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BUDGETARY IMPLICATIONS OF CROSS BOUNDARY FLOWS IN EAST ANGLIA

A Report to the Regional Health Authority

by

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A. Introduction and Terms of Reference.

The East Anglian Regional Health Authority is concerned to base its budgetary decisions on accurate information about the costs of cross-boundary flows in the Region. A patient counts as a cross boundary flow when a resident in one district completes a spell as an in-patient in a hospital in another district. Patients can flow across regional boundaries as well as district boundaries within the same region. The first question at issue is whether such patients present distinctively different treatment problems from those presented by resident patients. Such treatment problems might register in terms of greater length of stay and/or greater severity of condition requiring more intensive treatment during the stay.

Severity could have several aspects to it. At admission it could involve the expectation of greater difficulty in diagnosis or in treatment. During treatment, it could present in terms of the need for more medical and nursing time for some patients or for more complex or more frequent treatment. Severity would lead to greater caution about discharge and to greater length of stay.

The second issue is whether such differences (if they exist) lead to higher cost. The third issue is whether such differences in cost justify budgetary compensation. To justify compensation in terms of budgetary targets the costs would have to be consistent and likely to continue over a long period of time. There could also be compensation in arrears which would be related to measured differences from plan. At present districts are compensated for cross boundary flows on the basis of average costs per case by specialty.

The East Anglian RHA has asked the Centre for Health Economics at York University to carry out an independent study of the whole issue. This request followed the Report of the Regional Working Party on Resource Allocation published in September 1983. We set out the two relevant paragraphs in Appendix 1 as they reflect the state of information and the questions in the minds of policy-makers when we began our enquiry. The terms of reference set to us by the RHA originally cover all types of hospital care. In subsequent discussion it was agreed that the study should cover in-patients only and exclude out-patients, day cases and the costs of laboratory tests. The information required to make estimates on these points is not available routinely in sufficient detail for individual cases. The aim is:

> "To show whether there is a significant variation among Districts in the severity of illness of patients crossing boundaries for treatment and, if so, whether this results in a significant difference in attributable costs".

The study has been carried out between March 1986 and March 1987. It was accepted that with the time and resources available, it would not be possible to do a detailed study of individual cases using clinical evidence. The study aims at the best adjustment possible with circumstantial evidence. The first stage was to make as full use of HAA (Hospital Activity Analysis) data as possible. In using it we benefited from published tables, and from special tabulations from the 100 per cent return. We also carried out subsequent analyses on a 10 per cent sample. The first part of this Report deals with these results. The aim was to make use of existing information in order to provide a fuller picture of length of stay and age, residence and diagnosis. HAA has clear deficiencies. One of them is that it deals with cases rather than

patients: but it can provide some valuable evidence on differences in length of stay. It also provides a good deal of information on the exact place of origin of cross-boundary flows. This can provide evidence on whether cross-boundary flows are drawn from many wide and scattered points within the Region implying an element of selection, or whether they are drawn from adjacent districts.

The second stage of the study examined the pattern of work and use of resources in more detail in Cambridge. As part of this study we interviewed senior nursing staff on most wards at Addenbrooke's Hospital in order to get the views of experienced professionals to balance with the statistical evidence.

In conclusion the report sets out the budgetary implications of the findings and makes some recommendations for budgetary methods in the future. The problem of fair costing for cross boundary flows is likely to recur in a region where the boundaries of health districts are not natural boundaries for patients. New hospital developments and any shift of care to primary care may alter the problem but are not likely to eliminate it completely. The aim of this study is to produce a management tool which can both resolve the current problem and which will be of assistance in the future.

We would like to thank Jan Jay and Nursing staff at Addenbrookes: Isabel Moden of the RHA, Dr. Roy Carr-Hill and Keith Humphries of CHE, Bob Lavers of IRISS and Ron Akehurst of the York Health Economics Consortium for their help in preparing this report.

B. Cross Boundary Flows in East Anglia: The Evidence from HAA

The EARHA is divided into eight Health Districts, one of which, Cambridge, contains a large teaching hospital, and another, Huntingdon contains a recently built hospital which is gradually introducing comprehensive acute facilities. Both Norwich and East Suffolk contain two large District General Hospitals as well as a number of smaller hospitals, some of which are used for special purposes such as treatment of geriatric or convalescent patients. Peterborough District provides a DGH which is used by a large number of patients outside the region in the Trent overlap. Similarly some residents in North Essex and North Herts use Addenbrookes hospital in Cambridge. Cambridge and West Suffolk have an unusual geographic boundary, in that part of West Suffolk would more naturally lie in the Cambridge district. This part contains Newmarket hospital, so that some Cambridge residents go to Newmarket, and some West Suffolk residents to Addenbrookes.

