Who treats cancer?

PENELLA J. WOLL, BMedSci, MRCP(UK), Medical Registrar
Chester-le-Street General Hospital, Durham.

The rapid development of effective systemic treatments for cancer in the last quarter century has lead to heated debate about ‘who should treat cancer’? [1,2,3]. Surgical and radiotherapeutic procedures are performed only by specialists, but the tools of chemotherapy are available to any interested physician. The drugs used may be of unknown value and have serious adverse effects for both patients and staff [4]. In different regions this work has been undertaken by radiotherapists, general and chest physicians, gynaecologists, haematologists and surgeons. A survey of the results of cancer chemotherapy emphasised the high cost/benefit ratio and prompted the suggestion that such treatments should only be administered in specialised units [5]. Discussions on the role of the District General Hospital (DGH) have been largely speculative [6]. Remarkably little information is available on ‘who treats cancer’. This study describes the cancer workload of a DGH during one year.

Method

Patients admitted to one DGH during 1980 with a malignancy on their final diagnosis list were identified from Hospital Activity Analysis (HAA) data by the Regional Statistics Department. From this group, details were sought of all patients in that year with tumours chosen to include those that can be cured (testis, lymphoma) or palliated (lung, breast, ovary) by chemotherapy, and those treated primarily by surgery and radiotherapy in which systemic treatments for advanced cases are under investigation (uterus, cervix, melanoma). This was done by examining the case-notes of patients with disease of these types and the common sites of metastases (bone, brain, ‘carcinomatosis’). All case-notes were examined by the same investigator and the following items were recorded about the patient, his or her first admission during 1980 (the ‘index admission’) and treatment for that illness episode:

1. Case-number, age, date of birth, sex.
2. Dates of admission and discharge, duration of stay, cause of admission, specialties admitted under and referred to.
3. Performance status—derived from clerking information (1 = normal, unrestricted activity, 2 = restricted activity but capable of full self-care, 3 = requiring considerable assistance, in bed at least 50 per cent of waking hours).
4. Diagnosis, new or return case, date of and time from diagnosis, stage at diagnosis—deduced by investigator (1 = carcinoma in situ, 2 = locally invasive, 3 = regional lymph node involvement, 4 = disseminated, except for lymphomas, where the Ann Arbor classification was used), histological confirmation of diagnosis.
5. Treatment (surgery, radiotherapy, chemotherapy), date of referral for specialist treatment.
6. Number of admissions and total duration of hospital stay in 1980.
7. Date, place and cause of death, where applicable.

Results

The number of admissions with malignancies to this hospital during 1980 was 1094. Their distribution by tumour type is shown in Figure 1. From these, 337 cases satisfied the selection criteria. A total of 324 case-notes (96 per cent) were traced and examined, accounting for 458 (41.9 per cent) of the cancer admissions. Of these, 278 patients had tumours in the defined categories, including eight patients with two malignancies.

Accuracy of coding

Nine patients with non-malignant disease had been wrongly coded (2.9 per cent). Twelve other cases had a serious error in diagnostic coding (eg skin for breast carcinoma) and 12 had minor errors (eg cervix for corpus uteri). Case-note numbers were wrong in 10 entries. Date of birth was wrong by more than a year in 20 entries. Sex was wrongly coded in two cases.

Cancer case-load

The total cancer case-load for 1980 is represented in Figure 1, and those selected for further study are indicated. The number of new and return cases seen in each category, with their average hospital stay, is shown in Table 1. A summary of non-surgical treatments is shown in Table 2. Details are presented for tumours of bronchus, breast and ovary.

Bronchogenic carcinoma

During the year, 103 cases were seen of which 76 were new and 27 were returns.

New. Of the 76 new cases, 10 (13.2 per cent) were small cell tumours, 35 (46 per cent) were non-small cell tu-
Table 1. Cancer caseload of a DGH. The number of new and return patients with the selected tumour types admitted during 1980.

| TUMOUR TYPE | Total 278 | New  | Return |
|-------------|-----------|------|--------|
| Bronchogenic|           | 103  | 76     |
| Breast      |           | 108  | 70     |
| Ovary       |           | 21   | 13     |
| Uterus      |           | 10   | 8      |
| Cervix      |           | 10   | 9      |
| Testis      |           | 5    | 4      |
| Lymphoma    |           | 16   | 9      |
| Melanoma    |           | 5    | 2      |

|                  | Median number of admissions | Median hospital stay (days) |
|------------------|-----------------------------|----------------------------|
| Bronchogenic     | 1                           | 3                          |
| Breast           | 1                           | 11                         |
| Ovary            | 2                           | 18                         |
| Uterus           | 1                           | 14                         |
| Cervix           | 1                           | 16.5                       |
| Testis           | 1                           | 9                          |
| Lymphoma         | 1                           | 4                          |
| Melanoma         | 1                           | 11                         |

mours and 31 (40.8 per cent) were diagnosed clinically. Among the 45 patients with a histologically confirmed diagnosis (mean age 61.3 years), 25 were of performance status 1, 18 were of status 2, and two were of status 3. Of those diagnosed clinically (mean age 69.4 years), four were of performance status 1, 15 were of status 2, and 12 were of status 3.

