

Report on Chemotherapy Services Review

North Trent Cancer Network

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List of Abbreviations

ABVD	Adriamycin, Bleomycin, Vinblastin, Dacarbazine
AC	Adriamycin, Cyclophosphamide
ACE	Doxorubicine, Cyclophosphamide, Etoposide
BVAM	BCNU (Carmustine), Vincristine, Cytarabine, Methotrexate
C(V)OP	Cyclophosphamide, Vincristine (Oncovin), Prednisolone
CAP	Cisplatin, Adriamycin, Cyclophosphamide
CAV(E)	Cyclophosphamide, Doxorubicin, Vincristine, Etoposide
CEOP	Cyclophosphamide, Epirubicin, Vincristine, Prednisolone
ChIVPP	Chlorambucil, Vinblastine, Procarbazine, Prednisole
CHOD	Cyclophosphamide, Hydroxydaunorubicin (Doxorubicin), Oncovin (Vincristine), Dexamethasone.
CHOP	Cyclophosphamide, Adriamycin, Vincristine, Prednisolone
CMF	Cyclophosphamide, Methotrexate, Fluorouracil
CMV	Cisplatin, Methotrexate, Vinblastine
Epi-Dox	Epirubicin, Taxotere
EV	Etoposide, Vincristine
FAM	Fluorouracil, Adriamycin, Mitomycin C
FEC	Fluorouracil, Epirubicin, Cyclophosphamide
FU	Fluorouracil
ICE (C=Carboplatin)	Ifosfamide, Carboplatin, Etoposide
ICE (C=Cisplatin)	Ifosfamide, Cisplatin, Etoposide
MV	Methotrexate, Vinblastine
MVP	Mitomycin, Vinblastin, Cisplatin
MVP	Mitomycin C, Vinblastin, Cisplatin
NSCLC	Non-small Cell Lung Cancer
OA	Ovarian Ablation
PABLOE	Prednisolone, Adriamycin, Bleomycin, Vincristine (Oncovin), Etoposide,
PBSC	Peripheral Blood Stem Cell
PE	Cisplatin, Etoposide
PEB	Bleomycin, Etoposide, Cisplatin.
PIF	Protracted Infusion Fluorouracil
POMB	Vincristine, Methotrexate, Folinic acid, Bleomycin, Cisplatin
SCLC	Small Cell Lung Cancer
TAM	Tamoxifen
TANGO	TANGO trial - (Epirubicin, Cyclophosphamide, Taxol, Gemcitabine)
VAPEC	Ifosfamide, Cytarabine, CisPlatin
VEDex	Vincristine, Epirubicine, Dexamethasone

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1.0 Executive Summary

Aim

1.1 The aims of this review were to:

- Identify all the chemotherapy activities undertaken at Weston Park Hospital and in the cancer units in North Trent;
- Develop proposals to support an increase in activity as close to patients' homes as possible.

Methods

1.2 This was carried out by gathering information from various sources: cancer incidence from Trent Cancer Registry; Hospital activity from Weston Park Hospital; key informant interviews, survey of oncologists and haematologists through questionnaire, and literature review.

Results

1.3 The National Institute for Clinical Excellence (NICE) implementation and developments in cancer chemotherapy will result in an increase in chemotherapy activity. This is not sustainable with the current infrastructure.

1.4 The following number of new cancer cases can be expected each year in North Trent:

- Lung cancer 1400,
- Breast cancer 1100, and
- Colorectal cancer 1000 (Table 3.1).

The incidence of these cancers had been stable over the years from 1985-96, with the possible exception of breast cancer in which the incidence of the disease might be increasing in recent years (figures 3.1-3.3). These cancers also accounted for nearly half (48%) of oncology workload in North Trent cancer Network (Table 3.2).

1.5 The average number of patients attending each chemotherapy session at the cancer units for breast cancer, January-March 2001, were as follows:

- Barnsley DGH 6,
- Chesterfield Royal Hospital 7,
- Doncaster Royal Infirmary 9, and
- Rotherham General Hospital 3 (Table 4.2).

Although lung cancer clinics were being introduced at the cancer units, the number of cases attending chemotherapy session were very limited or none in some units (Table 4.2).

1.6 There were significant variations in the level of oncologist nominal half-day (NHD) across the cancer units (Table 4.4). At the level of Type II cancer unit classification, all the cancer units with exception of Doncaster Royal Infirmary, showed significantly less oncologists NHDs. The Joint Collegiate Council for Oncology recommended 10 oncologist NHDs for a Type II cancer unit.

1.7 The result of self-classification of cancer units in North Trent shows that all the cancer units classified themselves as Type II cancer units. In the long-term, all the cancer units aspire to develop into Type I cancer units.

- 1.8 The most commonly administered chemotherapy regimens for breast cancer at cancer units were Adriamycin and Cyclophosphamide [AC] (60%); and Cyclophosphamide, Methotrexate, and Fluorouracil [CMF] (34%).
- 1.9 Nearly two-thirds (63%) of chemotherapy prescriptions for Breast cancer patients in North Trent were carried out in Sheffield (Weston Park Hospital) (Table 4.7).
- 1.10 Chemotherapy activity at Weston Park Hospital showed that chemotherapy prescription for the treatment of breast (32%) and colorectal (23%) cancers both accounted for over half (55%) of all chemotherapy prescriptions. Transfer of treatment of breast and colorectal cancer to the cancer units would significantly reduce the workload at Weston Park Hospital.
- 1.11 Chemotherapy activity workload at Weston Park Hospital, based on fraction of treatment, could be reduced by at least 25% if treatment for colorectal cancers were introduced at cancer units. Chemotherapy for colorectal cancer accounted for 35% of all fractions of chemotherapy treatment at Weston Park Hospital.

Chemotherapy services organisation elsewhere in England and Wales

- 1.12 Two models of chemotherapy service delivery were found in operation in cancer units elsewhere in England and Wales. These were central and devolved delivery of chemotherapy services. In Clatterbridge (Wirral, Merseyside) and Velindre (Cardiff, Wales) Hospitals chemotherapy services were centrally run. Chemotherapy drugs were prepared in these hospitals and delivered to cancer units (outreach clinics) by nurses trained in administration of chemotherapy. While in Pinderfield General Hospital (Wakefield), nurses and pharmacy were provided locally in the cancer units. Christie Hospital (Manchester) operated a combination of the above two models (Table 5.2).

Literature review

- 1.13 Literature search of major databases (MEDLINE, Cochrane, CINAHL; CancerNet; and NHS centre for reviews and dissemination) revealed a number of models of chemotherapy service organisation in other countries around the world.
- 1.14 The following models of delivering chemotherapy services were found to exist elsewhere around the world:
 - Initial assessment carried out at cancer centre and subsequent chemotherapy delivered at a centre closer to patients' home.
 - Medical and healthcare staff travelled to outreach clinics and provided consultative clinics and follow-up care.
 - Home-based chemotherapy.
 - General Practitioner (GP) administered chemotherapy in co-operation with oncology unit.
- 1.15 Option appraisal of five possible models of chemotherapy service delivery was carried out against a number of criteria gathered from key informants' interviews and the results of literature review. The models were:
 - Central model - nurses and drugs provided from cancer centre;

- Devolved model - nurses employed at satellite units and drugs also provided locally;
 - Integrated Model - Centrally managed nurses working in collaboration with nurses based at units / or nurses, and pharmacists are shared between the Cancer Units and Cancer Centre;
 - Home Model: chemotherapy administered by trained nurses at home; and
 - GP model: GP administered chemotherapy.
- The final choice of a favoured option will have to be made considering other factors including overall cost of each model.

1.16 Of the five model of chemotherapy delivery, the three main ones are the central, devolved and integrated models.

Chemotherapy services safe to give at cancer units

1.17 There was agreement among oncologists on chemotherapy regimens, which they considered safe to give at cancer units for the treatment of breast, lung, colorectal, gastric, ovarian and bladder cancers. However, for some chemotherapy regimens there remain differences of views among the oncologists. This will need to be resolved among the site-specific cancer groups.

1.18 Similarly, for haematological malignancies, there were chemotherapy regimens, which were agreed by both oncologists and haematologists to be safe to give at cancer units. They also disagreed on some chemotherapy regimens.

NICE drugs and local implications

1.19 Based on figures obtained from NICE, and local cancer incidence data, it was estimated that the proportion of eligible cases that were being treated with chemotherapy in North Trent were as follows:

- 18% of lung cancer cases were receiving docetaxol, paclitaxel, gemcitabine, or vinorelbine for NSCLC;
- 26% of breast cancer cases were receiving paclitaxel or docetaxol for advanced breast cancer; and
- 33% of ovarian cancer cases were receiving paclitaxol for ovarian cancer. (Table 7.1 and 7.2)

1.20 Cost estimates for selected NICE drugs showed that around £2.82 million would be needed to treat number of eligible cases in North Trent. This estimate does not include the cost of the new drugs, which are still under considerations by the NICE. This estimate was £0.4 million less compared with previous estimates presented to Weston Park Forum (Table 7.5).

RECOMMENDATIONS

1. The National Institute for Clinical Excellence (NICE) implementation and developments in cancer chemotherapy will result in an increase in chemotherapy activity. This is not sustainable with the current infrastructure.
2. A joint commissioner-provider implementation project group needs establishing to deliver a full, phased, costed implementation plan covering option appraisal on the three main models (central, devolved, and integrated) for delivering chemotherapy. The models and activity assumptions outlined in this report will be used as a basis for the option appraisal.
3. The implementation plan should address the future referral and management arrangements for oncology emergencies arising from the delivery of outreach chemotherapy. This is in light of the fact that it is unlikely that stand-alone units will be able to provide 24-hour oncology cover in the foreseeable future.
4. The principle of safe delivery of chemotherapy as close to the patients' home as possible is accepted.
5. The scope of these recommendations covers at least the time course of the implementation plan described within them. Further recommendations for the ongoing outreach chemotherapy service may then be appropriate.
6. The implementation plan should be phased and phasing should be able to cover aspects of clinical need (cancer sites) and/or geographical site as the North Trent Cancer Network deems appropriate.
7. The findings of this study should inform the development of the Weston Park Hospital site development full business case, as appropriate.
8. Satellite units should deliver the same standard of care as given for the equivalent treatments in the Centre.
9. The implementation plan should ensure that patients are made aware that they can expect to receive the same standard of care at the Satellite units for the equivalent treatments in the Centre.
10. The relevant Network site-specific cancer groups should reach consensus on chemotherapy regimens that can be recommended to the implementation project group, for consideration for outreach chemotherapy.
11. An early decision needs to be made by health communities in Barnsley, Bassetlaw, Doncaster, Rotherham and Chesterfield whether they support development of outreach chemotherapy and associated staffing and infrastructure costs.
12. An agreement is required by the commissioners-provider group on key performance indicators needed for monitoring chemotherapy activity in the cancer units across North Trent Cancer Network.

2.0 Background

North Trent Cancer Network Chemotherapy Review

The North Trent Cancer Network consisting of the following Health Districts: Doncaster; Barnsley; Rotherham; Sheffield; and North Derbyshire has commissioned Phase I of a major review of chemotherapy services (**Appendix A**) for the people served by the Sheffield Cancer Centre and its associated Cancer Units.

This review aimed to identify all the chemotherapy activities undertaken at Weston Park Hospital and in the satellite chemotherapy suites. It also aims to develop proposals to support an increase in activity as close to patients' homes as possible ultimately leaving a local service and highly specialised regimens to be handled by the Cancer Centre. The future configuration of the service would be a hub and spoke model with as much activity as clinically appropriate carried out locally to patients' home to reduce travel time. This will be consistent with current standards of good practice¹ detailed in Manual of Cancer Services Standards.

The Cancer Centre and Cancer Units had undergone a process of accreditation, which examined the standards of delivery of chemotherapy at each site. The Cancer Centre and its associated Cancer Units were certified to have passed the accreditation process, following assessment.²

Achieving a clear patient focussed care pathway was the fundamental principle underlying the work of the review.

This review also took into account the recommendations of report by the Joint Collegiate Council for Oncology (December 2000) relating to improving quality in cancer care at Cancer Units³. One of the major recommendations of the report was that each regional / zonal cancer commissioning team in partnership with health authorities and hospital trusts should review their existing cancer unit services and designate them according to the three types of cancer units (type I, II or III) – see **Appendix B**.

The overall chemotherapy workload was reported to be steadily rising over the previous two years by approximately 50% since April 1999. It was anticipated that there would be further significant increase resulting from the implementation of National Institute for Clinical Excellence (NICE) guidance on chemotherapy.

The brief required to take into account the recommendations relating to maximum waiting times specifically for chemotherapy and the overall cancer treatment waiting time requirements detailed in the National Cancer Plan⁴. According to the NHS Cancer Plan patients with breast cancer will receive treatment within a maximum of one month from diagnosis by 2001. A maximum of one-month wait from diagnosis to treatment should be rolled out for all cancers by 2005.

Weston Park Purchaser Forum, acting as the Project Team, managed the chemotherapy services review. The North Trent Cancer Network fulfilled the role of the Project Board.

The editorial group and consultation process

The report will be finalised by the editorial group who will make the draft recommendations. The report will then go out for consultation to:

- North Trent Disease Site Groups,
- Community Health Council,
- Primary Care Trusts / Health Authorities.

North Trent Cancer Network will make the final recommendations to Primary Care Trusts (PCTs).

Phase II of the review will be a costed implementation plan to support the phased expansion of local services in the North Trent cancer units. It is envisaged that implementation of the plan will commence by 1st April 2002.

OBJECTIVES

Phase I:

1. To identify all the chemotherapy activity undertaken at Weston Park Hospital and in the satellite units by main regime, disease site and patient numbers, by individual health authority. The baseline year would be 2000/01.
2. To describe how the chemotherapy is delivered to the patient for each regime, indicating: clinical input required; inpatient/day case/outpatient setting; number of cycles; and follow-up requirements.
3. To model the increase in patient activity associated with the implementation of the NICE guidance.
4. To establish in consultation with clinical staff the regimes which, due to rarity and/or complexity, must stay at Weston Park Hospital.
5. To identify possible models of care for delivering the services across the Network
6. To make recommendations to the Weston Park Purchaser Forum about the possible future configuration of chemotherapy services across the Network.

Phase II: [This phase will involve the commissioners]

7. To identify the potential increases in capacity in local services and the associated revenue and capital costs.
8. To identify the workforce implications of the proposed service changes.
9. To prepare an implementation plan to support the transfer of appropriate chemotherapy activity to the local settings over an agreed time-scale.

3. Disease epidemiology

3.1 Cancer incidence: 1985-1999.

Purpose:

The purpose of this section was to identify the incidence per year of the major cancers (lung, breast, colorectal, brain and pancreas) in North Trent by health authorities.

Methods:

Information on cancer incidence was obtained from Trent Cancer Registry (Quick Data) containing summary information on cancer incidence from 1985-1996. Data was obtained on the following cancer sites: lung, breast, colorectal, brain, and pancreas. Data on ovarian cancer was not available on Quick Data. The selection of these cancer sites was based on two factors:

- They were major cause of morbidity and mortality and could be treated at cancer units (The Joint Collegiate Council for Oncology, Report 2000).
- They were subjects of the National Institute for Clinical Excellence (NICE) recommended drugs.