In addition to patients crossing boundaries for reasons of geographic convenience, some specialist facilities are only provided in certain districts, mainly in Cambridge and Norwich with cardiac specialties in Huntingdon. These are known as Regional specialties. By virtue of its teaching hospital, Cambridge also provides facilities on a national basis in certain areas of expertise. Because of the existence of special facilities or expertise in certain districts, cases which are complex or unspecific may be referred to those districts in case the facilities are needed. These could be termed cases with potential medical difficulty. In some situations, the length of waiting lists varies from one district to another, and depending on their individual circumstances, patients may be referred by their GP's across boundaries. Some consultants conduct clinic sessions in more than one district and patients are then referred by

consultants according to the consultant's method of working, which may depend on the relative provision of diagnostic, treatment and post treatment facilities as well as consultants' convenience. Apart from these (partly planned) reasons, a number of patients will be treated on an immediate basis as a result of chance illness or accident while on holiday or business. This will apply particularly to the holiday coastal areas in Norfolk and Great Yarmouth, or to hospitals which serve major traffic routes.

It is therefore clear that the eight districts may expect to treat quite different groups of patients who cross into their areas, depending on the facilities they provide and their geographical situation. Equally, those districts which export a number of patients may do so either because they do not provide the treatment required, or the patient (or his GP or consultant) chooses to go elsewhere. Cross Boundary Flow is thus not at all homogeneous, and in the following analysis an attempt will be made to take this into account, by considering cross district and cross regional cases separately, and taking into account the casemix (specialty, diagnosis, age) of those seeking treatment.

The only comprehensive source of data on hospital in-patients is the HAA (Hospital Activity Analysis) for which the last complete year available when the study was carries out in 1984. A special 10 per cent sample is used here as well as data from the whole population. The most serious limitation of HAA data is that it is based on cases in any hospital for a continuous time. This means that a patient entering more than one hospital will be counted more than once, and equally a patient returning for follow-up treatment at the same hospital will be counted separately each time. In the case of patients crossing boundaries for specialist facilities, they

could have three separate entries, post and pre-treatment in the sending district, and during treatment in the receiving district. A district which has a policy of discharge to a convalescent hospital will show an apparent higher level of activity in the number of cases treated, although the total number of bed-days used would be similar to a district which does not.

The specialties shown in the tables are specialties on discharge. A person with a series of complicating conditions may have been seen in more than one specialty during the course of treatment; different districts also have different recording policies (e.g. in some areas urology is shown separately, in others included with general surgery; young children will sometimes be shown in paediatrics, in others in the main specialty of treatment e.g. ENT).

There is variation between districts - the relative demands for treatment by specialty vary. In particular there are large differences in the age distributions of the underlying populations serviced by the different districts thus giving rise to different expected numbers of patients in different specialties and with different treatment needs. Comparisons across districts should therefore be made with some care.

B1 Workload

What is the relative importance of cross-boundary flow cases in proportion to total workload in each district? We look first at gross inflows. The summary figures are set out in Table A.

The main conclusion that stands out is that of variation between districts. Overall a total of 176,081 cases were treated in the EAR in major acute non-regional specialties of whom 26,963 (15.3 per cent) crossed

Table A

Workload - Inflow

Number of Cases Treated in Major* Acute Specialties excluding Geriatrics, EAR 1984

District of Treatment	Number XD	Number XR	Number XB	(As % total workload)	Total major acute cases in district
Cambridge	5053	4860	9913	35.2	28187
Peterborough	956	3337	4293	17.1	25072
West Suffolk	3461	1051	4511	23.5	19171
East Suffolk	572	520	1092	4.2	26077
Norwich	3194	511	3705	9.5	38931
Great Yarmouth	433	702	1135	6.9	16504
West Norfolk	635	1090	1725	11.9	14487
Huntingdon	350	239	589	7.7	7652
EAR	14654	12309	26963	15.3	176081

* See appendix 2 for details

either regional (XR) or district (XD) boundaries. The proportions of workload represented by cross boundary flow patients varied from 4.2 per cent in East Suffolk to 35.2 per cent in Cambridge.

