,958
West London	978,756	181,642	1,160,398
North London	1,888,720	235,570	2,124,290
North East London	956,244	245,672	1,201,916
South East London	1,601,956	256,422	1,858,378
South West London	1,082,823	279,430	1,362,253
Peninsula	3,606,464	390,494	3,996,958
Dorset	2,252,341	315,437	2,567,778
Avon Somerset and Wiltshire	3,391,793	460,522	3,852,315
3 Counties	874,130	251,590	1,125,720
Thames Valley	2,686,507	316,868	3,003,375
Central South Coast	2,646,270	428,410	3,074,680
Surrey West Sussex and Hampshire	1,716,183	295,260	2,011,443
Sussex	2,022,447	389,103	2,411,550
Kent and Medway	2,098,049	339,741	2,437,790
Greater Midlands	1,915,419	347,326	2,262,745
North of England	5,530,721	819,742	6,350,463
Anglia	5,975,370	466,115	6,441,485
Essex	1,825,393	357,995	2,183,388
East Midlands	5,752,418	550,305	6,302,723
England	70,000,738	10,092,261	80,092,999

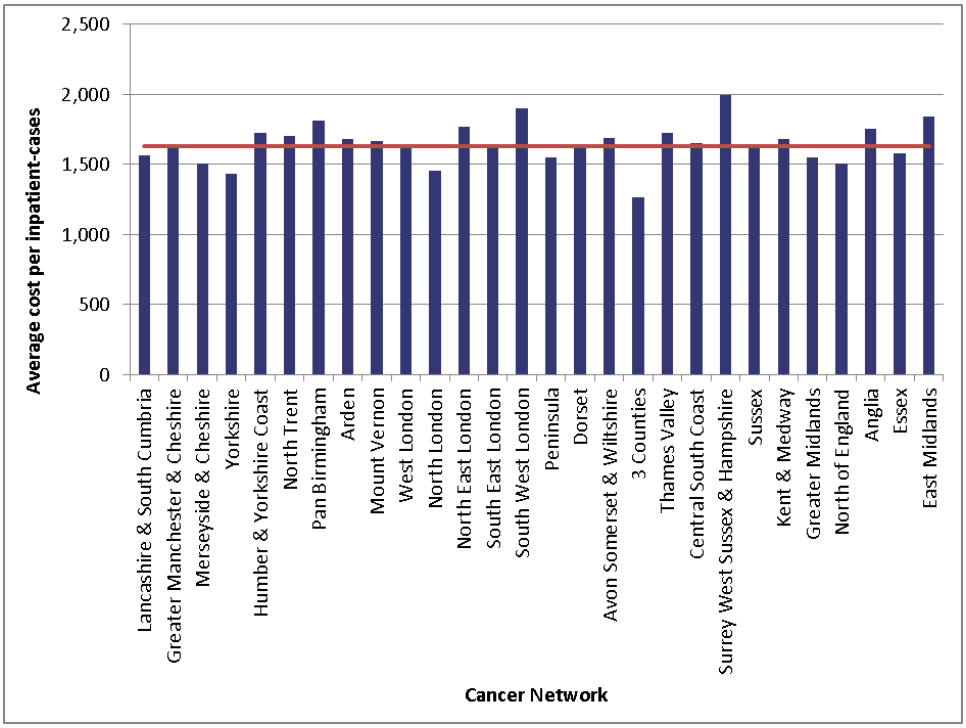
Source: HES data

Figure 10: Average cost of day cases by Cancer Network in 2010



Source: HES data

Figure 11: Average cost of inpatient cases by Cancer Network in 2010



Source: HES data

5 Discussion

The use of HES data offers a good source of information to estimate the cost and to undertake analysis of service availability regarding day case and inpatient care of NMSCs. For NMSC almost all patients who are admitted as a day case or inpatient have a procedure (98%). This is unlike other cancers where patients are admitted for a wider range of reasons.

Over 100,000 admissions for NMSC were identified in 2010 of which 94% were day cases. There were variations in the admissions among Cancer Networks and this might be due to a difference in practice at Trust level with NMSC cases being managed as outpatient cases and not recorded on inpatient HES or it might underline a variation in clinical practice such as ‘see and treat’(personal communication).

Dermatologists and plastic surgeons were the main specialties involved in the management of NMSCs and therefore the majority of admissions were under their care. Other specialists such as maxillofacial, oral and ENT surgeons also played an important role in skin cancer management. There was variation in the involvement of the main specialties between Cancer Networks which could reflect the multidisciplinary team work of skin cancer services or the availability of local expertise. However there have been anecdotal reports of specialties and consultants not being recorded correctly within their Trusts. For example, as noted in this report, the use of oral surgery as the main specialty involved in the care of NMSC is likely to be inaccurate.

