Tertiary cancer services in Britain: benchmarking study of activity and facilities at 12 specialist centres

M A Richards, J C Parrott on behalf of the 12 participating centres

Abstract

Objective—To collate information on current activity and facilities in British hospitals to assist the planning of future cancer services.

Design—12 hospitals delivering specialist cancer services provided information on the size of population served, activity levels related to non-surgical oncology for 1994-5, and facilities available. Inconsistencies in the recording of data were resolved through meetings of all participants.

Setting—Five single specialty NHS trusts and seven specialist cancer facilities within multispecialty trusts, serving a combined population of 24.3 million.

Main outcome measures—Activity levels and facilities per million population served.

Results—The facilities available per million population served varied widely between centres. In contrast, the range in the number of new referrals per million population (seen either at the centre or in peripheral clinics) was relatively small. Considerable variations were observed in the number of attendances per patient and amount of radiotherapy and chemotherapy delivered. Overall it was estimated that 40-45% of all new cases of cancer are currently being referred to non-surgical oncologists. For the seven hospitals which could provide data on trends in activity, the average increase in chemotherapy day case episodes between 1992-3 and 1994-5 was 83%.

Conclusions—The results of this study provide a benchmark both for purchasers and providers of cancer care. The increase in the use of chemotherapy points to an urgent need for a unified system for monitoring both activity and outcomes of treatment.

Introduction

All patients with cancer should have access to a uniformly high quality of care.¹ To achieve this the Expert Advisory Group on Cancer report recommended an integrated network of care involving three levels: primary care, cancer units (mainly based in district general hospitals), and cancer centres providing specialist diagnostic and therapeutic services (for example, radiotherapy). However, it is unclear what resources will be needed to deliver this model of care.

If cancer services are to be rationally planned information is urgently required regarding the likely demand for specialist services and the capacity of existing hospitals to meet this demand. We therefore conducted a benchmarking study involving 12 NHS trusts which together provide tertiary cancer services for a population of 24.3 million in England, Scotland, and Wales. We report here data regarding current activity levels, changes in activity over time, and facilities (for example, radiotherapy equipment and inpatient beds). Further work is in progress related to staffing, income, and expenditure.

Methods

PARTICIPATING HOSPITALS

In 1994 we established two separate but interlinked discussion groups involving 12 NHS trusts providing tertiary cancer services. The two groups merged in 1995. The aim of the merged group is to improve the quality and cost effectiveness of the care provided by each centre through the exchange of information and ideas. All five single specialty NHS trusts providing cancer services in Britain are represented, together with seven cancer facilities based within multispecialty trusts (box). The single specialty trusts are represented by executive board members. The multispecialty trusts are generally represented by clinical directors and senior managers responsible for cancer services. The number of centres in the group has been kept small to facilitate open and detailed discussion.

The centres are not representative of all tertiary cancer provider units in Britain. Larger centres are over-represented, with eight of the participating trusts being among the 10 largest providers of radiotherapy services in Britain.² Although we use the term "centre," the implementation of the recommendations of the expert advisory group report has not yet reached the stage at which trusts have been officially designated as cancer centres.

BENCHMARKING INITIATIVE

The benchmarking exercise was coordinated by the one centre involved in both groups. A form was developed to collect information on the population served, activity levels, and facilities at each centre. We did not attempt to collect outcome data as these are too sparse to be meaningful. At subsequent meetings the information collected was shared within the group and inconsistencies in the recording of data were resolved wherever possible. The data from each centre have been anonymised for this report.

The groups explored differences in working practices that might account for variations in the findings between centres. In some instances the methods of recording data were so different that comparisons were not possible.

POPULATION SIZE

To take account of the different sizes of population served by the centres most of the analyses are reported in terms of the levels of activity or facilities per million population. Each centre provided a detailed breakdown of activity (for example, radiotherapy fractions or courses) by district health authority, together with information on the population of each district. Districts were classified as local or distant from the centre. Distant districts were further classified as being shared with another centre or exclusively served by the centre, based on geographical considerations.

The Effective population was estimated by multiplying the shared district population by the activity per

**Guy's and St Thomas's
Hospital NHS Trust,
London**

M A Richards, *clinical director
for cancer services*

J C Parrott, *clinical operations
manager, tertiary services*

Correspondence to:
Professor M A Richards,
Department of Palliative
Medicine, St Thomas's
Hospital, London SE1 7EH.

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Participating hospitals

Single specialty NHS trusts:

Christie, Manchester
Clatterbridge, Liverpool
Royal Marsden, London
Velindre, Cardiff
Weston Park, Sheffield

Cancer facilities within multispecialty NHS trusts:

Bristol
Edinburgh
Glasgow
Guy's and St Thomas's, London
Mount Vernon, Middlesex
Northampton
Queen Elizabeth, Birmingham

100 000 for the shared district, and dividing the number obtained by the activity per 100 000 for the host district.