There is also evidence on how cross boundary flows affect workload by specialty. Apart from regional specialties with an overall 60 per cent crossing district boundaries there is a range among the main acute specialtiesover all EAR cases. As between specialties the proportions crossing boundaries are rather similar - for the main acute specialties excluding geriatrics and obstetrics the range in terms of proportions crossing boundaries is only from 13 to 19 per cent. The variation comes between districts. In general districts with high (or low) in-flows in one specialty also have high (or low) in-flows in others. As between districts there is a localization within the Region. Cross boundary in-flows are concentrated on three districts Cambridge, Peterborough and West Suffolk. The rates of in-flow found in other districts are quite low ranging from 4-12 per cent while the other three districts range from 17-35 per cent.

It is also possible to look at these flows in relation to the total district workload. A third or more of the in-flows are in surgery and general medicine. Adding on obstetrics nearly one half of all cross boundary flow cases are being treated in relatively broad specialties. The proportions of total cases between specialties is rather similar between districts whatever their absolute level of in-flows. Cambridge is unusual in the relative importance of inflows in opthalmology and obstetrics. West Suffolk has unusual inflows in trauma and orthopaedics and in gynaecology. Among 'other' non-regional specialties Huntingdon makes significant contribution in terms of thoracic medicine.

As well as evidence on in-flows there is also evidence on net flows which takes into account exports as well as imports. This evidence is set out in Table B and Graph A. There are more detailed figures in Appendix 2. The evidence on net flows changes the picture as between districts. Four districts are net exporters. Again the districts with the least definite natural boundaries and closest to other regions have the highest flows.

The map gives an indication of the in/out flows of non-regional specialty cases to each district. The width of the arrows is on the scale 1mm corresponds to 100 cases. A straight line represents 50-100 cases, and flows of less than 50 cases have not been marked.

The main impression is one of pressure on Cambridge and Peterborough from outside the region and a cross district flow of more than 50 cases from all districts in EAR to Cambridge, regardless of whether they have a joint boundary. Other large inter-district flows are only between adjacent districts. This would seem to indicate a slight pull of cases to Cambridge over and above that of the main flows arising from local geographical convenience although it may also be due to Cambridge being a centre in the commercial and communications sense.

The Report so far has presented evidence on total numbers of cases. The most clear conclusion is that in-flows mainly arise from across boundary lines in some adjacent districts, Cambridge, Huntingdon, West Suffolk and Peterborough. These districts have (apart from Huntingdon) both high levels of cross district flows and high levels of cross regional flows. The only other sizeable flow in the Region is along a natural line of communication from Yarmouth to Norwich. For Cambridge in-flows from certain limited areas must amount to a high proportion of the total demand for hospital services. However there are also some flows from all

Table B

1 Net Flows by District All Non-Regional Specialties Excluding Geriatrics*

Source HAA 1984 XBF Tables

District	In-Flow (Number of Cases)	Out-Flow (Number of Cases)	Net Flow (Number of Cases)
Cambridge	10819	3782	7037
Peterborough	4757	1441	3316
West Suffolk	5114	3334	1780
East Suffolk	1364	2124	-760
Norwich	5150	2060	3090
Great Yarmouth	1367	3175	-1808
West Norfolk	1872	2193	-321
Huntingdon	1816	3529	-1713
EAR	32259	21638	10621

* [Includes major specialties as Table A and other specialties some of which are not found in all districts]