A three-year average of the selected cancer incidence was obtained using figures for the years 1997-99. The incidence of the selected cancer (1985-99) is in **Appendix C**.

Results:

A summary table (Table 3.1.1) and figures show that:

- The average number of new cases per year in North Trent for lung cancer were 1356, breast cancer 1080, and colorectal cancer 1028 (Table 3.1.1).

Age standardised incidence rate per 100,000 in Trent Region (Figure 3.1-3.2 and Table 3.1.2) shows:

- A decline in incidence of Lung and Pancreatic cancers (Fig. 3.1 and Table 3.2).
- The incidence of colorectal cancer has remained stable over the years (Fig. 3.3 and Table 3.2)
- The overall pattern of incidence of Breast cancer is increasing in Trent Region (Figure 3.2 and Table 3.12).
- There is a significant increase in the incidence of Brain cancer between 1985 and 1996, by 22%.

Table 3.1.1: Selected cancer sites suitable for chemotherapy [based on cancer sites covered by NICE guidance]: Annual cancer incidence (numbers) based on 3-year average (1997-1999) by health authorities.

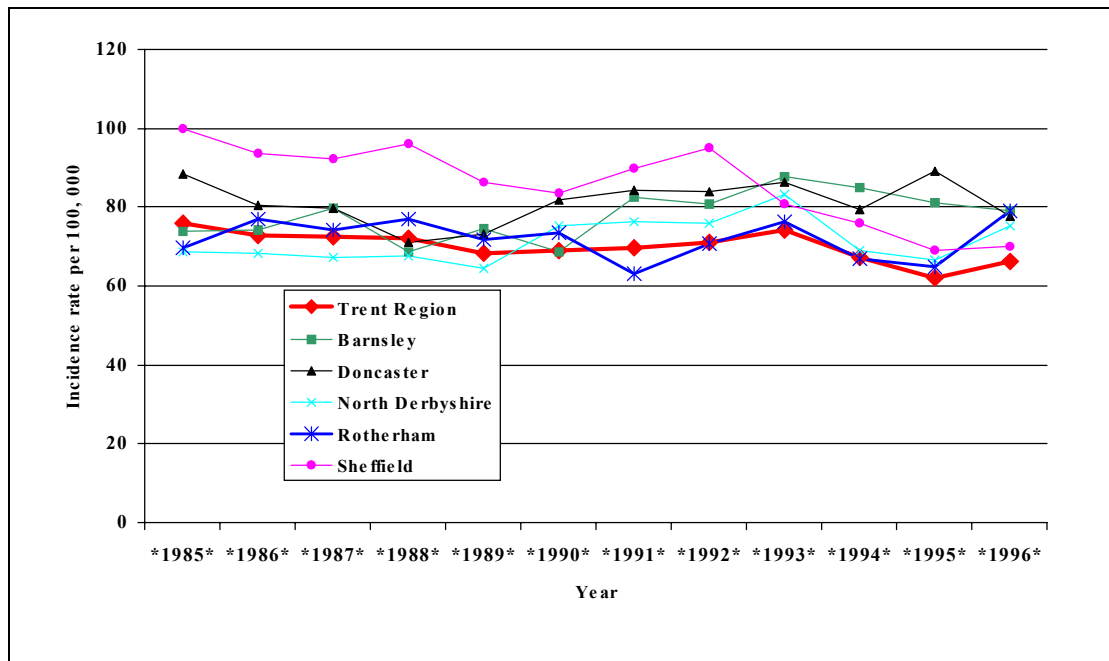
Main Cancer Sites	Health Authorities						TOTAL
	North						
	Barnsley	Bassetlaw*	Doncaster	Derbyshire	Rotherham	Sheffield	
Lung cancer	193	69	237	245	193	420	1356
Breast cancer	137	72	202	246	134	288	1080
Colorectal cancer	146	70	170	224	143	276	1028
Brain cancer	16	11	24	34	22	39	145
Pancreatic cancer	29	17	32	43	34	66	221

Source: Trent Cancer Registry, 2001.

*Based on Bassetlaw Local Authority

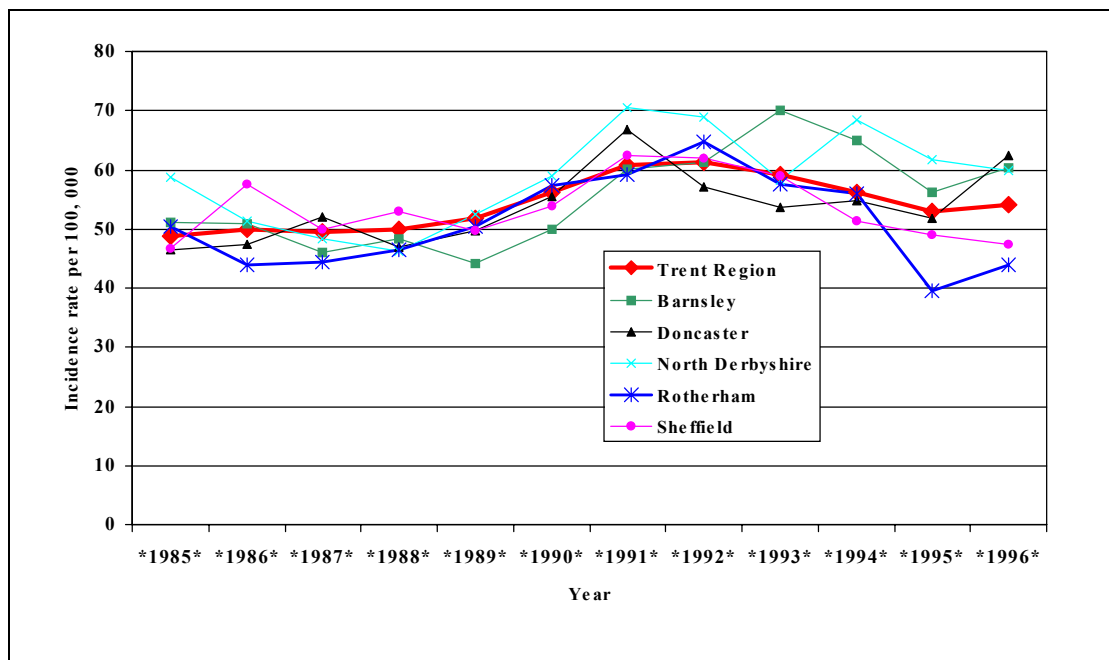
Cancer incidence figures for 1985-1999 by health districts is in Appendix C.

Figure 3.1: Incidence of lung cancer per 100,000 population, 1985-1996 by Health Authorities in North Trent



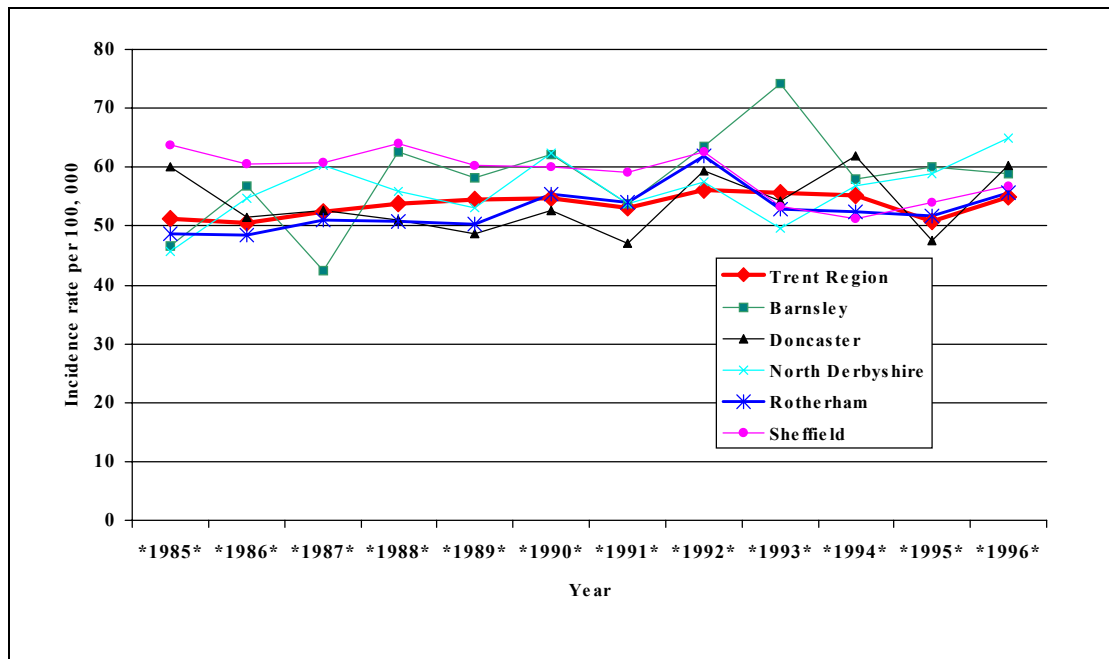
Source: Data from Quick Data 2000, Trent Cancer Registry.

Figure 3.2: Incidence of breast cancer per 100,000 population, 1985-1996 by Health Authorities in North Trent.



Source: Data from Quick Data 2000, Trent Cancer Registry.

Figure 3.3: Incidence of colorectal cancer per 100,000 population, 1985-1996 by Health Authorities in North Trent



Source: Data from Quick Data 2000, Trent Cancer Registry.

Table 3.1.2: Age Standardised (Incidence) Rate per 100,000 (95% confidence interval) by Year from 1985-1996, Both Sexes, Trent Region.

Year	Brain (malignant)		Breast (invasive)		Colo-Rectal		Lung		Pancreas	
	ASR	95% CL	ASR	95% CL	ASR	95% CL	ASR	95% CL	ASR	95% CL
1985-1987	5.4 (5.0-5.8)		45.4 (44.3-46.5)		41.6 (40.7-42.6)		60.6 (59.5-61.8)		9.3 (8.8-9.7)	
1986-1988	5.3 (5.0-5.7)		45.6 (44.5-46.7)		42.0 (41.0-43.0)		59.2 (58.0-60.3)		9.4 (8.9-9.8)	
1987-1989	5.6 (5.2-6.0)		45.9 (44.9-47.0)		42.7 (41.7-43.7)		57.7 (56.5-58.8)		9.2 (8.7-9.6)	
1988-1990	5.8 (5.4-6.2)		48.0 (46.9-49.1)		43.3 (42.3-44.2)		56.5 (55.4-57.6)		9.1 (8.7-9.6)	
1989-1991	6.0 (5.6-6.4)		51.3 (50.2-52.5)		42.5 (41.6-43.5)		55.3 (54.2-56.4)		9.0 (8.6-9.4)	
1990-1992	6.2 (5.8-6.6)		54.1 (53.0-55.3)		42.5 (41.5-43.4)		55.4 (54.3-56.5)		9.2 (8.7-9.6)	
1991-1993	6.3 (5.9-6.7)		54.9 (53.7-56.1)		42.3 (41.3-43.2)		56.2 (55.1-57.3)		9.2 (8.8-9.7)	
1992-1994	6.6 (6.2-7.0)		53.1 (52.0-54.3)		42.7 (41.8-43.7)		55.4 (54.3-56.4)		9.0 (8.5-9.4)	
1993-1995	6.4 (6.0-6.8)		50.3 (49.2-51.4)		41.1 (40.2-42.0)		52.8 (51.8-53.9)		8.6 (8.2-9.0)	
1994-1996	6.5 (6.1-6.9)		48.2 (47.1-49.3)		40.7 (39.8-41.6)		50.5 (49.5-51.5)		8.2 (7.8-8.6)	
1996	6.6 (5.9-7.3)		47.1 (45.3-48.9)		41.5 (39.9-43.1)		50.9 (49.2-52.7)		8.6 (7.8-9.3)	

Data source: Quick Data, Trent Cancer Registry; [ASR = Age Standardised Rate]

3.2 Number of new cases referred to oncologist, 2000.



PURPOSE:

To demonstrate the number of new cancer cases referred to Oncologists (which represent oncology workload across North Trent during a period of one year.

METHOD:

Information on new cancer cases referred to oncologists in North Trent during 2000 was obtained from the Patient Administration System (PAS) at Weston Park Hospital. The information obtained was aggregated data grouped by hospital where patients were seen by oncologists.

RESULTS:

Breast and lung cancers were among the commonest types of cancer accounting for most of workload of oncologists. Most of these cases were seen at Weston Park Hospital (33%), Doncaster Royal Infirmary (15%), Chesterfield Royal Hospital (11%) and Royal Hallamshire (10%) (Table 3.2). A detail breakdown of cancer cases by diagnosis can be found in **Appendix D**.

Table 3.2: List of new cancer cases: January to December 2000 by cancer site groups and hospital where patient were seen by Oncologists.

HOSPITALS											
Diagnosis: cancer sites	Weston Park Hospital	Child Clifford Dental Hospital / Jessop Hospital for Women	Northern General	Royal Halamshire	Chesterfield Royal Hospital	Barnsley DGH	Rotherham DGH	Doncaster Royal Infirmary	Bassetlaw	Total	%
BREAST	99		75	178	134	88	89	256	81	1000	19.6
LUNG	126	9	160	108	101	87	86	158	35	870	17.0
UROLOGICAL	202	0	3	94	102	8	56	94	42	601	11.8
LOWER GI	248	0	47	8	67	92	54	54	21	591	11.6
HEAD & NECK / ENT	102	31	1	3	28	16	26	39	1	319	6.2
GYNAE	131	0	21	1	35	27	34	45	3	297	5.8
HAEMATOLOGICAL	157	0	3	34	17	10	8	33	6	268	5.2
UPPER GI	85	0	29	9	11	51	28	31	18	262	5.1
STEREOTACTIC RADIOSURGERY	258									258	5.0
NEUROLOGICAL	60	0	1	54	2	2	5	4	2	130	2.5
SKIN	68	0	0	4	3	1	1	3	3	83	1.6
SOFT TISSUE	64		2	2	3	3		4		78	1.5
UNKNOWN											
PRIMARY	82		21	31	41	48	42	45	33	343	6.7
MISCELLANEOUS	12	0	0	0	0	0	0	0	1	13	0.3
TOTAL	1694	40	363	526	544	433	429	766	246	5113	100.0
%	33.1	0.8	7.1	10.3	10.6	8.5	8.4	15.0	4.8	100.0	2.0

Data source: Weston Park Hospital, Medical Record.

[Details of cancer sites can be found in the **Appendix D**]

3.3 Projection of selected cancer cases

AIM: To determine the pattern of projection to year 2010 of selected cancer sites (lung, breast, colorectal, pancreatic, and brain cancers).