Of those with small cell tumours (mean age 57.8 years), there were seven with limited disease (confined to one lung and the ipsilateral supraclavicular lymph nodes) and three with extensive disease; eight were seen by a chest physician but one did not see any specialist; none died on the index admission. Of those with limited small cell disease, six were referred for and five treated by radiotherapy; one was referred for but not treated by thoracic surgery; three had chemotherapy (two from chest physicians, one from radiotherapist); one had no treatment. Of those with extensive small cell disease, one had radiotherapy; one was referred for but not treated by thoracic surgery.

Of those with non-small cell or clinically diagnosed tumours (mean age 65.6 years) there were 39 with limited and 27 with extensive disease; 17 (25.8 per cent) died on the index admission; 48 (72.7 per cent) were seen by a chest physician, but 12 did not see any specialist; 30 (45.5 per cent) were referred for and 27 treated with radiotherapy; 15 (22.7 per cent) were referred for and nine had thoracic surgery; three had chemotherapy (all from chest

Fig. 1. Sites of malignancies in all patients admitted during 1980 (1094 admissions with 1107 malignancies). The shaded area indicates those examined in the survey.
physicians). The referral pattern is shown in Tables 2 and 3.

**Returns.** Of the 27 return cases, three (11.1 per cent) were small cell tumours and nine (33.3 per cent) were non-small cell tumours, 15 (55.6 per cent) had been diagnosed clinically. Those with small cell tumours (mean age 48 years) had been diagnosed 9, 11, and 47 months before; one had had surgery and radiotherapy but none had been previously treated with chemotherapy; two were seen by chest physicians and one was treated with chemotherapy. Those with non-small cell or clinically diagnosed tumours (mean age 62.4 years) had been diagnosed (median) nine months before; 12 had previously had radiotherapy, five thoracic surgery and one chemotherapy; 10 (41.7 per cent) died on the index admission; 20 (83.3 per cent) saw a chest physician but four did not see a specialist; seven were referred for and three treated with radiotherapy; two had chemotherapy—both from chest physicians.

**Breast carcinoma**

One hundred and eight patients were seen during the year with 110 tumours, 70 of which were new and 40 returns.

| TUMOUR TYPE | Lung 103 | Breast 108 | Ovary 21 | Uterus 10 | Cervix 10 | Testis 5 | Lymphoma 16 | Melanoma 5 | TOTAL 278 |
|-------------|----------|------------|---------|-----------|----------|---------|-------------|-----------|----------|
| Performance | 80 (77.7)| 96 (88.9)  | 21 (100)| 10 (100)  | 9 (90)   | 5       | 14 (87.5)   | 5         | 240 (86.3) |
| Specialist  | 85 (82.5)| 53 (49.1)  | 11 (52.4)| 3 (30)    | 4 (40)   | 5       | 13 (81.3)   | 3         | 177 (63.7) |
| Radiotherapy| 36 (35.0)| 38 (35.2)  | 0       | 1 (10)    | 3 (30)   | 4       | 4 (25.0)    | 2         | 88 (31.7)  |
| Chemotherapy| 9 (8.7)  | 7 (6.5)    | 11 (52.4)| 0         | 0        | 0       | 7 (50.0)    | 2         | 36 (12.9)  |
| Given by    | 1        | 3          | 10 (47.6)| 0         | 0        | 0       | 1           | 2         | 17 (6.1)   |

| REFERRAL TO: | None | Chest medicine | Radiotherapy | Thoracic surgery | General/Geriatric medicine | General surgery | Total (%) |
|--------------|------|----------------|--------------|------------------|---------------------------|-----------------|----------|
| PRESENTED TO:| 20   | 9              | 37           | 17               | 3                         | 1               | 76 cases |
| General/Geriatric medicine | (26.3) | (11.8) | (48.7) | (22.4) | (3.9) | (1.3) | 76 cases |
| General surgery | | | | | | | 76 cases |

**Table 2.** Non-surgical treatments for cancer: summary of patients with selected types of tumour admitted during 1980 showing number (percentage) receiving each treatment. ‘Specialist’ includes chest physicians and thoracic surgeons for lung cancer, gynaecological oncologists, haematologists for lymphoma and radiotherapists.