Net Flows by District: Geriatrics

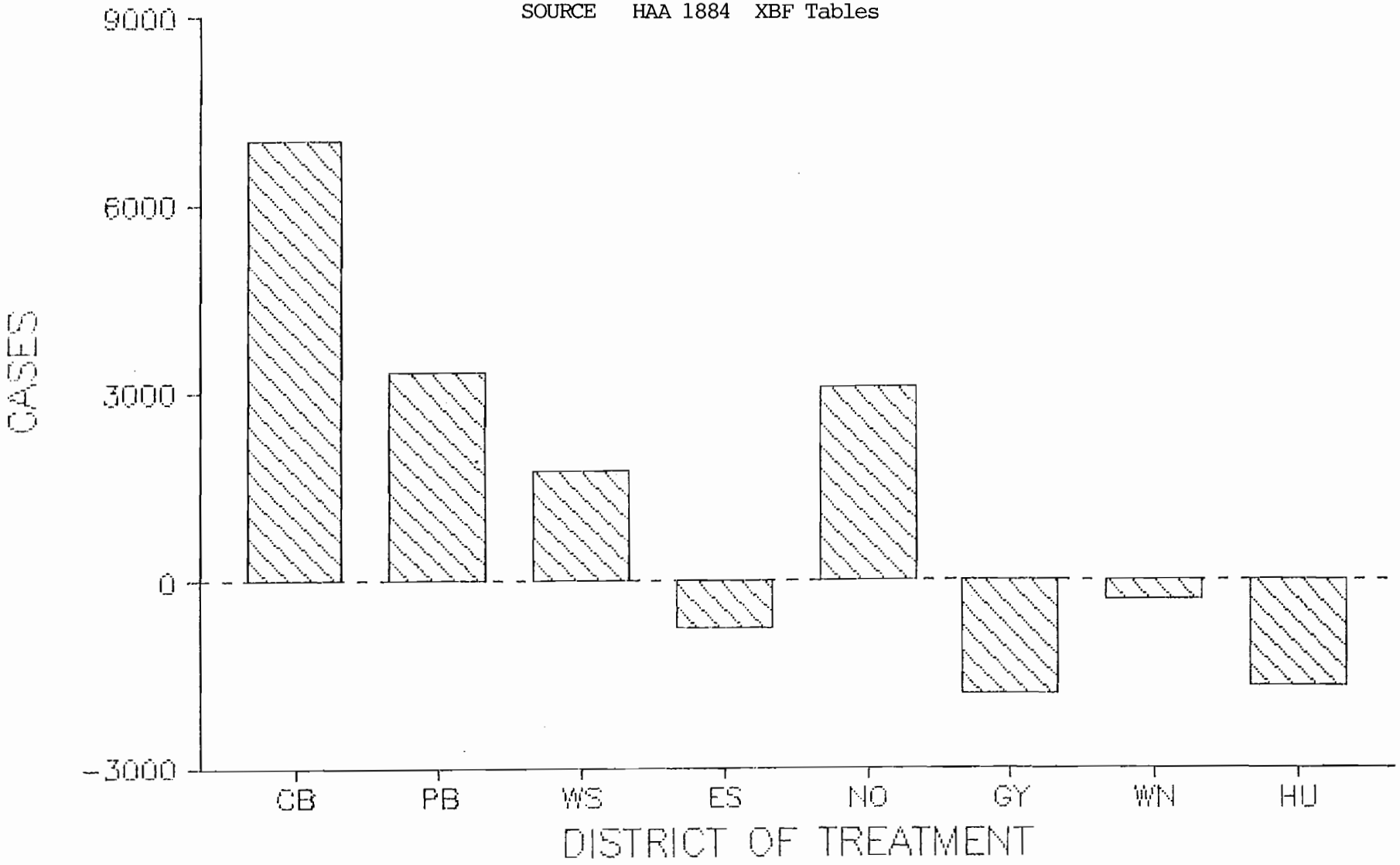
District	In-Flow (Number of Cases)	Out-Flow (Number of Cases)	Net Flow (Number of Cases)
Cambridge	222	491	-269
Peterborough	135	39	96
West Suffolk	539	98	441
East Suffolk	54	100	-46
Norwich	181	76	105
Great Yarmouth	26	77	-51
West Norfolk	134	103	31
Huntingdon	62	37	25
EAR	1353	1021	332