METHODS:

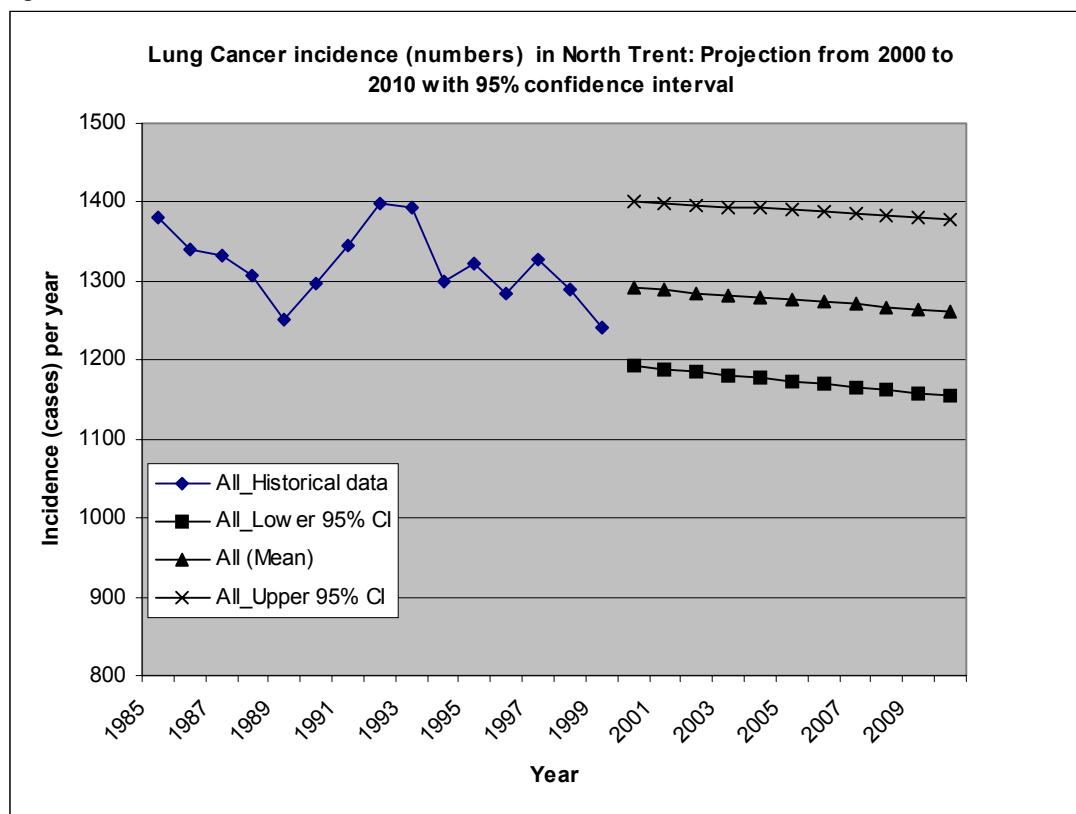
Data on number of incidence cases was obtained from Trent Cancer Registry for the period 1985-1999 by year, disease sites, and health authorities in North Trent. Projection was carried out at Public Health Intelligence Unit at Doncaster Health Authority.

RESULTS:

Projection of the selected cancer sites shows that by the year 2010, the following pattern will be observed:

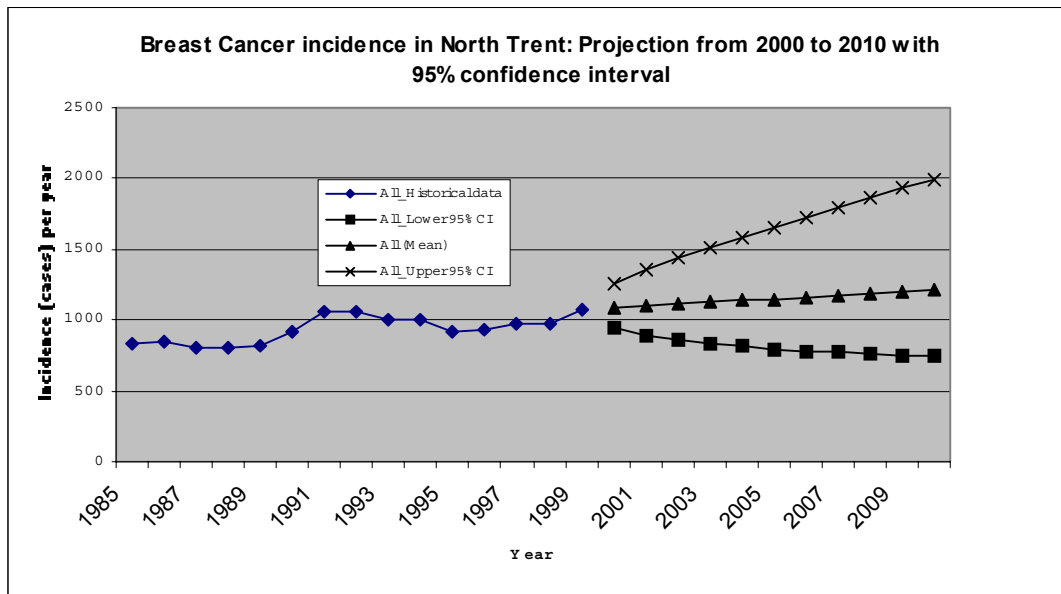
- A gradual decline in the number of lung cancer cases in North Trent
 - A gradual increase in the number of breast cancer, brain cancer, and pancreatic cancer
 - A stable number of cases with colorectal cancers
- (See figures 3.4-3.8)

Figure 3.4:



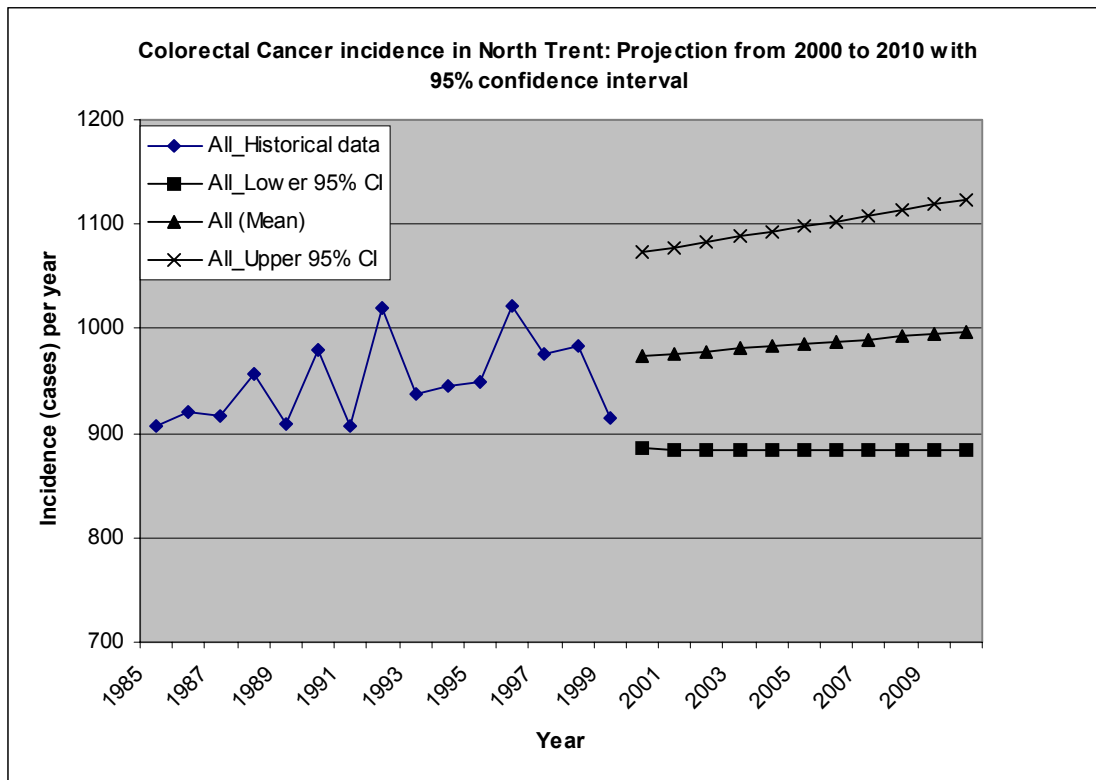
Source: Trent Cancer Registry

Figure 3.5:



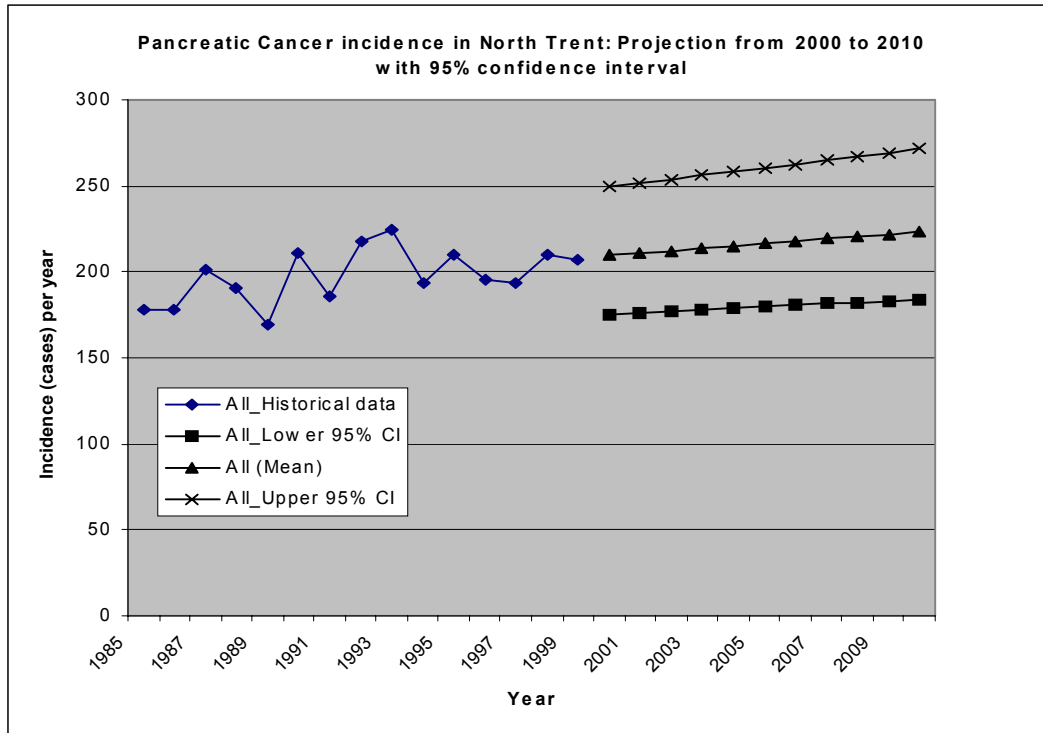
Source: Trent Cancer Registry

Figure 3.6:



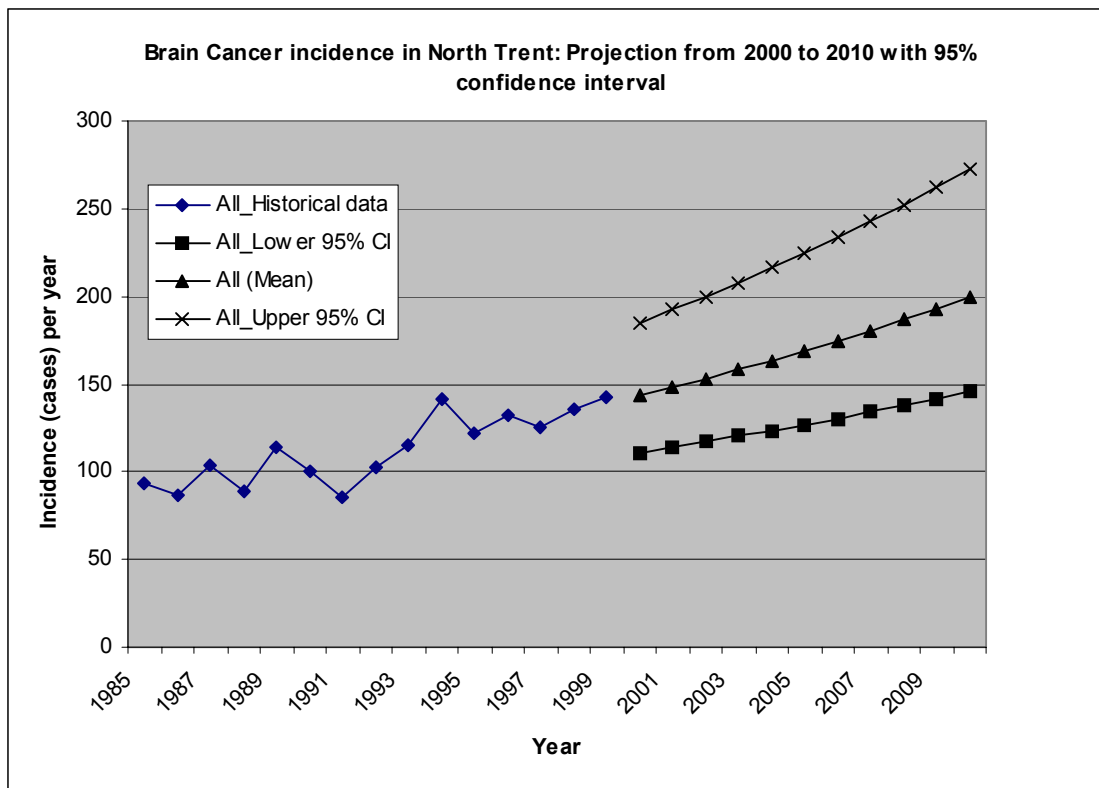
Source: Trent Cancer Registry

Figure 3.7:



Source: Trent Cancer Registry

Figure 3.8:



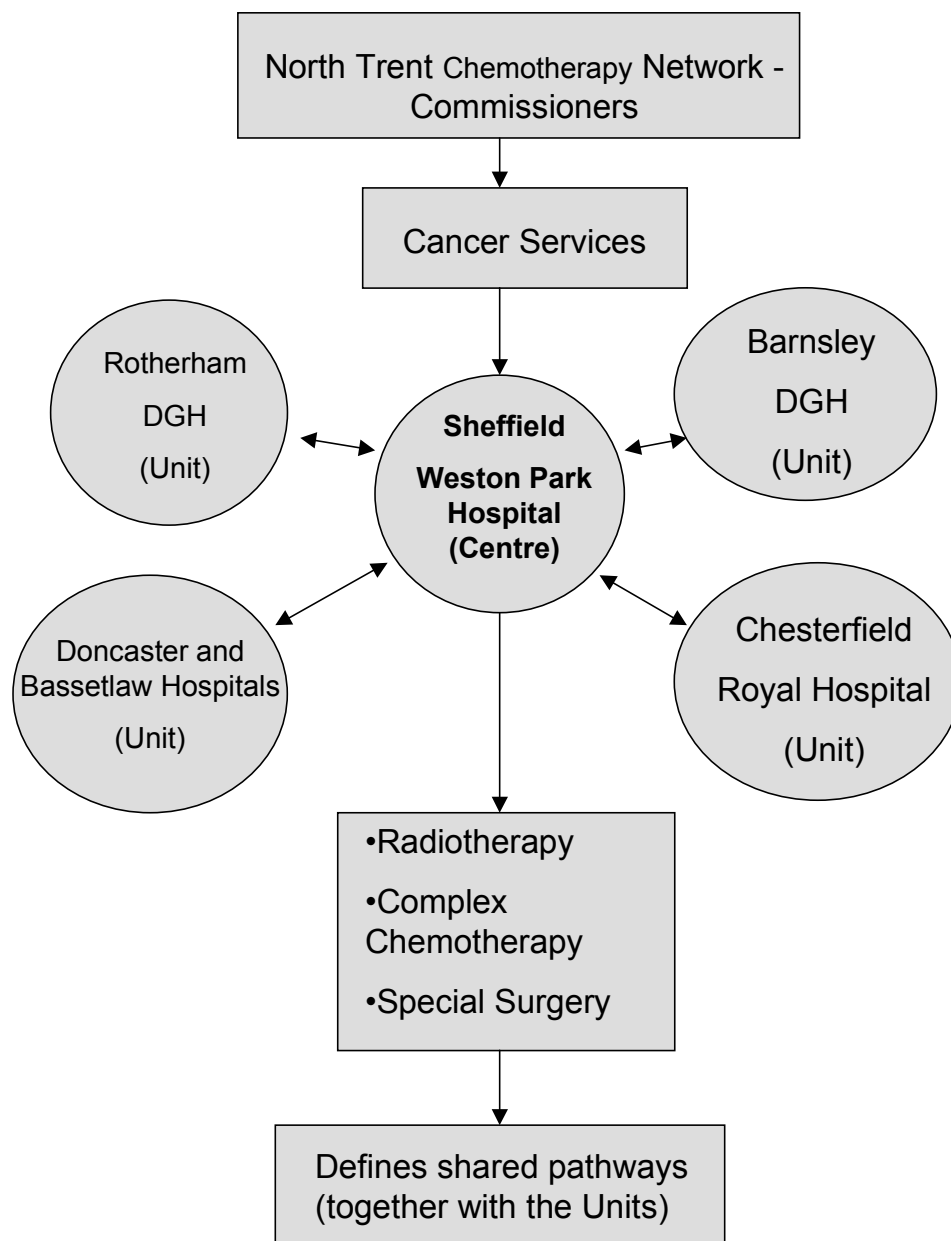
Source: Trent Cancer Registry

4.0 Current service provision

4.1 Structure of service organisation:

Chemotherapy services are provided in North Trent by a network of chemotherapy care from Weston Park Hospital in Sheffield and satellite services in cancer units. The cancer units consist of Barnsley, Chesterfield, Doncaster, and Rotherham district general hospitals (DGHs) (Figure 4.1 below).