**Table 3.** Referral pattern of 76 new patients with bronchogenic carcinoma. Note: some patients had several referrals.

*New.* Of the new cases, 36 (51.4 per cent) were stage 2, 27 (38.6 per cent) were stage 3 and seven (10 per cent) were stage 4. Those with stage 2 tumours (mean age 57.4 years) were treated primarily by mastectomy (30) or lumpectomy (6); 14 were referred for and six treated with adjuvant radiotherapy; two had endocrine treatment (one tamoxifen and one oophorectomy) prescribed by the surgeon; none had adjuvant chemotherapy; one relapsed later in the year and was given cyclophosphamide at that time by her surgeon. Those with stage 3 tumours (mean age 60.6 years) were treated primarily by mastectomy (22) or lumpectomy (3); 24 were referred for and 21 treated with radiotherapy; six had endocrine treatments (four prescribed by radiotherapists, two by surgeons); one received chemotherapy (from a radiotherapist). Of those with stage 4 tumours (mean age 63.9 years), one had a mastectomy; three died on the index admission; five were referred for and three treated with radiotherapy; endocrine therapy was prescribed for five (three by radiotherapists, one by a surgeon, one by a physician); none received chemotherapy. The referral pattern is shown in Tables 2 and 4.

**Returns.** The return cases (mean age 60.1 years) had been diagnosed (median) 30 months before; 30 (75 per cent)
Table 4. Referral pattern of new patients with carcinoma of breast. Note: some patients had several referrals.

| REFERRAL TO: | None | Radiotherapy | General surgery | General/Geriatric medicine | Gynaecology | TOTAL (%) |
|-------------|------|--------------|-----------------|---------------------------|-------------|-----------|
| PRESENTED TO: |      |              |                 |                           |             |           |
| General surgery | 21   | 42           | -               | 1                         | 1           | 65 (92.9) |
| General/Geriatric medicine | -    | -            | 1               | -                         | -           | 1 (1.4)   |
| Gynaecology | -    | -            | 1               | -                         | -           | 1 (1.4)   |
| Orthopaedic surgery | 1    | 1            | 2               | -                         | -           | 3 (4.3)   |
| TOTAL (%) | 22   | 43           | 4               | 1                         | 1           | 70 cases  |

had previously had a mastectomy and 15 (37.5 per cent) had had radiotherapy; 11 (27.5 per cent) had had endocrine treatments and six chemotherapy. Twenty (50 per cent) had disseminated disease, nine (22.5 per cent) were admitted for lymph node biopsy, three for excision of a local recurrence, three for chemotherapy, four with a second primary carcinoma (two breast and two ovarian); three were admitted for reasons unconnected with their breast tumour. Six (15 per cent) died on the index admission; 12 (30 per cent) were referred for and eight treated with radiotherapy; eight had endocrine treatments (prescribed by surgeons in five and radiotherapists in three); six received chemotherapy (four from surgeons and two from radiotherapists).

Ovarian carcinoma

Twenty-one cases were seen during the year, 13 new and eight returns.

New. Of the new cases, five were stage 2, one was stage 3 and seven were stage 4. Those with stage 2 and 3 tumours (mean age 59.5 years) were assessed at laparotomy; three were referred to a radiotherapy research registrar for inclusion in trials of combination chemotherapy; none died on the index admission. Of those with stage 4 tumours (mean age 60.3 years), two received chemotherapy (on trial protocols); one had intraperitoneal thiopeta; one died on the index admission.

Returns. The return cases (mean age 58.9 years) were diagnosed (median) 14 months before; four had previously been treated by surgery and one by radiotherapy. Six were admitted with disseminated disease, one for transfusion and one for chemotherapy; none died on the index admission. All were referred to the radiotherapy research registrar and received chemotherapy on a trial protocol.

Terminal care

Among the 324 cases examined, 50 died on the index admission, after a median stay of six days in hospital. A further 35 patients died in this hospital within one year of their index admission, after a median stay of 6.5 days. By comparison, 183 cancer deaths were registered in the Local Government District during 1980. In the first six months of 1981, 98 cancer deaths were registered in the District, of which 46 took place in hospital and 47 at home. There were no specialist nurses or terminal care teams in the District to provide extra support for patients in hospital or at home.