Graph A

NET FLOW INTO EACH DISTRICT

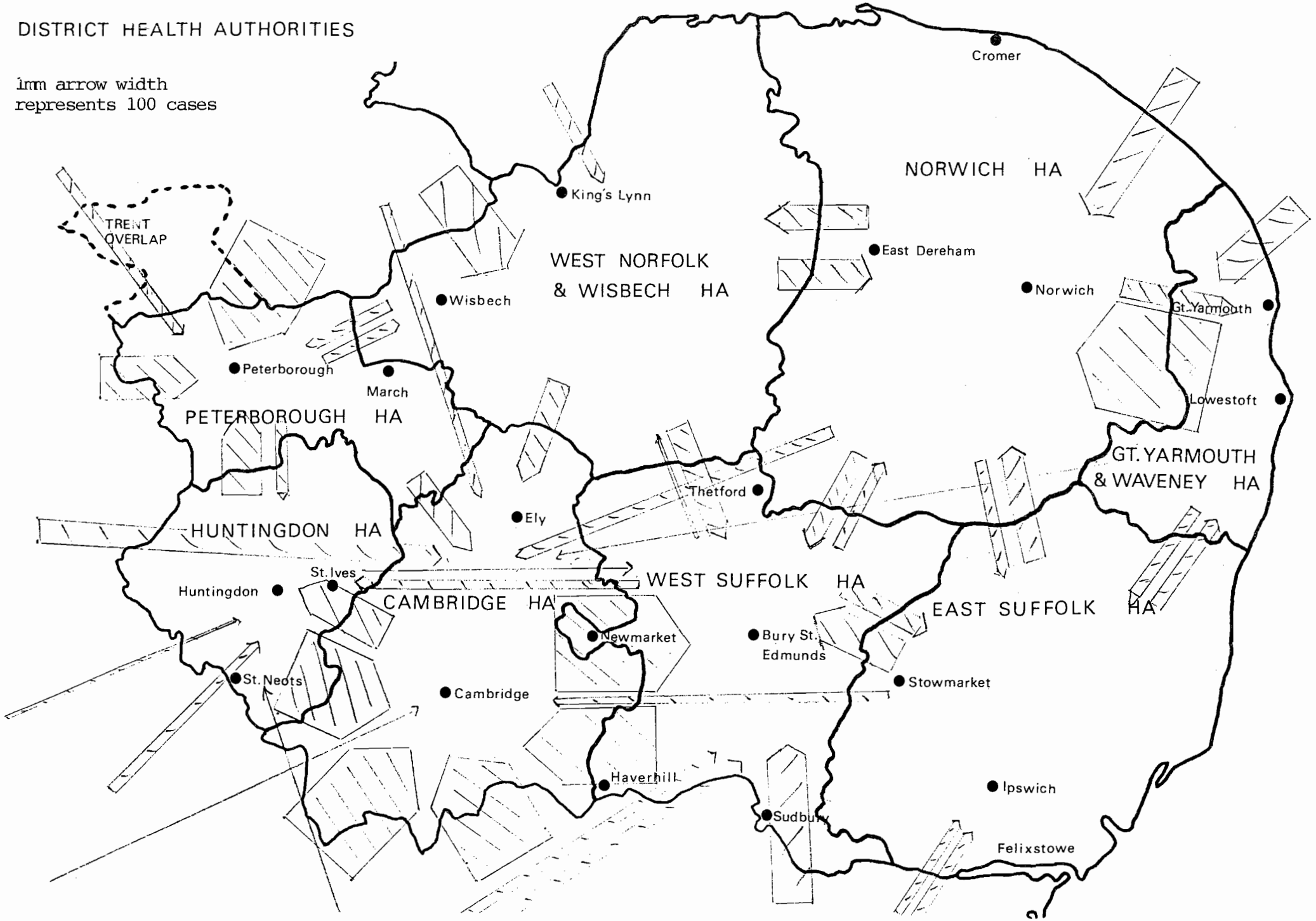
ALL NON REG SPECS EXC GERIATRICS

SOURCE HAA 1884 XBF Tables



EAST ANGLIAN REGIONAL HEALTH AUTHORITY MAJOR NON-REGIONAL SPECIALTIES EXCLUDING GERIATRICT '84 HAA IN-PATIENTS

DISTRICT HEALTH AUTHORITIES



districts into Cambridge. Cambridge attracts a heavy flow for many specialties: but for geriatrics the position is reversed: Cambridge is a net exporter.

B2 Severity Factors

The Report now turns to other indicators available from HAA on the characteristics of cases. So far we have been dealing with the evidence on the number of cases. Such evidence may provide a crude measure of total workload but has little to offer on the issue of severity. There are however some other data in HAA which do provide some better although still indirect evidence on severity. The main variables are:

Length of stay or bed-days - it might be expected that people who were more severely ill would stay longer.

Age - length of stay is correlated with age and age by itself may be indicative of difficulty such as length of time to recovery, nursing dependency and complexity.

Diagnostic case mix - Certain diagnoses are known to involve more expensive treatment procedures: however the information available on HAA about diagnosis has to be treated with some reservations.

There are certain points which have to be borne in mind in interpreting the data on length of stay. Districts which have an early discharge policy will show on average a shorter length of stay than ones that do not for the same kinds of patient. A District may also have a different discharge policy for XBF cases and for its residents: on the one hand it might discharge some XB cases early for convalescence in the sending district, on the other it might not be able to discharge them so

easily as its own district patients, if there were extra communication difficulties, or if the district had forms of post-treatment community facilities which were available to its own residents but not to XB cases.

Differences in discharge policy may also occur both between specialties (e.g. in the provision of after-care treatment) and between consultants (in their use of such facilities for the management of cases).

Cases which are admitted for reasons of medical severity or specialist treatment may be 'transferred' from a previous course of treatment from one district to another. Although this group might be expected, on average, to stay longer than a set of less severe patients with the same diagnoses, they will already have spent some part of their treatment in one place, so their stay on average in the receiving district will be shorter than that for an equivalently severe group of residents.

Length of stay comparisons between resident and cross boundary cases within districts can be affected by the hospitalisation rates in the district. A district which has more capacity for in-patient care may accept more easy cases (who might otherwise be treated on a day care basis) leading to a lower average length of stay for resident cases. Comparisons between resident and cross boundary cases would need to be looked at in conjunction with hospitalisation rates to reflect the additional severity due to length of stay of cross boundary cases. Appendix 5 gives the rates for in-district patients in 1984. In fact hospitalisation rates are not higher for resident patients in districts with high in-flows.