Figure 4.1: Structure of North Trent Chemotherapy Network.



There are agreed shared care pathways (agreed protocol, guidelines/regimens) by all cancer site oncologists across the Cancer Network for all cancer sites. The infrastructure (staff, and space) in each of the different Cancer Units is not however consistent.

Population estimate from the Office for National Statistics (March 2001) showed that there were 1.67 million resident populations in North Trent served by this network.⁵ The distribution of population by health districts in North Trent is shown in Table 4.1.1.

Table 4.1.1: Estimates of Resident Population in North Trent, 1999.

	District Health Authorities					
	Barnsley	Doncaster	North Derbyshire	Rotherham	Sheffield	Total
Population	228158	289897	371216	253706	530649	1673626
%	13.6	17.3	22.2	15.2	31.7	100.0

Source: Office for National Statistics, 2001 (Compendium of Clinical and Health Indicators 2000)

NB: Population of Bassetlaw has not been included in the above Table. Bassetlaw is included within North Trent Cancer Network, although it falls under North Nottingham Health Authority.

The Cancer Centre provides complex chemotherapy, supported by radiotherapy and special surgery related to cancer treatment. The Cancer Units and Centre carry out less complex chemotherapy for the local population for the treatment of breast and lung cancers. For people living in Sheffield, the full range of chemotherapy is offered for all disease sites at Weston Park Hospital.

Chemotherapy services are offered on average of 2 sessions (one session for breast and one for lung cancer) per week at the Cancer Units (morning or afternoon). However, Rotherham District General Hospital was providing treatment only for a breast cancer clinic at the time of information gathering for this report. The profile of the units in relation to whether they employ chemotherapy nurses, provide chemotherapy drugs locally or possess shared haematology service is shown in Table below (Table 4.1.2)

An oncologist from Weston Park Hospital provided consultant support in each of the above units. In addition, a clinical assistant was employed to support session.

4.2 Chemotherapy Service Provision

4.2.1 Average number of attendance at chemotherapy session

Method: The number of attendance at outreach chemotherapy sessions was obtained from prescription records held by the Chief Pharmacy at Weston Park Hospital. Chemotherapy regimens administered to patients were used to determine what types of cancer site were treated. The chemotherapy regimens in Cancer Treatment Handbook (Weston Park Hospital) 6th edition was used.

Results: Within a three-month period (January to March 2001), it was found that the average numbers of patients attending each chemotherapy session for breast cancers were as follows: Barnsley 6, Chesterfield 7, Doncaster 9, and Rotherham 3 (Table 4.2). During the same period, only Chesterfield recorded any attendance for lung cancer treatment and this averaged at around one attendance per session.

Table 4.2: Number of patients given a course of chemotherapy at chemotherapy sessions in chemotherapy outreach clinics, January - March 2001.

Jan-Mar 2001	Barnsley		Chesterfield		Doncaster		Rotherham	
	Breast	Lung	Breast	Lung	Breast	Lung	Breast	Lung
Session 1	8		8	1	10		3	
Session 2	6		5	1	11		3	
Session 3	6		2	1	10		2	
Session 4	9		3	1	6		4	
Session 5	6		7		9		1	
Session 6	6		8		12		2	
Session 7	5		4		11		5	
Session 8	7		5	1	8		2	
Session 9	7		8		7		6	
Session 10	4		7	1	10		3	
Session 11	5		6	1	9		2	
Session 12	5		12		9		6	
Session 13	6		10		9			
TOTAL	80		85	7	121		39	
Average attendance per session	6		7	1	9		3	

Source: Chief Pharmacy, Weston Park Hospital

NB: Session 1 = Week at the beginning of January 2001; and Session 13 = Week at the End of March 2001.

4.2.2 Capacity of cancer units

At the time of gathering information for this report, Doncaster Royal Infirmary was in the process of building a dedicated facility for a chemotherapy unit. The new location was hoped to expand and improve the delivery of chemotherapy at the unit.

At the Cancer Centre, where a variety of chemotherapy treatments were given, a maximum of 18 patients was treated as outpatients each day. For a typical patient it was estimated that the time taken to receive chemotherapy was about 3 hours. This was divided up as follows: 30 minutes waiting for blood test; 20 minutes for seeing a doctor; and up to 2 hours for administering chemotherapy.

In the cancer unit, for example in Barnsley DGH, the time taken for chemotherapy treatment was given as approximately 4 hours. This included 5 minutes for blood sample; 30 minutes for education and information; 15 minutes for seeing a doctor; and 30 minutes to 2 hours for administering chemotherapy. [The duration of time for a typical session is given here only as an approximate guide. This could vary slightly from one session to another and between cancer units].

Variation was found in capacity of cancer units in relation to oncology sessions, nursing staff and treatment stations at the satellite units (Table 4.3)

Patients were booked manually for chemotherapy appointments at the cancer units through the Cancer Centre at Weston Park Hospital.

It is expected that chemotherapy at the Cancer Units will expand. This expansion will have impact on staff (nursing and pharmacy), resources, and investigations.

All patients for clinical trials were treated at Weston Park Hospital.

4.2.3 *Classifications of cancer units*

PURPOSE:

To determine where the Trusts were and where they would like to be in the future against the classification of cancer units by the Joint Collegiate Council for Oncology (2000).

METHOD:

Survey of Chief Executives of Trusts, plus written confirmation from Lead Clinician where possible.

RESULTS:

All cancer units currently self classified themselves as Type II cancer unit. However, with the exception of Doncaster, all of the cancer units fell short of the number of nominal half day (NHD) oncology support required by the Joint Collegiate Council for Oncology (2000) (Table 4.4).

A substantial investment in oncology nominal half days at cancer units would be required if Trusts' aspirations were to be met.

Table 4.3a: Capacity of Chemotherapy services at outreach clinics: Nursing staff

Hospital Trusts	Number of nurses recruited to manage Weston Park Hospital workload for outreach chemotherapy		Chemotherapy sessions per week		
	Total number	Total hours / week	Total number of sessions	Breast cancer session per week	Lung cancer session per week
	Barnsley DGH	2	16	2	1
Chesterfield RH	3	20	2	1	1
Doncaster RI	2	16	3	2	1
Rotherham GH*	2	16	1	1	0

*Rotherham GH: Figure excluding one A-Grade Care Assistant contracted at 8 hours per week.

(Figures obtained in December 2001).



Table 4.3b: Profile of chemotherapy activity in North Trent

Chemotherapy activity		Locations					WPH
		Barnsley	Chesterfield	Doncaster	Rotherham		
Chemo made up on site	Haematology	Yes	Yes	Yes	Yes		N/A
	Solid tumour	Yes	Yes	Yes	Yes		Yes
Own Chemo nurses	Haematology	Yes	Yes	Yes	Yes		N/A
	Solid tumour	Yes	Yes	Yes	Yes		Yes
WPH nurses	Haematology	No	No	No	No		N/A
	Solid tumour	No	No	Yes	No		Yes
Number of sessions per week	Haematology	3	1	5	2		N/A
	Lung	1	1	1	0		*
	Breast	1	1	2	1		*
Accreditation status	Haematology	Pass (commendation)	Pass (commendation)	Pass (commendation)	Pass (commendation)		N/A
	Solid tumour	Pass (Commendation)	Pass (Commendation)	Pass (Commendation)	Pass		Pass

*Chemotherapy services at WPH run from Monday to Friday, 9:00 am to 6:00 pm for various cancer sites including breast and lung cancer.

Table 4.4 Classification of Cancer Units in North Trent by current position, future aspiration, and elements of cancer services

	District General Hospitals: Cancer Unit classification					Main elements of service in a cancer unit		
	Barnsley	Chesterfield	Doncaster*	Rotherham	Weston Park**	Type I	Type II	Type III
	II	II	II	II	I			
TYPE OF CANCER UNIT CURRENTLY	II	II	II	II	I			
ASPIRATION FOR DEVELOPING CANCER UNIT	I	I	II	I	I			
<i>Main element of service provided currently*:</i>								
Site-specific & general oncology clinics	+	+	+	+	+	+	+	+
MDTs	+	+	+	+	+	+	+	+
OP chemotherapy	+	+	+	+	+	+	+	-
Specialised chemotherapy nurses	+	+	+	+	+	+	+	-
Pharmacy for cytotoxic drug preparation	+	+	+	+	+	+	-	-
Chemotherapy ward	-	-	-	-	+	+	-	-
24-hour on-site oncology cover	-	-	-	-	+	+	-	-
Patient self-referral	-	+	+	-	+	+	+	-
Psycho-social support & palliative care	+	+	+	+	+	+	+	+
<i>Medical Workforce: Minimum Oncologist Nominal Half Days (NHDs). (For treatment of breast, lung and colo-rectal cancers:</i>								
Lead Oncologist NHD	-	2.5	2	-	-	6.5	-	-
Oncologist NHDs	5	3.5	10	5.5	22	12	10	4

Source: Adapted from report of the Joint Collegiate Council for Oncology, by Royal College of Physicians and Royal College of Radiologists, December 2000.

Note: *Following further discussion within the Hospital Trust, Doncaster has changed their long-term Aspiration from Type II to Type I cancer unit. **WPH is a Cancer centre, and it also offers facilities as a cancer unit to Sheffield residents. There are 16 oncologists who take part in chemotherapy sessions at Weston Park Hospital).

NB: Cancer Units self-assessment (Trusts Chief Executives and written confirmation by Lead Clinicians [No written confirmation was received from Lead Clinicians at Barnsley and Chesterfield).

4.2.4 Chemotherapy regimens undertaken at cancer units



OVERALL PURPOSE:

The overall purpose of the review of outreach chemotherapy was to determine the number of chemotherapy activity (treatments) by chemotherapy regimens and disease sites taking place at the cancer units. Breast and lung cancers were the only cancer sites being treated at the cancer units.

Method

1. Information on patients treated at Weston Park Hospital was obtained from the prescription record held by Pharmacy at the same Hospital. Data was obtained from prescription sheets of patients containing identifier, date of birth, regimens received, and date of chemotherapy. This information was entered onto an excel file (computer package) and sorted. Patients were allocated to diagnostic group by chemotherapy regimens they received. The regimens in the *Cancer Treatment Handbook* 6th edition⁶, used by the clinician at Weston Park Hospital were used to relate regimens to cancer sites. Estimated number of cases was obtained by sorting data by patients' identifier and date of birth.
2. Patient attendance at chemotherapy units by date of attendance and regimens received were obtained from the Chief Pharmacy at Weston Park Hospital. The data was sorted by name of patient to determine number of individual regimens as well as the number of patients with breast, and lung cancers.
3. A separate chemotherapy prescription statistics for breast cancer by outreach clinics and regimens for January to December 2000 was obtained from the Chief Pharmacists at Weston Park Hospital. The information was collated, hence it did not have any patient identifier.
4. Chemotherapy regimens, frequency and number of cycles and inpatient /outpatient methods of administration was obtained from *Cancer Treatment Handbook*, Weston Park Hospital (6th edition).

RESULTS:

Table 4.5

- Breast and lung cancers were the only disease sites treated at the cancer units. Chemotherapy prescriptions for breast cancer in all units made up 93.9% (n=1128) of the prescriptions while that for lung cancer were 6.1% (n=73).
- Nearly half (47.6%) of all chemotherapy prescriptions at cancer units were attributed to patients treated at Doncaster; a third (33.0%) to patients treated at Chesterfield, while Rotherham and Barnsley accounted for around 10% of all the prescriptions.

Table 4.6

- During the period April 2000-March 2001, Lung Cancer Treatment at the units was mainly undertaken at Chesterfield. [Note that at the time of this review, Barnsley DGH had started treating patients with Lung cancer as well].

Table 4.7

- Nearly two-thirds (63%) of chemotherapy prescribing for breast cancer were attributed to Weston Park Hospital, and a fifth (19%) to Doncaster outreach clinics. The main regimens were CMF (61%) and AC (34%).
- The level of chemotherapy activity based on prescribing information for breast cancer was low at Barnsley (0.8%) and Rotherham DGH (3%).
- Chemotherapy regimens, including frequency, number of cycles and outpatient / inpatient administration for breast and lung cancer are shown in **Appendix E**.

Table 4.5: Breast cancer Chemotherapy prescriptions April 2000 to March 2001

Cancer Site	Regiments	Barnsley*	Chesterfield	Doncaster	Rotherham**	Total
Breast	AC	49	122	215	9	395
	CMF	17	140	162	104	423
	CF	2	0		0	2
	MF	0	71	143	0	214
	EPI	30	38	16	0	84
	FEC	0	0	1	0	1
	Pamidronate	8	1	0	0	9
Total		106	372	537	113	1128
	% of all prescriptions	9.4	33.0	47.6	10.0	100.0
	Estimated number of cases treated	29	85	114	16	244

Source: Chemotherapy prescriptions, Chief Pharmacy, Weston Park Hospital

* outreach chemotherapy at Barnsley from November 2000.