We calculated mean and SD values for each factor and have also reported the full range.

Results

POPULATION SERVED AND SERVICES PROVIDED

The total population served by the 12 centres was estimated to be 24.3 million. Three centres serve populations of more than 2.5 million, six serve populations between 1.5 and 2.5 million, and three serve populations less than 1.5 million. All centres provide both radiotherapy and chemotherapy, but five do not provide a full haematology service. All centres have access to palliative care services, but five do not employ specialists in palliative medicine. Two centres have no direct input from medical oncologists. All of the multispecialty trusts and two of the single specialty trusts provide surgical services for cancer patients. The remainder of this report concerns the non-surgical aspects of cancer care.

NEW REFERRALS

The number of new referrals (seen either at the centre or in peripheral hospitals) was obtained for 10 centres. In one centre it was not possible to separate this figure from referrals to surgeons and joint clinics, and in another centre patients seen initially in a peripheral clinic were counted again if they subsequently attended the centre. For the 10 assessable centres the mean number of new referrals per million population was 2296 (table 1). Compared with other factors studied the range of values from individual centres was quite narrow (-12% to 19%).

OUTPATIENT SERVICES

The 12 centres provide outpatient services in 153 peripheral hospitals, with an average of two clinics a week being held in each peripheral hospital. Most of the peripheral hospitals are district general hospitals, a minority being other specialist hospitals. On average, 6.3 peripheral hospitals are served per million population (table 1). The mean catchment population for all of the hospitals served (including the seven multispecialty trusts with cancer centres) is about 150 000.

Most (62%) new patients are seen initially in peripheral hospitals, and just over half (53%) of outpatient attendances are in peripheral clinics (table 1). However, the proportion of patients seen at the centre or in peripheral clinics varies widely between centres. Centres which serve large geographical areas tend to see more patients in peripheral clinics (data not shown).

The number of outpatient attendances per new referral is a measure of follow up practice. Considerable variation was observed between centres (mean 7.2 attendances per new referral, range 3.3 to 10.3).

RADIOTHERAPY FACILITIES AND WORKING PRACTICE

The 12 centres had a total of 65 megavoltage machines (55 linear accelerators and 10 cobalt machines), giving a mean of 2.68 machines per million population served. Similarly, the centres had a total of 22 simulators (including computed tomography simulators) giving a mean of 0.9 simulators per million. Considerable inequality was evident in provision of high technology equipment between centres (table 2). An additional 13 megavoltage machines and nine simulators would be required to bring the centres with below average numbers of machines up to the current median.

All 12 centres were able to provide information on radiotherapy fractions and courses. The 12 centres delivered a total of 557 886 fractions in 1994-95, of which 94% were delivered by megavoltage machines. The total number of courses was 54 938. The median number of fractions per million population was 23 306 with six centres delivering within 5% of the median. The median number of fractions per course was 10.4 with four centres falling within 5% of this value and a further three centres within 10%. The number of fractions of radiotherapy per course was not related to the availability of megavoltage machines per million population. It is thus presumably a reflection of the practice of clinical oncologists.

Overall 94% of radiotherapy fractions were delivered by megavoltage machines, with only three centres delivering less than 90% of fractions on megavoltage equipment. The range of fractions delivered per megavoltage machine varied widely (table 2). This was largely due to differences in working practices in relation to extended working hours. All centres work extended hours to compensate for unplanned machine down time. However, the three centres which serve the largest populations (>2.5 million) routinely work extended hours (10-12 hours per day) on at least some machines. Each of these centres deliver over 9000 fractions a year per megavoltage machine.

INPATIENT FACILITIES

The number of dedicated hospital beds for clinical or medical oncology was known for 11 centres. In the 12th centre it was not possible to separate this figure from beds used for surgical oncology. Beds allocated for haematology-oncology were considered separately as five centres do not provide this service. Eight of the 11 centres provide dedicated hostel beds for cancer patients. Provision of dedicated cancer beds varied widely between the centres (table 3).

CHEMOTHERAPY ACTIVITY

Methods for recording chemotherapy activity are not standardised, making comparisons between centres extremely difficult. All 12 centres deliver chemotherapy on both an inpatient and a day case basis. Most of the centres also deliver some chemotherapy at peripheral hospitals, but as the costs are in some cases borne by the peripheral hospital the methods for recording activity may differ between the centre and the unit.

Seven centres (population 10.3 million) had reliable data for the total number of day case chemotherapy episodes delivered at the centre or peripheral hospitals during 1994-95. The mean number of day case episodes per million was 3865 (range 2162-5634). These seven centres also provided data on the increase in chemotherapy between 1992-93 and 1994-95. The mean and median increase in activity were both 83%.