Given the limitations of HAA referred to above, and the caveats on interpretation of length of stay as indicative of medical severity, it is

clear that length of stay is not totally reliable as a basis for allocation of resources. It does however, give a useful picture to show how, under current cross boundary flow patterns and patterns of resource provision and use, the eight districts are being affected in terms of bed-days (and hence hotel cost).

It is possible to get a good deal of information from HAA about length of stay by specialty within District as set out in Table C and Appendix 3. Graph B combining all non-regional specialties is also presented. The main conclusions to emerge from these figures are as follows:

For the four districts with small numbers of 'imports' - East Suffolk, Great Yarmouth, West Norfolk and Huntingdon - lengths of stay of cross boundary patients are often less than those of home patients with the exception of geriatrics.

In Cambridge length of stay of cross boundary flow patients is greater than residents for six out of eight major specialties. (See Appendix 3, Table 3.4) The exceptions are Trauma/Orthopaedics and Opthalmology where lengths of stay are shorter.

In Peterborough length of stay of cross boundary flow cases is greater that residents for four specialties, exceptions being paediatrics, trauma/orthopaedics, gynaecology, and opthalmology.

For Cambridge patients crossing regional boundaries stay rather shorter times in some specialties than cross district patients. However for Peterborough the cross-regional patients stay rather longer especially in general surgery.

In most specialties the difference in average length of stay for all types of patient between districts is much greater than the differences within districts by different residents groups. This is well brought out by Table C.

The complex picture for lengths of stay between and within Districts is well summed up by Graph B. This brings out the variety in length of stay within districts and also that cross district patients generally stay somewhat longer in the main importing districts.

It is also possible to examine the distribution of lengths of stay in more detail. Are there a disproportionate number of XBF cases who stay a very long time? Appendix 3 provides an analysis of the proportions of all patients treated within districts who stayed longer than 28 days. Apart from geriatrics and T/O these proportions are very small. There is also information about the percentage of all discharges within a specialty who were discharged within 3 weeks. A second table shows more detail for three specialties for the different residence sub-groups. There are few major differences between home and cross boundary patients within these groups. There is a very slight tendency for Cambridge to have rather more cross-boundary patients who stay more than three weeks: most of these are patients who have crossed district boundaries.

A further comparison would be to consider the proportion of cases at different percentile points in the distribution. An overall small difference in means could be due to two groups of cases among the XBF, a group of easy and a second group of more serious cases - the mixture giving an overall similar mean to the host, and possibly similar 90 percentile points. The needs of the two groups in terms of treatment and cost may be