** Outreach chemotherapy activity started at Rotherham from May 2000.

Table 4.6: Lung cancer Chemotherapy prescriptions April 2000 to March 2001

		District General Hospital				
Cancer Site	Regiments	Barnsley*	Chesterfield	Doncaster	Rotherham**	Total
Lung cancer	ACE	0	27	6	0	33
	CAV	0	20	0	0	20
	EV	0	20	0	0	20
	Total	0	67	6	0	73
	% of all prescriptions	0.0	91.8	8.2	0.0	100.0
	Estimated number of cases treated	0	25	1	0	26

Source: Chemotherapy prescriptions, Chief Pharmacy, Weston Park Hospital

* outreach chemotherapy at Barnsley from November 2000.

** Outreach chemotherapy activity started at Rotherham from May 2000.

NB: Outreach chemotherapy for Lung cancer commenced at Barnsley from April 2001. There is however, no Lung cancer clinic at Rotherham during the stated period in Table 4.6.

Table 4.7: Breast cancer outreach clinics (note that the figure is based on January – December 2000, unlike Table 4.5 above, which was based on figures from April 2000 – March 2001).

Outreach chemotherapy visits Jan-Dec 2000							
	Sheffield	Barnsley	Chesterfield	Doncaster	Rotherham	TOTAL	%
Regimen							
AC	461	10	114	185	0	770	34.3
CMF	844	7	189	251	74	1365	60.7
Epi	112	0	0	0	0	112	5.0
Total	1417	17	303	436	74	2247	100.0
%	63.1	0.8	13.5	19.4	3.3	100.0	

[NB: Table 4.7 - Figures for Barnsley were small due to the fact that chemotherapy activity started later in the year, November 2000].

Detail of chemotherapy regimens for breast and lung cancers including frequency, number of cycles and inpatient / day case delivery is in **Appendix E**.

4.2.5

(a) Chemotherapy Regimens undertaken at Weston Park Hospital - 2000

PURPOSE

To determine the main chemotherapy regimens undertaken at Weston Park Hospital with a view to identify those that could be delivered safely at cancer units.

METHODS

Chemotherapy regimens undertaken at Weston Park Hospital for the period January to December 2000 were obtained from the Chief Pharmacists. This was based on prescription given out to treat patients. Information was obtained in aggregated form, therefore it was not possible to group by health authorities.

RESULTS

Two main cancer sites treated at Weston Park Hospital by number of courses of chemotherapy administered were breast (32%) and colorectal (23%) cancers (Table 4.9).

88% of chemotherapy regimens used for treating breast and colorectal cancers (**Appendix F**) were suitable for outpatient use. Suitability for treatment as outpatient / day case was based on oncologists' opinion from survey results (Tables 6.2 and 6.4).

(b) Chemotherapy Prescriptions at Weston Park Hospital: May 2001 – October 2001

Purpose:

The purpose of this was to obtain an up to-date information on chemotherapy prescribing using the most recent prescribing at Weston Park Hospital.

Rationale:

It has been reported that chemotherapy regimens were constantly evolving, and using chemotherapy regimens that were as old as one year might not represent current position of the regimens prescribed. Some of the regimens used one year ago were abolished or changed. Therefore, based on available figure, it was decided to supplement existing information on chemotherapy prescribing from Weston Park Hospital with the latest data obtained in the last six months.

Methods:

Summary statistics on chemotherapy prescriptions for January to October 2001 was obtained from the Chief Pharmacist, at Weston Park Hospital. The data summarised chemotherapy prescriptions by ward, oncology, site and month of treatment.

A decision was made to choose chemotherapy data for the recent six months (May to October 2001). Apart from providing information on the latest prescribing activity, the recent six-month period will also enable any stipulation to a one-year period.

Fraction of chemotherapy was determine for each chemotherapy regimen where there was sufficient information to do so. Definition of a fraction of chemotherapy used for the calculation was that agreed by Clinical Working Group on Chemotherapy Healthcare Resource Group (HRG) (May 2001) – see box below.

BOX: Definition of fraction of chemotherapy

Fraction: The term fraction has been adopted as the basic unit of chemotherapy. A fraction will normally equate with a single contact with a chemotherapy nurse specialist for the delivery of chemotherapy. For simple chemotherapy regimens delivered in a day case setting a fraction equates with an 'attendance' or 'day case episode'. Several drugs may be delivered in one fraction. Only one fraction would be counted on any one day. For more complex treatments given to inpatients each administration of chemotherapy requiring a chemotherapy nurse specialist or doctor would count as a fraction. Thus a chemotherapy treatment requiring separate administrations of cytotoxic agents daily for 5 days counts as 5 fractions

Source: NHS Information Authority(May 2001): *Chemotherapy HRGs Version 3.1 Definitions Manual.*

Firstly, fraction(s) of chemotherapy per prescription of chemotherapy regimen was determined using a guide note obtained from the Chief Pharmacy. The guide note contained details of cytotoxic regimens prescribed at Weston Park Hospital by cancer sites, day case or inpatient administration, number of bolus, duration of infusion (in hours or days).

Secondly, the total fractions of chemotherapy were calculated by multiplying total prescriptions by fraction of chemotherapy per prescription.

Results

A total of 4652 prescriptions were made for cytotoxic drugs between May and October 2001. This six-month period represented the most recent prescribing activity at Weston Park Hospital. A total of 264 (5.7%) prescriptions were excluded from analysis because the prescriptions for the cytotoxic medications were either for

clinical trials or the dosages were variable. The total number of chemotherapy prescriptions that were used in the analysis was 4388 (94.3%) – Table 4.8. The Chief Pharmacy at Weston Park Hospital was consulted before excluding these prescriptions.

Table 4.8: Chemotherapy activity at Weston Park Hospital by cancer site, May 2001 to October 2001.

Cancer site	Total Prescriptions		Total Fractions	
	n	%	n	%
Colorectal	904	20.6	2,815	35.1
Breast	939	21.4	955	11.9
GIT	389	8.9	929	11.6
Lymphoma	608	13.9	847	10.6
Ovary	483	11.0	647	8.1
Lung	524	11.9	539	6.7
Melanoma	132	3.0	396	4.9
Teratoma	60	1.4	224	2.8
Cervix	69	1.6	85	1.1
Others	280	6.4	577	7.2
Grand Total	4,388	100.0	8,014	100.0

Data source: Chief Pharmacist, Weston Park Hospital.

Detail of prescription of chemotherapy regimens by cancer sites is included in appendix M.

Chemotherapy prescribing for the six month period (May 2001 to October 2001) represented 51.6% (n=4652) of prescribing activity compared to a period of 12-months from 1st January 2000 to 31st December 2000 (n=9024). This is a fair number of prescribing expected for a six-month duration. There is, however, a lower proportion of prescription (21.4%) for breast cancer during the six-month period than in the 12-month period (31.6%).

Workload implication to Weston Park Hospital for expanding chemotherapy services

Chemotherapy prescribing for colorectal cancer is the main contributor (35.1% fraction of chemotherapy) of chemotherapy workload at Weston Park Hospital. Considering colorectal cancer alone, a significant reduction in chemotherapy activity workload at Weston Park Hospital could be achieved if treatment for colorectal cancer were rolled out to the cancer units. Given that all the cancer units do not treat patients with colorectal cancers presently, all cases of the disease are treated at Weston Park Hospital. Information from cancer incidence (Table 3.1) suggests that 28.8% (n=276) of colorectal cancer cases in North Trent were diagnosed to Sheffield residents each year. If Weston Park Hospital treats only Sheffield residents while the remaining cases are treated at the respective cancer units in North Trent, then it is estimated that this will result into 25.3% reduction in the workload at Weston Park Hospital. This will be an equivalent of **1,305 prescriptions or 4,065 fractions** of treatment for colorectal cancer **per year**.

The reduction in the workload could be more if treatment of other cancer sites were considered to be introduced at the units. This includes introduction of other

chemotherapy regimens for breast or lung cancer presently not being used at cancer units.

[NB: A limitation of existing definition of fraction of chemotherapy is that it does not take into full account the workload implications to nursing and pharmacy staff. For example, one fraction of chemotherapy treatment containing 4 drugs may take up more pharmacy staff-time to prepare than one fraction of chemotherapy treatment with only 2 drugs].

4.2.6 *Opinion expressed about existing chemotherapy service organisation in the cancer units*

Concern was expressed about the small number of sessions in some cancer units. At the time of the review (June 2001), for example, Rotherham DGH had as little as only 1 oncology session (one-half day) per week. This concern centred on administration of chemotherapy services and the best cheapest way of delivering chemotherapy drugs.

Management of complications resulting from administration of chemotherapy was one of the main concerns expressed at the Cancer Units. This required clear written accountability arrangements for management of complications to be in place as indicated in standard 6/14 of Manual of Cancer Services Standards.¹

Currently, individual pharmacies at cancer units claim the drug cost from Weston Park Hospital. Local pharmacies prepare chemotherapy at cancer units. Because of the fewer numbers of cases seen per chemotherapy session in each unit, it was felt that unused medicines from original packs were being wasted.

A common concern expressed by haematologists at the cancer unit included the following:

- *Dealing with neutropaenic sepsis*: Record keeping problem as Weston Park Hospital kept patients record. No details of patient treatments were available at local Chemotherapy Unit for patients who presented to hospital with complication. Electronic patient record was suggested as a solution to the problem of access to patient record.
- Management of complication of chemotherapy is not adequate. Chemotherapy is given as out patient (few receive in-patient treatment).
- Trials were issues as these groups of patients got treated at Weston Park Hospital.

Another reason given in support of developing the local chemotherapy services at the cancer unit was that elderly patients tend to be familiar with the local hospital where they attend for day case or outpatient chemotherapy. These elderly patients would prefer to attend to the local hospital for related problem with their treatments rather than travel to a distant place (Cancer Centre, Weston Park Hospital) for treatment if the treatment can be provided safely locally.

Table 4.9: Number of prescriptions of Chemotherapy regimens undertaken at Weston Park Hospital, 1st January 2000 to 31st December 2000, by cancer sites

REGIMENS	Breast	Chorio	Colorectal	Gynae	Lung	Lymphoma	Melanoma	Others	Ovary	Testicular	Total	%
FU / FA	1		1625					15			1641	18.2
CMF	891										891	9.9
Carboplatin	12			282	9		22	43	230	1	599	6.6
AC	475										475	5.3
Epi (Epirubicin)	295				2						297	3.3
CHOP					4	247		1			252	2.8
Taxol/Etopophos wkly				121					124		245	2.7
Carbo/paclitax		5		152					70		227	2.5
Chlorambucil						179			17		196	2.2
Doxetaxel	188				6						194	2.1
Doxorubicin / Vinorelbine study	176										176	2.0
ACE	78				83			5	3		169	1.9
CAV	43				116			1			160	1.8
Cisplatin/FU				7				147			154	1.7
Trastuzimab alone	144										144	1.6
Cisplatin				99	3			30			132	1.5
Vedex					3	119		2			124	1.4
IM MTX		122									122	1.4
IFN					3	8	76	27			114	1.3
FU			108					3			111	1.2
MVP	78				25			5			108	1.2
FAM			3					100			103	1.1
Ceavac study			102								102	1.1
ALL REGIMENS	2856	196	2115	722	652	998	286	575	500	124	9024	100.0
%	31.6	2.2	23.4	8.0	7.2	11.1	3.2	6.4	5.5	1.4	100.0	

As data was provided in aggregated format, it was not possible to apportion the figure by Health Authorities. (Details of other regimens can be found in **Appendix F**).

5.0 MODELS OF CARE FOR DELIVERING CHEMOTHERAPY SERVICES



5.01 Purpose:

The aim of the review relating to models of care was to identify the most suitable model(s) for delivering chemotherapy services across North Trent Cancer Network. This was driven by consideration for what was considered best, convenient and safe for the patient.

One of the key questions was whether staff involved in the delivery of chemotherapy services should be employed and based at cancer centre or cancer units.

5.02 Methods:

5.1 EXISTING MODELS AND LOCAL VIEWS

Methods: Meetings were held with key informants involved in the management of chemotherapy services (Project Managers, specialist nurses, and clinicians (oncologists and haematologists) in Cancer Centre and Units across the Cancer Network.

5.1.1 Existing model

The Cancer Centre at Weston Park Hospital is responsible for delivery of chemotherapy services across North Trent. It extends this service to other parts of the Network through the cancer units. Currently, the delivery of chemotherapy service in the Cancer Units varies across North Trent Cancer Network. This variation can be described as follows:

Model 1 (*Integrated model* – Centrally employed nurses deployed to work in collaboration with locally employed nurses at the cancer units):

In this model

- Additional chemotherapy nurses from cancer centre are deployed to work alongside nurses based at cancer units.
- Drugs are provided locally by the local pharmacy based at cancer unit.

[Doncaster can be classified into this model].

Model 2: (*Devolved model* – cancer units employ its own nurses and pharmacists)

In devolved model

- All chemotherapy nurses are employed locally by the hospital trust of each cancer units.
- The cancer unit employs pharmacy staff and provides chemotherapy drugs.

[Barnsley, Rotherham and Chesterfield DGHS can be classified into this model]. Weston Park Hospital employs all the Oncologists. The cancer units, employ clinical assistants who work under the supervision of oncologists.

The presence of locally employed nurses at cancer units enhances integration with haematology. All the cancer units in North Trent have an integrated working relationship with haematology and oncology.

The cancer units all started delivering chemotherapy services at different times and have since developed differently. From the time of gathering information for this report (June 2001) the approximate time when the units started were as follows:

- Doncaster Royal Infirmary - 5 years ago (1996)
- Chesterfield Royal Hospital - 2 years ago (1999)
- Rotherham General Hospital 1.5 years ago (1999)
- Barnsley District General Hospital - 0.5 years ago (2000).

5.1.2 Views of Key individuals

a) *Oncologists Views – Weston Park Hospital*

One of the key informants (a senior Oncologist) at Weston Park Hospital felt that in an ideal world the Cancer Centre should run everything from the centre including the provision of nursing staff, and chemotherapy drugs [*Central Model*]. However, to run chemotherapy services centrally was considered by the informant to be not possible in the real world, as each cancer unit would like to exercise control and ownership of their unit. [Other oncologists at Weston Park Hospital shared this view from the point of view of efficiency of running chemotherapy services]. Therefore, the role of the Cancer Centre, according to the informant, was to co-ordinate the activities across the cancer units to ensure that services were similar in the following areas:

- Pharmacy practice standards
- Nursing practice standards
- Environment in which chemotherapy was delivered.

An ideal model, from the perspective of the Oncologist, was to include the following components in the service organisation across the Cancer Network:

- Shared non-medical staff (nursing, and pharmacy) – between the Cancer Units and Cancer Centre. The staff will rotate between the Cancer Centre and the Units. This will also provide opportunity for educational development for the staff.
- Having similar resources (Iso-resources) – budgets, staff.
- Establishing Communications channels (to ensure conformity with similar practice standards) through:
 - Lead Clinicians
 - Multidisciplinary team (MDT) leads
 - Lead Nurses
 - Lead Managers

Views of various staff at Weston Park Hospital about the advantages and disadvantages of having locally employed specialist oncology nurses were explored and these are summarised in the Table 5.1 below.

Table 5.1: Advantages and disadvantages: Locally employed nursing staff at cancer units

Advantage of having local oncology nurse at Cancer Unit	Disadvantage of having local oncology nurse at Cancer Unit
<ul style="list-style-type: none"> ➤ Local ownership; ➤ Integration with haematology services ➤ Less travelling time 	<ul style="list-style-type: none"> ➤ Training issues; keeping up to date with developments ➤ Recruitment and retention

On balance, according to the oncologist, it was better to employ oncology nurses centrally.