Discussion

In attempting to show ‘who treats cancer’ I have outlined the inpatient cancer workload of a DGH during one year and described in detail a cross-section of treatments given for selected cancer types. This approach has excluded all patients seen and treated as outpatients or in the community. One anomaly has been the inclusion of patients attending as day cases for rigid bronchoscopy but the exclusion of those attending for outpatient fibreoptic bronchoscopy. HAA data are coded by clerks from hospital discharge summaries, so errors can arise in the registration document, discharge summary, or coding process. Errors in diagnostic category have previously been estimated at 6 per cent and 38 per cent [7,8] and demographic errors at 3.2 per cent [7]. In the present study, 10 per cent of case-notes were wrongly coded for diagnosis, 3.1 per cent for hospital number and 11 per cent for date of birth. This compares favourably with previous analyses of HAA data. The retrieval rate of 96 per cent of case-notes sought permits some confidence in the completeness of the survey.

The hospital surveyed had 433 beds and provided 70 per cent of acute services to a Health District of 238,670 population. Inpatient services were provided for general and chest medicine, haematology, geriatrics, rheumatology, the young disabled, general and orthopaedic surgery, obstetrics, gynaecology and paediatrics. Outpatient clinics were also held in dermatology, neurology, ophthalmology, renal medicine, otolaryngology, industrial diseases, cardiothoracic surgery, radiotherapy and psychiatry. There was no medical oncology service in the region in 1980 and in many regions medical oncology is still not funded as a regional specialty. During the year there were 12,560 admissions including 2,309 to medical
The eight types of malignancy studied were selected to include those curable by modern treatments (lymphomas and germ cell tumours) and those in which good palliation can be achieved (small cell bronchogenic, ovarian and breast cancers) [9]. Although a few patients would have been unsuitable because of age or poor performance status, 86 per cent were fit for appropriate treatments. Unlike a recent Italian survey [10], I have not tried to assess the diagnostic and staging procedures used, or the quality of treatment. Full clinical and pathological staging assessments are increasingly important for planning treatments as more toxic and effective regimens are developed and prognostic groups are more closely defined [11].

Most patients first presented to a general physician, surgeon or gynaecologist and were referred to specialists when necessary. Considerable controversy still surrounds the primary treatment of common tumours [12] and there is little agreement on secondary treatments. The majority of patients with ovarian tumours were referred for chemotherapy and were included in controlled clinical trials. No other patients were entered for trials. This, sadly, reflects practice through Britain [13], where few patients enter comparative studies and many trials are too small to detect significant differences between treatments. Advances in knowledge and new drugs are available, but must be evaluated so that patients can benefit from them. The Medical Research Council and Cancer Research Campaign co-ordinate multicentre trials in Britain. In Northern America, community hospitals successfully participate in randomised trials [14], but even among academic oncology units considerable experience with each tumour type is necessary to maintain the quality of participation [15].

In this hospital, chemotherapy was given in several departments, including general surgery, chest medicine, haematology and gynaecology, usually by inexperienced junior medical staff. In addition, some patients were transferred to the regional radiotherapy centre for chemotherapy. This is an expensive form of treatment requiring special facilities and skills in nursing and medical staff. The costs of cancer treatments are high but the drug costs are often a small proportion of the total [16] when set against the costs of staff, investigations and inpatient services. The hazards of handling cytotoxic drugs [17,18] are poorly understood, but may include increased fetal loss [19]. Injections should be drawn up in a protected area by specially trained staff, ideally in a designated pharmacy unit [20]. This will reduce drug wastage and be economically self-funding. Junior medical staff giving cytotoxic injections may learn about the problems of extravasation by practice, unless warned of the risks of necrotic ulceration. This work can be well done by specialist nurses who can also advise on problems such as hair loss and infertility. Concentration of the equipment and skills needed for administration of cancer chemotherapy in one department would improve efficiency, safety and economy.

A survey of referrals to a teaching hospital oncology unit [3] showed that patients treated accounted for 9.3 per cent of the hospital pharmacy budget, and serious medical complications developed in 8.8 per cent of patients. The authors concluded that the use of cancer chemotherapy should be restricted to specialist centres or well-conducted trials. Results from multi-centre studies in children's tumours [21] and testicular teratomas [22] suggest that specialised units achieve better results in these highly chemo-sensitive tumours, with considerable gains in survival.

I have shown that the cancer workload of a DGH is high, not only in terms of diagnoses and treatment, but also in supportive and terminal care. Many patients do not see a cancer specialist, but generalists cannot be expected to keep up to date in this rapidly advancing field. Perhaps, as in the case of dialysis and transplantation [23], referring physicians select patients more rigorously than do the specialists. Many new drugs, including biological response modifiers and less toxic derivatives of standard therapeutic agents, are becoming available. All these are expensive and require carefully controlled evaluation before entering general use. At present, access to these new and less toxic forms of treatment is restricted to the minority of cancer patients in this country referred to a medical oncologist.