The use of OPSC codes varied with the primary codes for skin procedure (code prefix S) being used more often on their own. Other skin related primary codes (code prefix: E,C,D,F,H,P,N) were often used to describe a secondary procedure alongside a primary code for skin procedure (code prefix S). This was more specifically when repair procedures were undertaken.

Excision biopsies including wide local excisions represented the majority of procedures and were undertaken in equal proportion by dermatologists and plastic surgeons. These procedures were defined under the generic term ‘other excisions of lesions of skin’ although 63% of them were ‘excision of lesion of the skin of the head and neck’. This mirrored the high frequency of NMSC cases presenting at this anatomical site. There was a very clear sex difference of NMSC presentation on the ear with the majority of lesions occuring in males.

The distribution of procedures among specialties was in line with expected data. Plastic surgeons were undertaking grafts and flaps, while curettage and punch biopsies were more likely to be undertaken by dermatologists.

HES data do not include the morphology of the disease. Using NCDR we were able to show that the proportions of basal cell carcinoma and squamous cell carcinoma (73.3% vs 23.3%) in the cohort were within the range of expected values in England.

The variation among Cancer Networks in the costs of day cases and inpatient cases was reduced once adjusted for population. Various factors could influence this large variation: recording of HRG, inclusion of day cases recorded elsewhere as outpatients, number of cases and clinical practice. Average costs per admission by Cancer Network did not show important variation for day cases but did for inpatient cases. This might be due to the sample size as well as the diversity of procedures given in accordance to service availability. The national average number of bed days per admission was 4.3 days.

Data obtained from Vallejo Torres[9] calculated £889 per NMSC treated using a bottom up approach based on a simplified model of the skin cancer care pathway. This amount related to all costs related to skin cancer management. The national averages calculated in this study were £727 for day case admission and £1,626 for inpatient admission.

While NMSCs are often considered as a cancer of the elderly, at least 10% of cases were in the age group 40 to 59 years old and around 2% were in the below 40 age group.

Additional analyses are taking place to identify the procedures undertaken specifically for the management of basal cell carcinoma and squamous cell carcinoma. Given the predicted increase in incidence of NMSCs over the coming years it is essential that a better assessment of the costs of NMSC management is obtained. It will allow providers to deliver an efficient service for patients. Further costing related to topical treatment and primary care services as well as residual cost and outpatient HES data should be added in order to gain a more accurate value. Recent access to outpatient data should support this by providing data to consider in the overall national cost of treatment.

6 References

1/ Skin Cancer Hub - Worried about skin cancer. Available from: http://www.swpho.nhs.uk/skincancerhub - [Accessed July 2014]

2/ Library of recommendations on coding and classification policy and practice agreed by the UKACR executive committee (last updated: 24 July 2013). Available from: http://www.ukacr.org/content/practise [Accessed July 2014]

3/ Veronique Poirier, Alex Ives, Luke Hounsome, Carlos Rocha, Tina Ball and Julia **Verne** (2013). The role of the South West Public Health Observatory as the Lead Cancer Registry for Skin Cancer. Available from: http://www.swpho.nhs.uk/skincancerhub/resource. [Accessed July 2014]

4/ Non-Melanoma Skin Cancer: Estimates of cases, November 2010, South West. Available from: http://www.swpho.nhs.uk/skincancerhub/resource. [Accessed July 2014]

5/ NICE (2006). Improving Outcomes for People with Skin Tumours including Melanoma-update - 2010

6/ HES data dictionary - Health & Social Care Information Centre: Available from http://www.hscic.gov.uk/hesdatadictionary - [Accessed July 2014]

7/ Reference Costs 2010/11-(2010). Collection Guidance, Department of Health. Available from: (https://www.gov.uk/government/publications/2010-11-nhs-reference-costs-collection-guidance) [Accessed July 2014]

8/ Payment by Results in the NHS: tariff for 2012 to 2013 - Publications - GOV.UK. Available from: (https://www.gov.uk/government/publications/confirmation-of-payment-by-results-pbr-arrangements-for-2012-13) [Accessed July 2014]

9/ Vallejo Torres L., Morris S., Kinge J.M., Poirier V. , Verne J., (2013). Measuring current and future cost of skin cancer in England, Journal of Public Health , 2014 Mar, 36(1): 140-8, or available as epub 04/2013