Another informant (oncologist) proposed three possible models:

1. Centrally run - across the Network [this was felt to be more efficient]
2. Devolved service to cancer units – local activities operating within an agreed network.
3. Reduced number of cancer units. [The question asked was whether all the district health authorities needed a cancer unit]. The informant acknowledged that this would be the least option from among the three models.

There was expressed need for the development of outreach chemotherapy services at the cancer units.

b) Senior managerial staff: Weston Park Hospital

Problem of chemotherapy service delivery at Cancer Units as seen by senior managerial nursing and administrative staffs at Weston Park Hospital were as follows:

- Problem of recruiting Nursing staff at satellite site. Staff were under utilised for the purpose they were recruited to do (chemotherapy service – only 2 session per week, and the rest of time were spent on other activities at the district general hospitals).
- Similarly, the Pharmacy staffs were also under-utilised. It was reported that some DGH had invested heavily on recruiting pharmacy staff. The same expenditure was estimated to improve the central delivery of service up to three times.

It was suggested as an alternative to staffing problem, that staff recruitment was done centrally (at Weston Park Hospital) and such staffs would be offered 2 sessions per Week outside Weston Park Hospital. The advantage of this model was said to offer a break from the routine work at the centre for the staff involved. This also could maximise the use of staff time and improve efficiency. Chemotherapy service at Doncaster Royal Infirmary used this model where the specialist oncology nurses used to come from Weston Park Hospital (Sheffield) to deliver chemotherapy service in Doncaster. The managers at Weston Park Hospital expressed satisfaction with the delivery of chemotherapy service in Doncaster.

c) Senior nursing staff: Weston Park Hospital.

Issues expressed included the following:

Nursing staff and quality of service

- Nurse re-training (professional development) at cancer units may be limited. Staff might also be lacking behind in keeping up with the latest developments.
- Professional isolation for nurses.
- Recruitment of nurses could be difficult at the units. Weston Park Hospital was reputed to be attractive to nurse recruitment, therefore, it was considered that recruitment would not be a problem if handled centrally at Weston Park Hospital.
- Quality of services might suffer if there were few nurses at the units. At the time of information gathering, there were up to two chemotherapy nurses in each unit. The question posed was what would happen if one nurse fell sick or was unavailable for duty?

Element in an ideal model of service delivery, according to senior nurses at Weston Park Hospital, should be based on:

- Appropriateness of treatment
- Cost effectiveness
- Staff recruitment

The delivery of service needed to be standardised across the units.

Further advantages of central management of the nursing staff from Weston Park Hospital were given. These included:

- Easy of implementing any change
- Having the same nurse for patient follow-up would make patient care better.

Pharmacy

Regarding preparation of medicine for cancer patients, the opinion of key informants (senior nurses) at Weston Park Hospital was in favour of a model where chemotherapy was prepared centrally at Weston Park Hospital then delivered to cancer units.

d) Views of staff at Cancer Units

The views of staff at Cancer Units differ with those expressed by staff at Weston Park Hospital in relation to arrangements for nurses and pharmacy.

There were strong views expressed about the need for locally employed nurses at cancer units to maintain continuity of patients' care. It was cited that patients who turn up at cancer units would find a nurse who knows about their treatment history. This will also improve patients care.

Similarly, it has been argued in favour of maintaining local pharmacy service. The reason given for this include:

- Any decision to delay or defer chemotherapy on the day can be easily accommodated and medication will not be wasted.
- Delays resulting from traffic conditions, which may delay chemotherapy, will not arise, as medication will be prepared locally.
- Pharmacy staff are fully utilised in other related duties for which they have contracted, including preparation of chemotherapy for haematological malignancy.

Local staffs at all the cancer units were happy with current model of chemotherapy service and they expressed the desire for continued support of the local cancer units. This has been captured in the following phrases or slogans stated by some of the staff at cancer units:

“Local service for local people” [Barnsley]

Excellence, sustainability, and local [Doncaster]

(Excellence – best standards; sustainability – will not change in the near future; and local - local to people if technology and excellence can allow).

The general views emanating from the units were that for increasing local resources rather than taking anything away. This increase of resources has been highlighted in the following areas:

- Medical staff (oncologists / staff grade)
- Nursing staff
- Pharmacy staff
- Consideration of other knock on effects resulting from increase in chemotherapy activities (e.g. increased in the number of investigations / tests).

In addition it was suggested that uptake of chemotherapy services could be improved by offering services in the evening in addition to the ones in the morning

5.2. SURVEY OF OTHER CANCER CENTRES IN ENGLAND & WALES

This survey was carried out to find out local models of service delivery in England and Wales.

5.2.1 Methods



Cancer Centres in England and Wales were selected for telephone survey to find out how chemotherapy service was delivered in their cancer network. These Cancer Centres were chosen based on proximity to, or neighbouring, North Trent Cancer Network. The contacts of the chief pharmacists at these cancer centres were made available through the Chief Pharmacy at Weston Park Hospital.

Contact was made with the chief pharmacist or a senior pharmacist at the centre by phone to find out about the chemotherapy services organisation. The following cancer centres in England and Wales were contacted to find out how chemotherapy services were organised for the catchment population:

- Christie Hospital in Manchester
- Clatterbridge Hospital in Merseyside
- Velindre Hospital in Cardiff, Wales and
- Leicester Royal Infirmary, in Leicester.
- Pinderfield General Hospital, Wakefield.

5.2.2 Results

The Table 5.2: below summarises the finding on how cancer services are organised in these centres.

Table 5.2: Delivery of chemotherapy services at cancer units from selected cancer network in England and Wales, 2001.

Name of Cancer Centre / Hospitals	Cancer Units present (Yes/No)	Model of chemotherapy services delivery
Christie Hospital in Manchester	Yes (Breast, colorectal and lung cancers)	<ul style="list-style-type: none"> • CENTRAL: Oncologists, drugs, nurses provided from centre to units. • DEVOLVED: Nurses and pharmacy are local in units, but oncologists go to units from the Cancer centres.
Clatterbridge Hospital in Merseyside	Yes (Breast, Colorectal, and Lung cancers)	<ul style="list-style-type: none"> • CENTRAL: All chemotherapies are prepared at Clatterbridge Hospital and delivered to DGH near to patients. Sent out team of consultant oncologists and nurses with drugs. Has been in operation for at least 7 years. There are a total of 12 outreach clinics locally.
Velindre Hospital in Cardiff, Wales	Yes (Breast, ovary, colorectal and lung cancers)	<ul style="list-style-type: none"> • CENTRAL: Drugs are prepared at Centre (Velindre Hospital) and delivered to outreach clinics by oncology nurses. There are a total of 4 outreach clinics.
Leicester Royal Infirmary	No	<ul style="list-style-type: none"> • All chemotherapies are prepared and given at Cancer Centre.
Pinderfield General Hospital, Wakefield	Yes (Breast, Colorectal, and Lung cancers)	<ul style="list-style-type: none"> • DEVOLVED: Nurses and pharmacy are provided locally in units, but oncologists come from the Cancer centres to the units.

Source of information: Chief Pharmacists / Pharmacist / or manager at the hospitals above.

5.2.3 Implications of introducing Taxotere at Cancer Units: The Approach of Christie Hospital

A discussion paper produced by Christie Hospital had identified strengthening the infrastructure at the cancer units as the way forward in order to administer Taxotere widely at the cancer units.

The important role played by local pharmacies at cancer units in the preparation of chemotherapy drugs was highlighted as Taxotere has a short shelf life of only four hours, once prepared. This meant that it was important that preparation of Taxotere was carried out at local pharmacies at the units. It also required the training of additional local nurses at cancer units, working with a trained nurse from the cancer centre (Christie Hospital).

Discussion paper was produced by Dr Angela Lynch, Director of Chemotherapy, in collaboration with Chief Pharmacy, nursing and medical staff at Christie Hospital (see **Appendix L**). The discussion paper on Taxotere was sent to various local cancer

groups in the Northwest England. The paper considered the implications of introducing Taxotere in cancer units for treatment of advanced breast cancer as a second line agent, based on the recommendations of the National Institute for Clinical Excellence (NICE).

As shown in Table 5.2, Christie Hospital had different arrangements for provisions and administration of chemotherapy for breast cancer at each of its units. In some of the cancer units, Christie Hospital Pharmacy prepared and provided the chemotherapy for the nurses to take to the clinics. Christie Hospital also recorded chemotherapy activity in only half of the cancer units (Table 5.3).

Table 5.3: *Arrangement for the provision and administration of chemotherapy for breast cancer at cancer units, under Christie Hospital (Cancer Centre), Manchester, 2001.*

Cancer Units	Christie Provide Nurse	Christie Provide Drugs	Christie record activity for treatment
Tameside	Yes	Yes	Yes
Oldham	Yes	Yes	Yes
Leighton	Yes	No	Yes
Bolton	Yes	No	No
Bury	Yes	No	No
Rochdale	Yes	Yes	Yes
Wigan	No	No	No
Macclesfield	No	No	No

Source: Discussion paper, Dr Angela Lynch et al. (2001)

5.3 LITERATURE REVIEW ON MODELS OF CHEMOTHERAPY SERVICE DELIVERY



A review of literature was carried out to find out other models of delivering chemotherapy services elsewhere in UK and other countries.

5.3.1 Methods

The following databases were searched for published articles on models of delivering chemotherapy services: MEDLINE from 1966 to the present (2001); NHS centre for reviews and dissemination (The University of York); CINANL (1996-2001); The Cochrane Database of systematic reviews (2001); and CancerNet. Key search words used included a combination of the following: models, chemotherapy, healthcare, outreach, home, cancer and treatment.

5.3.2 Results

a) *Model: Cancer care in the community (Canada)*

In Canada, two models of cancer care in the community were described⁷ (Rusthoven et. al 1986):

1. One stressed the extension of resources outwards to the community from major cancer centres. In this model, patients were initially assessed at one centre but can subsequently receive chemotherapy at a centre closer to home.
2. The other stressed the support of already established resources in the community. In this model, consultative clinics and follow-up care was provided by radiotherapists and medical oncologists who travelled to outreach clinics; and community-based regional oncologists provided diagnostic and treatment services in small communities.

b) *Model: Home chemotherapy*

A cost analysis and safety of home chemotherapy for cancer patients was carried in Australia between 1989-94⁸. The study concluded that home chemotherapy programme was efficient, safe, and potentially cost-effective in comparison with the same treatment administered in the day ward of a hospital. Another study by Holdsworth and colleagues in New Mexico (USA) examined the cost-effectiveness of a home chemotherapy programme versus hospital admission for chemotherapy for paediatric oncology patients⁹. They found that home chemotherapy for paediatric oncology patients resulted in substantial savings. They also concluded that effective control of nausea and vomiting could be accomplished at home in majority of patients. Hart and Redding¹⁰ estimated that home medical care might be 30-50% cheaper than hospital care.

It had also been found that home chemotherapy appeared to be acceptable and safe alternative to hospital treatment for patients with colorectal cancer that might improve compliance and satisfaction with treatment.¹¹ Similar results had been reported with domiciliary chemotherapy for other malignant disease.¹²

A prospective study of advanced non-ambulatory cancer patients was carried out to assess home versus hospital comprehensive treatment.¹³ The services provided

included physical examination, pain control, psychosocial interventions, chemotherapy and blood transfusions, nutrition consultation and bereavement counselling. This was offered by a multidisciplinary health team consisting of an oncologist, oncology nurse, social worker, dietician and medical technician which visited patients at home in an equipped van. It was found that patient and family acceptance of home treatment was excellent, and it was considered an effective alternative to hospitalisation for terminal cancer patients. Quality of life had been improved in patients treated at home compared to those treated in hospital.¹⁴

It had also been shown that patients who received stem cell transplantation at home expressed satisfaction with the treatment¹⁵. Study had also demonstrated the feasibility of managing carefully selected patients in their home environment when at risk from febrile neutropenia or other septic complications following autologous peripheral stem cell support.¹⁶

However, a systematic review of studies, which investigated whether comprehensive home care programmes were more effective than standard care in maintaining quality of life, produced inconclusive results¹⁷. The review examined eight studies, seven in USA, and one in UK and it involved 4,249 participants. It is worth noting that this study did not focus on cancer patients. A second systematic review, which assessed the effect of hospital-at-home compared with in-patient hospital care for patients also, was inconclusive due to insufficient evidence¹⁸. The review examined 5 studies involving 866 patients. The studies were not large enough to detect important statistical differences. Another study conducted in Sydney, Australia found out that if the demand for chemotherapy were to exceed ward capacity by up to 50%, then moving chemotherapy into the home could provide a less costly strategy for the expansion of a chemotherapy service without compromising patient outcomes.¹⁹

In UK, there was a pilot project funded by South Thames Health Authority for a trained nurse to provide a community chemotherapy service for 2 years²⁰. The specialist nurse was based in oncology department of a London teaching hospital and supported by a multidisciplinary team. The nurse met new patients in the outpatient clinic with the medical oncologist and planned the programme of care with the patients and their family. Among the key services offered at home were blood tests, administration of cytotoxic chemotherapy, investigative blood tests or blood product infusions; psychological support and patient education. The evaluation of this model by a survey of primary care professionals, which included general practitioners, showed support for home chemotherapy service.

It had been reported elsewhere that success vesicant chemotherapy in the ambulatory setting required the selection of appropriate candidates for home infusions.²¹

c) *Model: Ambulatory oncology nursing practice models*

Two models were described relating to ambulatory cancer care in Canada²². It had been reported that in ambulatory care, the scope of nursing activities could range from those that complement the work of the oncologist (Nurse Complement Model – NCM), to where the activities of the nurse substituted for selected oncologist activities (Nurse Substitute Model – NSM). A study was carried out comparing the above two models and their effects on health resource utilisation by persons with breast cancer receiving first-time chemotherapy treatment for cure or control of disease. The study found no significant differences between the two groups on health resource utilisation.

d) *Model: General Practitioner (GP) administered chemotherapy in co-operation with oncology unit*

In this model which was described in Norway, patients with metastatic colorectal cancer were treated in general practice²³. The chemotherapy regimens were considered simple to use by a general practitioner in co-operation with an oncology unit. Training was provided to the general practitioners. An oncologist initially saw patients and the general practitioner provided the treatment according to a written instruction. The reported advantage of this model was that it provided treatment as close to home as possible for patients.

e) *Model: A model system: Integration of services for cancer treatment.*

This model was described in Boston, (Boston Floating Hospital for Infants and Children) Massachusetts (USA) in which inpatient-outpatient boundary had been breached by an inpatient case manager and the simultaneous temporary rotation of an inpatient nurse to the outpatient area for specialty training²⁴. It also improved its discharge planning by sharing a nurse with the clinic's major home health care company, which provided direct clinic-home health liaison for patients.

Note:

- An Oncology organisation (Southwest Oncology Group) in Canada was hailed as a model for other oncology organisation because it facilitated participation of community physicians and their cancer patients in clinical trials.²⁵

5.4 OPTIONS APPRAISAL: MODELS OF DELIVERY OF CHEMOTHERAPY SERVICES (Table 4.5)

Purpose: To determine the best option for delivering chemotherapy services in North Trent.