Table C

Mean Length of Stay in Days by Place of Residence and Specialty

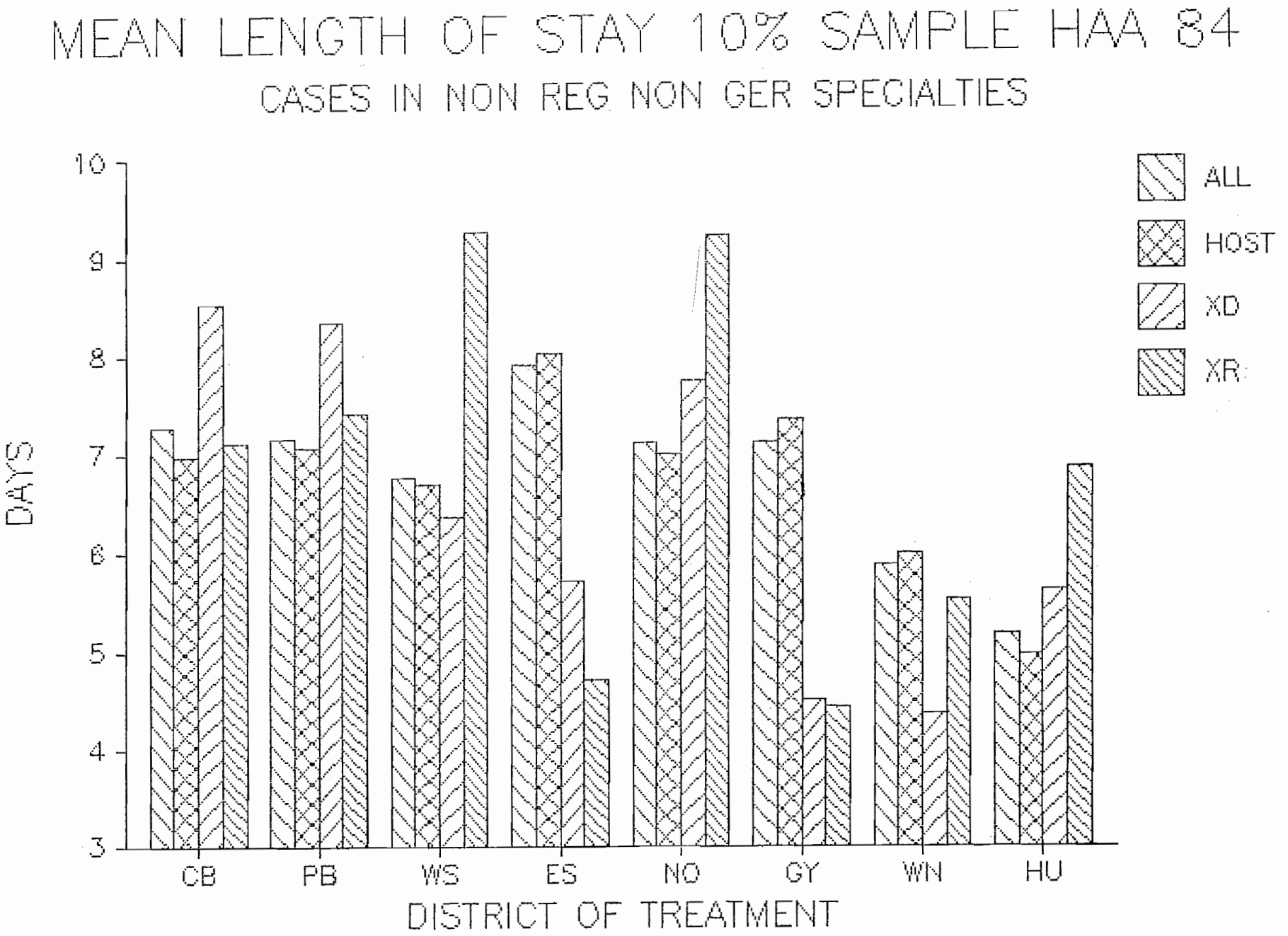
Source 1984 HAA XBF Special Tabulations

Specialty		DISTRICT OF TREATMENT							
		C	P	WS	ES	N	GY	WN	H
	All	11.74	9.93	10.06	11.05	8.57	7.28	6.90	6.91
(GM)	H	11.69	9.57	9.97	11.16	8.72	7.56	7.06	7.04
	XD	11.89	10.56	11.12	11.51	7.83	5.34	5.80	6.08
	XR	11.82	11.81	7.35	6.35	5.60	5.08	5.77	4.25
	XB	11.85	11.53	10.40	8.50	7.10	5.15	5.78	5.30
Diff	(H-XB)	-0.16	-1.96	-0.43	+2.66	+1.62	+2.41	+1.28	+1.74
Diff	(All-XB)	-0.11	-1.60	-0.36	+2.55	+1.47	+2.13	+1.12	+1.61
(P)	All	4.65	3.19	3.19	2.93	2.76	3.22	2.95	3.46
	H	4.28	3.34	3.22	2.98	2.73	3.43	3.03	3.50
	XD	6.05	2.31	2.88	2.04	3.31	2.18	2.07	1.77
	XR	4.50	2.34	3.16	1.84	2.21	1.84	2.69	3.14
	XB	5.36	2.33	2.96	1.80	3.04	1.90	2.45	2.63
Diff	(H-XB)	-1.08	+1.01	+0.26	+1.18	-0.31	+1.53	+0.58	+0.87
Diff	(All-XB)	-0.71	+0.87	+0.23	+1.13	-0.28	+1.32	+0.50	+0.83
(GS)	All	6.90	6.98	7.23	7.70	8.78	6.25	6.48	4.39
	H	6.52	6.81	7.20	7.79	8.88	6.44	6.49	4.45
	XD	7.96	6.98	7.68	6.44	7.84	4.32	5.49	3.11
	XR	7.75	8.17	6.43	4.99	6.01	3.24	6.73	4.34
	XB	7.85	7.90	7.34	5.63	7.57	3.70	6.42	3.67
Diff	(H-XB)	-1.33	-1.09	-0.14	+2.16	+1.31	+2.74	+0.07	+0.78
Diff	(All-XB)	-0.95	-0.92	-0.11	+2.07	+1.21	+2.55	+0.06	+0.72
(U)	All	5.16	6.40			6.15			
	H	5.07	6.39			6.21			
	XD	5.54	5.22			5.85			
	XR	4.80	6.74			4.23			
	XB	5.28	6.44			5.75			
Diff	(H-XB)	-0.21	-0.05			+0.46			
Diff	(All-XB)	-0.12	-0.04			+0.40			