Discussion

Providers of tertiary cancer services are eager to ensure that they have adequate resources to deliver high quality care. Purchasers, while supporting this objective, have a duty to ensure that resources are fairly distributed across

Table 1—Referrals and outpatient attendances for cancer services

Factor	No of assessable centres	Mean (SD)	Full range
New referrals per million population	10	2296 (227)	2029-2741
Total attendances per million population	10	16 850 (3353)	9160-24 519
Total attendances per new referral	9	7.2 (2.15)	3.3-10.3
% Of new referrals seen at centre	10	38 (17)	8-72
% Of all attendances at centre	10	47 (15)	23-76
No of peripheral hospitals served per million population	12	6.3 (3.2)	2.9-14.6
No of peripheral clinics held per week per million population	11	13.2 (4.7)	7.5-18.5
No of peripheral clinics held per week per peripheral hospital served	11	1.9 (0.7)	0.8-3.4

Table 2—Radiotherapy facilities and activity

Factor	No of assessable centres	Mean (SD)	Full range
Megavoltage machines per million population	12	2.68 (1.2)	1.5-6.3
Simulators per million population	12	0.9 (0.45)	0.44-1.7
Radiotherapy fractions per million population	12	22 799 (4572)	14 755-34 857
Radiotherapy courses per million population	12	2263 (520)	1679-3327
Radiotherapy fractions per course	12	10.15 (1.4)	7.9-13.6
% Of radiotherapy fractions delivered on megavoltage machines	12	94 (4.9)	84-98
Megavoltage fractions delivered per megavoltage machine	12	8075 (1696)	5161-11 332

Table 3—Inpatient facilities for cancer services

Factor	No of assessable centres	Mean (SD)	Full range
Clinical/medical oncology beds per million	11	43.9 (14.1)	22.9-67.9
Total cancer beds per million*	11	53.8 (15.6)	34.1-88.1

*Includes haemato-oncology beds and dedicated hostel beds.

all specialties. At present it is difficult for purchasers to compare the tertiary cancer services provided for their residents with those provided elsewhere. Similarly, it is hard to determine whether the claims of local cancer specialists for additional resources are reasonable.

The centres involved in this study are not representative of all providers of tertiary cancer services in Britain. However, as the total population served by these 12 centres is over 24 million we believe that the findings are a useful benchmark for centres not involved in the project and for health service planners. It is important to recognise, however, that a benchmark is not a gold standard. It is impossible to define a gold standard for tertiary cancer services without data on survival, quality of life, satisfaction with care, or cost effectiveness.

The mean number of new referrals was 2296 per million population. If the average referral rate is similar across the whole of Britain this would indicate that a

total of about 130 000 new patients with cancer are currently being assessed by non-surgical oncologists each year. As the total number of new cases of cancer is about 300 000 only about 40-45% of new cases are currently being assessed by a non-surgical oncologist. Patients' expectations for specialist assessment are increasing, and the expert advisory group report envisages multidisciplinary assessment becoming standard practice. The impact on workloads of non-surgical oncologists could be overwhelming. A moderate increase in the proportion of all cancer patients being assessed by a non-surgical oncologist (say from 40% to 60%) would lead to over a 50% increase in the new patient workload of oncologists.

The variation in referral rates between centres was small compared with that for other factors assessed in this study. Further work is required to assess the degree to which these variations are due to differences in case mix or differences in practice. All of the centres provide services in peripheral hospitals, but the services differ substantially from those envisaged by the expert advisory group. The mean catchment population of the current peripheral hospitals is about 150 000, with an average of 1.9 clinics per week being held in each hospital. The group recommends a minimum of five sessions of non-surgical oncology time, even in the smaller cancer units.

The expert advisory group report recognised that it is impracticable to devise a satisfactory single blueprint for a cancer centre but stated that the essential element defining such a centre is the expertise of the health care professionals working in it. The report envisaged that a cancer centre would normally serve a population of over one million (a criterion satisfied by 11 of the centres in our study), with two thirds of a million being considered an absolute minimum (satisfied by the 12th centre). All 12 centres provide most of the services that the report identified as features of most cancer centres. However, several centres do not currently provide one or more of these services (for example, medical oncology, intensive chemotherapy, specialist surgical services, or special expertise in palliative care).

This study has highlighted the need to develop and implement common policies for monitoring chemotherapy activity. This is particularly important because all centres observed a sharp increase in use of chemotherapy between 1992-3 and 1994-5. Wider recognition of the potential benefits of chemotherapy in patients with common tumours is likely to lead to further increases over the next few years. We hope that our results will be useful to purchasers and providers of cancer care and will form a baseline against which future trends can be monitored.

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Conflict of interest: None.

1 Expert Advisory Group on Cancer. *A policy framework for commissioning cancer services*. London: Department of Health, 1995. (Calman and Hine report.)

2 Royal College of Radiologists. *Survey of national radiotherapy workload and machinery*. London: RCR, 1990.