Method:

The criteria used for option appraisal was based on the outcomes of key informant interview and literature review:

- (1) Components of ideal model of delivering chemotherapy services as reported by key informants,
- (2) Main models of chemotherapy service delivery from survey and literature review.

5.5 MAIN MODELS

Of the five models (see Table 5.4), the editorial committee considered the following three main models of chemotherapy service delivery for further consultation:

1. Central model: (nurses and drugs are provided from Cancer Centre).
2. Devolved model: (nurses are employed at satellite units and drugs are also provided locally).
3. Integrated Model: (Centrally managed nurses working in collaboration with nurses based at cancer units. Drugs are provided locally).

The editorial committee considered that the other models, particularly home chemotherapy, might be considered in parallel with any development.

Table 5.4: OPTIONS APPRAISAL: MODELS OF DELIVERY OF CHEMOTHERAPY SERVICES

OPTIONS: Models of delivery of chemotherapy services					
	(1) Central model: (nurses and drugs provided from cancer centre)	(2) Devolved model: (nurses employed at satellite units and drugs also provided locally.	(3) Integrated Model: Centrally managed nurses working in collaboration with nurses based at units. Drugs are provided locally. Opportunity exists for shared staff.	(4) Home Model: chemotherapy administered by trained nurses at home	(5) GP model: GP administered chemotherapy
CRITERIA					
1. Quality of services – patient safety,	In case of complications or staff absence, there is capacity to manage it.	Some units may have capacity in dealing with staff cover in case of complication and staff absence.	Possible cover both locally and centrally in case of need - requiring advance notice	Infrastructure and manpower not in place presently. Issue of clinical governance.	Infrastructure and manpower not in place presently. Issue of clinical governance.
2. Appropriateness of treatment	Should be similar if same protocol is followed.	Should be similar if same protocol is followed.	Similar treatment across the units can be expected	Should be similar if same protocol is followed.	Should be similar if same protocol is followed.
3. Cost effectiveness	Cost effective in using nursing staff and medication	May be less cost effective in using nursing staff and medication if limited sessions for chemotherapy and number of attendants.	Likely to be cost effective	Studies have reported home chemotherapy to be cost effective. Some estimated it to be 30-50% cheaper than hospital care.	Unknown
4. Integration with haematology services	Minimum	More integration	Very good for integrated services	Minimum / None	None
5. Travel time (staff)	Long	Short	Some mobility will be required by staff	Long	Short
6. Patient convenience	Local service provided at cancer unit	Local service provided at cancer unit	Local services, convenient	Most convenient	Nearer to patient's home
7. Local ownership	Lower ownership of service, by local Trusts.	Local ownership of services and staff at unit	Partnership approach: local & centre. Agreement needed who will employ and have control of the staff.	Mobile service, but local to patients	Local ownership of service.

Cont...

Table 5.4 (cont.): OPTIONS APPRAISAL: MODELS OF DELIVERY OF CHEMOTHERAPY SERVICES

OPTIONS : Models of delivery of chemotherapy services					
CRITERIA	<i>(1) Central model: (nurses and drugs provided from cancer centre)</i>	<i>(2) Devolved model: (nurses employed at satellite units and drugs also provided locally.)</i>	<i>(3) Integrated Model: Centrally managed nurses working in collaboration with nurses based at units</i>	<i>(4) Home Model: chemotherapy administered by trained nurses at home</i>	<i>(5) GP model: GP administered chemotherapy</i>
8. Professional isolation	Limited if central commitments / training.	There will be some professional isolation	There is a bridge with central staff	Some isolation, unless part of cancer centre staff	Some isolation, unless regular CPD
9. Establishing communication channels	Easy	Some difficulty, but this can be overcome by establishment of communication channels.	Good channel of communication	Easy if managed from centre	Some difficulty as GP has other commitments.
10. Recruitment and retention	Not a problem at the moment.	There may potentially be a problem. Some Cancer Units, however, felt this is not an issue.	Easy to recruit nurse - however need agreement by cancer units and centre if staff will be shared.	Some problem – needs a large number of trained staff (not easily available now).	Takes time training – some problem
11. Training and continuous professional development (CPD)	Easy	Potential difficulty because staff are removed from centre. Where staff have annual performance review, CPD is thought to be not a problem.	If working in collaboration this should not be a problem	Some difficulty, unless staff are part of cancer centre staff	Some difficulty, unless there is agreed prior arrangements
12. Ease of implementing change	Easy to implement change	Less easy to implement change uniformly across the Network	Easy to implement change.	Easy to implement change if handled centrally.	Less easy to implement change.

6.0 Chemotherapy regimens safe to give at cancer units: survey of oncologists and haematologists



6.1 Purpose:

The purpose of the survey of oncologists and haematologists was to find out what chemotherapy regimens were safe to give at cancer units if resources were available and which ones should remain at Cancer Centre.

6.2 Methods

A decision was made, with members of the project board, to conduct a survey using a postal questionnaire to gather the views of clinicians regarding which regimens were safe to give at cancer units and which ones should remain at cancer centre.

A questionnaire was designed containing the main regimens used at cancer centre and cancer units (**Appendix G**). Chemotherapy regimens used in the questionnaire were taken from the “Cancer Treatment Handbook” 6th edition, produced by Weston Park Hospital. It is worth noting that the chemotherapy regimens were continuously being updated with new drugs. Therefore, newer additions to the Cancer Treatment Handbook that were not in the Handbook were not included in the questionnaire.

Oncologists and Haematologists were asked to tick under one of three columns (yes, no, or don't) whether it was safe to give a particular regimen at Cancer Centre or Cancer Unit, if professional standards relating to chemotherapy (Section D5 – **Appendix H**)²⁶ were met. Where a particular regimen was not within the specialisation of an individual clinician or an individual clinician was unable to comment on an area, he/she was asked to tick under 'don't know'. Clinicians were also asked to indicate whether a regimen was usually given as in-patient, or outpatient / day case.

[Most of chemotherapy regimens used by haematologists for treating haematological cancers were not included in the questionnaire. Most of these regimens were not included in Cancer Treatment Handbook produced by Weston Park Hospital. A copy of protocol containing chemotherapy regimens for treating haematological malignancies is in **Appendix H**.

The questionnaire was piloted with two clinicians: a haematologist and an oncologist. Comments from the clinicians were incorporated into the final questionnaire. The main concern from the oncologist was the relevance of sending the same questionnaire to both oncologists and haematologist. This was addressed by inserting instruction for those completing to mark under 'don't know' if the area concerned was not within their professional competence.

The Questionnaire was sent to all Haematologists and Oncologists in North Trent with a covering letter through Lead person for the Cancer Network.

6.3 Results

6.3.1 Response Rate

Table 6.1: Response rate from survey of oncologists and haematologists

	Oncologists	Haematologists*	Total
No. of questionnaires sent out	16	6	22
No. of questionnaires completed and returned	12	6	18
Response rate (%)	75.0	100.0	81.8

*Two pairs of Haematologists completed single questionnaire each and these were treated in the analysis as responses from 4 haematologists. (Total number of haematologists = 8)

A response rate of 82% (18/22) was achieved (75% [12/16] for oncologists and 100% [6/6] for haematologists) – Table 6.1.

Tables 6.2-6.4 summarise the results of survey of oncologists and haematologists regarding which chemotherapy regimens were considered safe to give at cancer units and which ones were not safe to give at cancer units. Detail of the results of the survey of oncologists and haematologists can be found in **Appendix J**.

6.3.2 Oncologists

Oncologists surveyed considered that it was safe to give the following chemotherapy regimens at cancer units:

- Early breast cancer - adjuvant chemotherapy: AC, FEC, CMF, TAM, TAM+FEC, TAM + OA, TAM + AC, and TAM + Epi-DOX.
- Advanced Breast cancer – CMF, Epirubicin, Doxorubicin, Mitozantrone, Mitomycin C + Vinblastin.
- Lung cancer – Small cell lung cancer: EV, CAV(E), ACE.
- Colorectal cancer - adjuvant Quasar and non-Quasar study (5-day) regimens containing Fluorouracil.
- Gastric Carcinoma – FAM (Fluorouracil, Adriamycin, and Mitomycin C).
- Ovarian Carcinoma – Carboplatin, Treosulphan, and Chlorambucil.
- Bladder Carcinoma – MV (Methotrexate, Vinblastine).

Oncologists were divided in their views on whether it was safe to give the following chemotherapy regimens in the cancer units:

- Early Breast cancer - Epi-Dox study (Epirubicin and Taxotere).
- Colorectal cancer – Irinotecan (for second-line treatment).
- Non-small cell lung cancer – Gemcitabine, Vinorelbine.
- Pancreatic cancer – Gemcitabine.

Although the oncologists considered that the NICE drugs were usually administered as outpatient, they however felt that these drugs were not safe to give at cancer units.

6.3.3 Oncologists and Haematologists views on haematological cancers

There was agreement between oncologists and haematologists on the following chemotherapy regimens being safe to give at cancer units:

- Advanced Hodgkins diseases – all regimens (at the time of survey).
- High grade non-hodgkin's lymphoma – CHOP, CEOP.
- Relapsed Hodgkin's disease and non-hodgkin's lymphoma – VAPEC-B, Cytarabine, Ifosfamide, Cisplatin.
- Other lymphoma regimens – Oral Etoposide, VEDex.

However, there were disagreements between oncologists and haematologists on some chemotherapy regimens. Oncologists considered the following chemotherapy regimens unsafe to give at cancer units while haematologists thought these were safe to administer at cancer units:

- Lymphoblastic Lymphoma – Modified LSA2LA regimens.
- Primary Cerebral Lymphoma – CHOD, BVAM – BCNU
- Relapsed Hodgkin's disease and non-hodgkin's lymphoma – MINI-BEAM regimens (BCNU).

SUMMARY TABLES

Summary Table 6.2: Results of regimens considered safe / unsafe to give at Cancer Units by Oncologists.

<u>Cancer Sites and Regimens</u>	<u>Is it safe to give at Cancer Units?</u>	
	<u>Oncologists opinions</u>	
	<u>Yes / No / Divided</u>	<u>Inpt (IP) / Outpt (OP)</u>
Breast Cancer:		
Early Breast Cancer Adjuvant Chemotherapy		
AC; FEC; CMF; TAM; TAM + TACT; TAM + FEC; TAM + OA; TAM + AC; TAM+ Epi-DOX	Yes (78-100%)	OP (78-100%)
TANGO	No (83%)	OP (100%)
Epi-Dox study	Divided (3:4)	OP (100%)
Advanced Breast Cancer		
CMF; Epirubicin; Doxorubicin; Mitozantrone; Mitomycin C + vinblastin.	Yes (89-100%)	OP (100%)
Taxotere + epirubicin; Peripheral blood stem cell rescue: CbTC breast cancer	No (75%)	OP (100%)
Lung Cancer		
EV; CAV(E); ACE [Small cell lung cancer]	Yes (78-89%)	OP (89-100%)
ICE (standard), PE [Small cell lung cancer]; MVP [Non small cell lung cancer]	No (100%)	IP (100%)
Colorectal cancer		
Adjuvant Quasar and non-quasar study regimens;		
Tomudex.	Yes (75-100%)	OP (100%)
PIF	No (100%)	OP (100%)
De Gramont (48-hour infusion regimen)	No (60%)	IP (100%)
Irinotecan (secondline treatment for colorectal cancer)	Divided (3:2)	OP (100%)

Source: Cancer regimens were taken from Cancer Treatment Handbook, 6th edition, at Weston Park Hospital

Summary Table 6.3: Lymphomas - regimens considered safe / unsafe to give at Cancer Units by Oncologists and Haematologists.

Cancer Sites and Regimens	Is it safe to give at Cancer Units?			
	Oncologists opinions		Haematologists Opinions	
	Yes / No / Divided	IP/OP/Divided	Yes / No / Divided	IP/OP/Divided
Advanced Hodgkin's disease				
All regimens (listed in questionnaire)	Yes (80-86%)	OP (100%)	Yes (88-100%)	OP (100%)
High grade Non-Hodgkin's Lymphoma				
CHOP	Yes (80%)	OP (100%)	Yes (100%)	OP (100%)
CEOP	Yes (100%)	OP (100%)	Yes (100%)	OP (100%)
Lymphoblastic Lymphoma				
Modified LSA2LA regimen - induction therapy	No (67%)	IP (75%)	Yes (63%)	IP (83%)
Modified LSA2LA regimen - Maintenance therapy	No (67%)	IP (75%)	Yes (75%)	Divided (2:3)
Primary cerebral Lymphoma:				
CHOD	No (67%)	OP (75%)	Yes (100%)	OP (75%)
BVAM - BCNU	No (67%)	Divided (3:2)	Yes (83%)	OP (100%)
Relapsed Hodgkin's disease and non-hodgkin's lymphoma				
VAPEC - B	Yes (100%)	OP (100%)	Yes (100%)	OP (75%)
Infusion Ifosfamide and Cytarabine:				
Cytarabine: CisPlatin.	Yes (67%)	IP (80%)	Yes (100%)	IP (83%)
MINI-BEAM regimen - BCNU	No (67%)	IP (75%)	Yes (63%)	Divided (3:3)
Other Lymphoma regimens				
Oral Etoposide; VEDex	Yes (100%)	OP (100%)	Yes (100%)	OP (100%)
HDC and PBSC rescue: BEAM (relapsed NHL or HD)	No (100%)	IP (100%)	No (71%)	OP (67%)

Summary Table 6.4: Other cancer - regimens considered safe / unsafe to give at Cancer Units by Oncologists

Cancer Sites and Regimens	Is it safe to give at Cancer Units?	
	Oncologists opinions	
	Yes / No / Divided	IP/OP/Divided
<i>Gastric Carcinoma</i>		
FAM (Fluorouracil; Adriamycin; Mitomycin C)	Yes (100%)	OP (100)
<i>Oesophageal Cancer</i>		
MRC OE02 Study: Cisplatin + fluoroauracil	No (100%)	IP (100%)
<i>Ovarian Carcinoma</i>		
Carboplatin; Treosulphan; Chlorambucil.	Yes (100%)	OP (100%)
CAP (Cisplatin; adriamycin; Cyclophosphamide)	No (100%)	IP (75%)
<i>Bladder Carcinoma</i>		
CMV (Cisplatin; Methotrexate; Vinblastine)	No (100%)	IP (100%)
MV (Methotrexate; Vinblastine)	Yes (80%)	OP (100%)
<i>Testicular Tumours</i>		
POMB; BEP regimens; ICE	No (100%)	IP (100%)
NICE DRUGS		
Docetaxel; Paclitaxel (Non-small cell lung cancer)	No (100%)	OP (83-100%)
Gemcitabine; Vinorelbine (Non-small cell lung cancer)	Divided (3:2)	OP (88-100%)
Taxanes (Ovarian cancer)	No (100%)	OP (67%)
Taxanes (Breast cancer)	No (100%)	OP (100%)
Temozolomide (Brain cancer)	No (100%)	OP (100%)
Gemcitabine (Pancreatic cancer)	Divided (3:3)	OP (100%)

7.0 NICE drugs and local implications: Increase in patient activities and cost implications



7.1 Modelling patient's increase

7.1.1 Purpose

The purpose of modelling increase in patient chemotherapy activity was to determine increase in the number of cases eligible to receive NICE recommended chemotherapy.