This survey describes how generalists treat selected cancer patients in one Health District with support from visiting specialists. Whether patients would be better served by the formation of a hospital 'tumour board' [24] to co-ordinate cancer care, or the services of a local medical oncologist [25], or strengthening of the existing links with the regional radiotherapists is a matter for debate—or are we all to remain oncologists? [26].

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Tabor's (or Talbor's) Cure of the Ague

In its war with the Empirics the College sometimes collected egg on its face or rather, in this case, was left with the sour taste of quinine. John Evelyn reminisced in his diary of 19th November 1694 'concerning the quinquean which the Physicians would not give the King [Charles II] at a time when in a dangerous ague... because it had been brought into vogue by Mr Talbor, an Apothecary. 'Asked why they would not, Dr Lower saide it would spoile their practice... and at last confessed it was a remedy fit only for Kings.' Poor Dr Richard Lower, his advice was not accepted by the king, he became a Whig at quite the wrong time, losing most of his practice, and died from a cold contracted when putting out a fire in his chimney.

Tabor (or Talbor) did give quinine to Charles II who was cured of his ague and commanded the Lord Chamberlain to write to the President of the College on 2nd May 1678. 'His Majesty having received great satisfaction in the Abilities and Success of Dr Tabor for the curing of Agues, hath caused him to be admitted and sworn one of his Physicians; and being graciously enclined to give him all favour and assistance in this his practise for the publique good hath commanded mee to signifye his pleasure to you and the rest of the Colledge of Physicians; that you should not give him any molestation or disturbance in his practise.' The Annals record that Comitia resolved unanimously that 'the matter should be tolerated but not indulged'. Weeks later the king knighted Tabor.

Sir Robert Tabor's story is illuminated by an anonymous Frenchman whose manuscript account was found by Siegal and Poynter (see Medical History, 1962, Vol. 6, p. 82) in a book on the history of medicine. The Frenchman had contracted the intermittent fever while serving in our army in Flanders during the Dutch war. He recorded how he was cured with quinine taken in white wine prescribed by a very poor man, a little fellow called Taber. The Frenchman, advised by Tabor that he could 'amuse himself swimming and even in debauchery if he felt inclined', came to England to attend the Court. So he attended Charles II on a visit Sheerness (this can be dated 7th June, 1672) 'the most fever-ridden place in the whole of England'. There the Frenchman told the king about Tabor's cure for the ague and Charles, 'the most inquisitive King in the whole world, who is also the greatest patron of Empirics', sent for Tabor and with him made many experiments with Tabor's preparations of quinine. So it was that the king knew who to send for when he was laid low with ague.

The Frenchman further described Tabor as 'quite ignorant but so devoted to this project that he stayed especially in an unhealthy district in order to try out his remedy'. In truth Robert Tabor was not so poor and ignorant. True, he went to live in the Essex marshes to gain experience in ague. There he later married into the Aylet family, landowners in Kelvedon. But he was grandson of the Registrar to Cambridge University and son of the Registrar to the Bishop of Ely. He was apprenticed to an apothecary in Cambridge where he developed his interest and skill in administering Jesuit's bark or Cinchona. In fact, in the year that the Frenchman met him, he published a book on the treatment of fevers. But the Frenchman obviously had no doubt as to the importance of Tabor because he began his manuscript by reporting how 'Quinquina became firmly established all over Europe after it had been practically concealed by the efforts and greed of certain people unworthy of such an honourable profession'.

Charles II proved a good patron, giving Tabor both fame and fortune as he cured the Dauphin of ague and Louis XIV bought the secret from him. In view of Charles' prolonged secret negotiations with Louis it might be wondered whether Tabor's presence at the French court was entirely medical and not political. His work in France led to the publication in 1682 of 'The English Remedy, or Tabor's wonderful secret for curing of agues and feavers.' This contains a neat passage on the price of quinine, pointing out its expense 'when it was only in the hands of the Jesuits' and how it became cheaper 'as soon as the droguists began to trade in it'. Then, 'Sir Robert Talbor, observing that febrifuges were prepared which came very close to his own and fearing least somebody at length might discover it, resolved to buy up all the Quinquina that he could find at Paris and the other chief towns of France and of England also'. As a result, 'the execution of this design making some noise', Talbor's rivals entered the market and the price of quinine rocketed. Tabor's fame was not at an end. He treated Queen Louisa Maria of Spain in 1679 and came back with his fingers loaded with rings. After his death in 1681 a monument commemorating him was put up in Trinity Church, Cambridge.

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