7.1.2 Method

Average number of new cancer cases per year related to the NICE recommended drugs was obtained from Trent Cancer Registry data. The number of cases per year was derived from an average of three years (1997-1999) – Table 3.1. Figure for Ovarian Cancer was obtained Trent Cancer Registry annual report for 1999, based on figures for 1997. Data on ovarian cancer was not available on Quick Data from Trent Cancer Registry.

At the time of producing this report, NICE guidance was still in progress related to clinical effectiveness and cost effectiveness of *capecitabine* and *tegafur uracil* for colorectal cancer. It is expected that the guidance will be ready in March 2003.²⁷

Proportions of patient eligible for the new NICE recommended drugs were obtained from each of the NICE publications for the cancer sites (breast^{28 29}, lung³⁰, brain³¹, pancreas³², and ovary^{33 34}). Where information on proportions of cancer cases eligible for treatment were not available from the NICE publications, this was obtained from CERT (Campaign for Effective and Rational Treatment 2000)³⁵.

The estimated number of patients currently being treated was derived from the total number of prescriptions made for chemotherapy regimens used for treatment of particular cancer sites (**Appendix F**). Information was obtained on the number of cycles for the specified chemotherapy regimens (from NICE publications related to each chemotherapy and cancer site). The estimated number of cases currently receiving NICE recommended chemotherapy was therefore obtained by dividing the number of prescriptions for each regimen by the number of cycles. [It was not possible to identify the number of patients who received specified regimens at Weston Park Hospital]

Assumption was made based on an increase of 25% uptake rate for eligible cases by each quarter (3-month period), such that all cases would take up chemotherapy within a year. [This is only one possibility of uptake of chemotherapy. Variation may occur where it may be aimed that all eligible patients receive chemotherapy within a shorter or longer period].

The number of eligible cases for NICE recommended chemotherapy were too small for pancreatic and brain cancers (**Appendix K**), therefore these two cancer sites were omitted from modelling of patient increase.

Modelling was done for NICE drugs pertaining to the following cancer sites: lung, breast, and ovarian cancer treatment (tables 7.1 and 7.2).

7.1.3 Results

NSCLC:

- It was estimated that around 18% (n=34) of eligible cases for Docetaxel, paclitaxel, gemcitabine, and vinorelbine as first-line treatment for non-small cell lung cancer (NSCLC) were already receiving chemotherapy with the new drugs.
- Modelling based on 25% uptake per quarter of eligible patients suggests an increase of 40 patients (double current number) of NSCLC cases eligible for Docetaxel, paclitaxel, gemcitabine, and vinorelbine for first-line treatment of NSCLC in North Trent. [i.e. an equivalent of 13 additional cases per month across North Trent]. This number will be subject to whether those eligible patients would take up the chemotherapy treatment when offered to them.

ADVANCED BREAST CANCER

- 26% (n=42) of breast cancer patients already were receiving Paclitaxel and Docetaxol for advanced breast cancer across North Trent.
- Across North Trent, an additional increase of around 30 cases (19% of eligible number of cases) per quarter would have to be offered treatment with Paclitaxel and Docetaxol based on 25% quarterly increase in the number of eligible cases to be treated. [i.e. an equivalent of around 10 cases per month across North Trent]

OVARIAN CANCER

- A third (n=46) of eligible ovarian cancer cases for Paclitaxol were being treated with Paclitaxel in North Trent. This means 24 (17%) additional eligible cases per quarter may need to be offered the above treatment [i.e. an equivalent of around 8 cases per month across North Trent].

7.2 NICE drugs: local implementation and audit mechanisms

7.2.1 Purpose

To determine any existing mechanism for audit and monitoring of NICE drugs.

7.2.2 Methods

Information on chemotherapy regimens was obtained from Protocol registration form at Weston Park Hospital through the Director of Chemotherapy, and Pharmacist at Weston Park Hospital. Information on any existing audit or monitoring mechanism was obtained from the Director of Chemotherapy Services.

7.2.3 Results

There was no existing audit and monitoring mechanism in place related to implementation of NICE recommended cancer drugs. It was considered that this was awaiting guidelines from NICE (Table 7.3)

7.3 NICE drugs: number of cases in North Trent and cost implications

7.3.1 Purpose

To determine the cost implication which would result from introducing NICE drugs for the treatment of cancers.

7.3.2 Method

Eligible number of cases was calculated based on NICE figures and where this was not available, figures from CERT were used. Costs per patients were obtained in a similar way.

Comparison was made with figures calculated in January 2001 for Weston Park Forum to determine variation in cost and eligible number of cases for treatments.

7.3.3 Results

The resulting cost from the new NICE recommended drugs for selected cancer treatment in North Trent was around £2.8 million per year (Table 7.4). This figure excludes new drugs under review which may be released in the future. This includes drugs for the treatment of colorectal cancer (Capecitabine and tegafur uracil) which is due to be released by March 2003.²⁷ Colorectal cancer make up 35% Fraction of chemomtherapy treatments at Weston Park Hospital.

These NICE recommended drugs were Gemcitabine for pacreatic cancer; Temozolamide for brain cancer; Paclitaxel, Docetaxol for advanced breast cancer; Docetaxol, Paclitaxel, Gemcitabine and Vinorelbine for first-line treatment of NSCLC; Docetaxel for 2nd lind treatment of NSCLC; Paclitaxel and Topotecan for ovarian cancer.

Previous cost estimates of introducing NICE drugs for the treatment of above cancers was £3.2 million compared to £2.8 million for current estimates (Table 7.5).

[Differences in the approach of deriving the above two cost estimates were mainly due to use of different proportion of cases eligible for treatment; the method of deriving incidence per year for North Trent; and differences in costs per patients].

Table 7.1: Modelling patient increase as a result of introducing NICE drugs (Lung and breast cancers)

Cancer sites and NICE drugs	Barnsley	North Derbyshire	Doncaster & Bassetlaw	Rotherham	Sheffield	North Trent
<i>LUNG CANCER: Docetaxel, paclitaxel, gemcitabine and vinorelbine (First-line Treatment)</i>						
Estimated number currently eligible	27	39	46	29	56	196
Estimated number currently treated	5	7	8	5	10	34
% currently treated						17.5
Estimated additional number of cases to be treated per year	22	32	38	23	46	162
<i>Cummulative increase in the number of cases by Quarter (25% increase per quarter)</i>						
Quarter 1	10	15	18	11	21	75
Quarter 2	16	23	27	17	33	115
Quarter 3	21	31	37	23	44	156
Quarter 4	27	39	46	29	56	196
<i>Paclitaxel (Taxol) and Docetaxol (Taxotere) for advanced Breast Cancer</i>						
Estimated number currently eligible	22	31	44	19	44	160
Estimated number currently treated	6	8	12	5	12	42
% currently treated						25.9
Estimated additional number of cases to be treated per year	16	23	32	14	32	119
<i>Cummulative increase in the number of cases by Quarter (25% increase per quarter)</i>						
Quarter 1	10	14	20	9	20	71
Quarter 2	14	20	28	12	28	101
Quarter 3	18	26	36	16	36	130
Quarter 4	22	31	44	19	44	160

This projection assumes that all the patients will be treated through out the year. The actual number to be treated may be lower due to refusal of treatment, death, etc.

Table 7.2: Modelling patient increase as a result of introducing NICE drugs (Source: Data from Trent Cancer registry, chemotherapy prescriptions from WPH (ovarian cancer)).

Cancer sites and NICE Drugs	Barnsley	North Derbyshire	Doncaster & Bassetlaw	Rotherham	Sheffield	North Trent
<i>Paclitaxel (Taxol) for Ovarian Cancer</i>						
Estimated number currently eligible	16	29	38	19	40	141
Estimated number currently treated	3	5	7	3	7	46
% currently treated						32.6
Estimated additional number of cases to be treated per year	13	24	31	16	33	95
<i>Cummulative increase in the number of cases by Quarter (25% increase per quarter)</i>						
Quarter 1	6	11	15	7	15	70
Quarter 2	9	17	22	11	24	94
Quarter 3	13	23	30	15	32	117
Quarter 4	16	29	38	19	40	141

This projection assumes that all the patients will be treated through out the year. The actual number to be treated may be lower due to refusal of treatment, death, etc.

Data sources: Trent Cancer Registry (cancer incidence); Weston Park Hospital (chemotherapy activity); and NICE figures on proportion eligible for treatment.

Table 7.3: NICE drugs local implementation and audit mechanisms

Cancer site	Regimens	Frequency	Local Guideline	Audit and monitoring mechanism
Non-small cell lung cancer (NSCLC)	Paclitaxel (Taxol) [day 1, iv]	3 weekly	Chemotherapy protocol registration form	There was no audit mechanism in place at the time of the time of producing this report. The audit mechanism was reported to be awaiting NICE guidance. However, discussion had taken place with cancer commissioners regarding the possibility of identifying patients who received NICE drugs from computer system in the near future. What was considered not possible to do was to identify patients who might have benefitted from NICE drugs. [Source: Dr P. Lorigan, Director of Chemotherapy Services, Weston Park Hospital, - Personal communication].
]+ Carboplatin [day 1, iv]		"	
	Docetaxel (Taxotere) - day 1, iv	3 weekly	"	
	Vinorelbine (day 1 and 8) + Carboplatin (day 1)	3 weekly	"	
	Vinorelbine, Day 1 and 8.	3 weekly	"	
Ovarian cancer	Carboplatin + paclitaxel	-	-	
	Topotecan	-	-	
Breast cancer	Docetaxel	-	-	
	Docetaxel + doxorubicin	-	-	
	Docetaxel + epirubicin	-	-	
	Doxorubicin + Vinorelbine	-	-	
	Paclitaxel	-	-	
Brain cancer	Temozolamide (Temodal)	-	-	
Pancreatic cancer	Gemcitabine	-	-	

Source: Chemotherapy Protocol Registration Form; and Chemotherapy prescription statistics, Weston Park Hospital. (Some of the above regimens were not yet included in the Cancer Treatment Handbook produced by Weston Park Hospital).

7.3 NICE drugs and cost implications

Table 7.4: Summary Table for NICE drugs cost implications (£) based on number of cases eligible (N) for chemotherapy per year by health districts in North Trent.

NICE drugs (Cancer sites) and % eligible for treatment	England & Wales		North Trent		Barnsley		North Derbyshire		Doncaster & Bassetlaw		Rotherham		Sheffield	
	N	Estimated cost (£)	N	Estimated cost (£)	N	Estimated cost (£)	N	Estimated cost (£)	N	Estimated cost (£)	N	Estimated cost (£)	N	Estimated cost (£)
Gemcitabine (pancreatic cancer) - 20% eligible	1366	3,251,080	44	103,768	6	13,804	9	20,944	10	23,800	6	14,756	13	30,464
Temozolomide (brain cancer) - 25% eligible	150	960,000	35	225,600	4	24,000	9	57,600	9	56,000	4	27,200	10	60,800
Paclitaxel, Docetaxol (Advanced Breast cancer) - 16% eligible	5286	21,145,600	160	640,640	22	87,680	31	124,800	44	175,360	19	76,800	44	176,000
Docetaxel, Paclitaxel, Gemcitabine, and Vinorelbine (1st line NSCLC) - 15% eligible	4995	12,987,000	196	510,120	27	70,200	39	101,790	46	118,950	29	74,100	56	145,080
Docetaxel (2nd line NSCLC) 1% eligible	333	1,448,550	13	56,898	2	7,830	3	11,354	3	13,268	2	8,265	4	16,182
Paclitaxel (Ovarian cancer*) - 68% eligible	4019	28,131,600	141	990,080	16	109,480	29	199,920	38	266,560	19	133,280	40	280,840
Topotecan (Ovarian cancer*) - 31% eligible	1832	8,244,450	64	290,160	7	32,085	13	58,590	17	78,120	9	39,060	18	82,305
TOTAL (COST £)		76,168,280		2,817,266		345,079		574,998		732,058		373,461		791,671

NB: % eligible and cost were based on figures from NICE, and where this was not available figure from CERT (Campaign for Effective and Rational Treatment (2000) was used.

*Figure for Ovarian cancer was obtained for 1999 registration, Trent Cancer Registry; while for the rest of cancer sites a 3-year average (1997-99) was taken.

Although the figure on estimated number of cases eligible for chemotherapy are displayed as whole number, the actual number with decimal points were used to calculate the estimated cost of drugs. This accounted for differences in costs even though the number of patients appears the same.

Table 7.5: Summary Table comparing previous and current estimated number of cases per year in North Trent and their Associated costs for NICE drugs.

NICE drugs (Cancer sites)	Previous Estimate based on 3% of UK incidence			Current Estimate based on actual Trent Cancer Registry data			Actual No. of Prescriptions	Estimated No. of cases (based on known number of cycles)
	% Eligible*	N	Estimated cost (£)	% Eligible**	N	Estimated cost (£)		
Gemcitabine (pancreatic cancer)	50	102	244,000	20	44	103,768	77	
Temozolomide (brain cancer)	38	45	333,000	25	35	225,600	0	
Paclitaxel, Docetaxol (Advanced Breast cancer)	30	297	1,665,000	16	160	640,640	249	42
Docetaxel, Paclitaxel, Gemcitabine, and Vinorelbine (1st line NSCLC)	15	145	380,000	15	196	510,120	103	34
Docetaxel (2nd line NSCLC)	1	10	42,000	1	13	56,898	126	-
Paclitaxel (Ovarian cancer)	35	62	540,000	68	141	990,080	207	46
Topotecan (Ovarian cancer)	-	-		31	64	290,160	13	3
TOTAL (COST £)			3,204,000			2,817,266		

*Based on CERT (Campaign for Effective and Rational Treatment 2000)

**Based on figures used by NICE and where not available figures used by CERT. [Figure for ovarian cancer was 1999 registration, Trent Cancer Registry]

[NB: Previous estimates for Paclitaxel and Topotecan (ovarian cancer) were combined together to give an overall cost estimate of £540,000.

8.0 Travel Time Isochrone: Breast, lung and colorectal cancers



AWAITING MAPS

9. APPENDICES

- A Aim and objectives of Chemotherapy Services Review
- B Classification of cancer units
- C Cancer incidence: 1985-99
- D Details of new cancer cases by diagnosis and hospital where cases were seen by oncologist, 2000.
- E Chemotherapy regimens for breast and lung cancers: frequency, number of cycles and inpatient / outpatient administration.
- F Chemotherapy regimens undertaken at Weston Park Hospital
- G Questionnaire to Oncologists and Haematologists on which chemotherapy regimens are safe to give at cancer units.
- H Section D5: Chemotherapy – Professional standards (2nd Round) for accreditation of cancer centres and cancer units for the Trent Region.
- I Protocol for treatment of haematological cancer
- J Results of questionnaire to oncologists and haematologists on which chemotherapy regimens are safe to give at cancer units
- K Number of eligible cases for treatment with NICE drugs
- L Implications of more widespread use of Taxotere
- M Appendix M: Chemotherapy activity at Weston Park Hospital by cancer site and chemotherapy regimens: May 2001 to October 2001.

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