Specialty		C	P	WS	ES	N	GY	WN	H
(GS+U)	All	6.36	6.83			8.04			
	H	6.13	6.70			8.16			
	XD	6.83	6.48			6.95			
	XR	6.82	7.71			5.58			
	XB	6.83	7.44			6.80			
Diff	(H-XB)	-0.70	-0.73			+1.36			
Diff	(All-XB)	-0.47	-0.61			+1.24			
(ENT)	All	3.68	3.35	2.96	2.98	2.57	3.20	2.21	2.44
	H	3.33	3.21	3.06	2.98	2.58	3.20	2.23	2.36
	XD	3.69	4.93	2.42	3.01	2.54	2.91	1.92	3.33
	XR	5.29	3.80	2.72	2.67	2.72	3.25	2.02	0
	XB	4.18	4.29	2.51	2.96	2.55	3.00	1.97	3.33
Diff	(H-XB)	-0.85	-1.08	+0.55	+0.04	+0.03	+0.20	+0.26	-0.97
Diff	(All-XB)	-0.50	-0.94	+0.45	+0.04	+0.02	+0.20	+0.24	-0.89
(T/O)	All	10.96	12.51	9.56	14.01	9.89	8.64	13.70	5.95
	H	11.12	12.56	9.75	14.11	9.94	9.02	14.70	6.07
	XD	11.40	12.10	9.24	10.83	9.28	6.48	9.31	2.70
	XR	9.70	12.34	8.78	13.33	9.97	4.81	8.63	10.80
	XB	10.71	12.29	9.12	12.29	9.48	5.55	8.91	5.40
Diff	(H-XB)	+0.41	+0.28	+0.63	+1.82	+0.46	+3.47	+5.8	+0.67
Diff	(All-XB)	+0.25	+0.23	+0.44	+1.72	+0.41	+3.09	+4.8	+0.55
(OPTH)	All	4.76	5.89	5.27	6.29	4.97	6.08	3.54	3.17
	H	5.05	5.90	5.15	6.34	4.71	6.10	3.45	3.22
	XD	4.58	5.39	5.84	4.53	7.28	5.63	4.08	2.25
	XR	4.55	5.99	4.89	6.00	4.80	4.80	4.44	2.00
	XB	4.56	5.86	5.77	4.67	7.13	5.31	4.23	2.17
Diff	(H-XB)	+0.49	+0.05	-0.62	-1.67	-2.42	+0.79	-0.78	+1.05
Diff	(All-XB)	+0.20	+0.04	-0.50	-1.62	-2.16	+0.77	-0.69	+1.00

Specialty		C	P	WS	ES	N	GY	WN	H
(GYN)	All	4.24	4.12	3.62	3.46	3.47	4.23	5.43	3.70
	H	4.02	4.18	3.65	3.46	3.47	4.28	5.43	3.79
	XD	5.36	3.64	3.49	3.92	3.47	4.10	5.56	2.73
	XR	4.21	3.76	3.84	2.45	4.83	2.34	5.43	3.15
	XB	4.72	3.73	3.58	3.41	3.56	3.21	5.47	2.89
Diff	(H-XB)	-0.70	+0.45	+0.07	+0.05	-0.09	+1.07	-0.04	+0.90
Diff	(All-XB)	-0.48	+0.39	+0.04	+0.05	-0.09	+1.02	-0.04	+0.81
(OBST)	All	4.58	5.11	4.88	5.49	4.39	-	5.68	4.45
	H	4.28	5.07	4.96	5.49	4.39	-	5.63	4.43
	XD	5.87	6.61	4.65	5.27	4.47	-	5.41	3.81
	XR	4.79	5.09	3.86	6.44	4.93	-	6.56	6.16
	XB	5.16	5.38	4.52	5.65	4.49	-	5.98	4.76
Diff	(H-XB)	-0.88	-0.31	+0.44	-0.16	-0.10	-	-0.35	-0.33
Diff	(All-XB)	-0.58	-0.27	+0.36	-0.16	-0.10	-	-0.30	-0.31
(GER)	All	47.63	58.33	46.88	114.63	35.89	62.88	22.69	51.00
	H	51.44	56.84	46.26	112.10	36.50	63.45	23.05	28.48
	XD	13.73	32.42	51.33	197.28	24.72	35.63	18.44	427.20
	XR	14.31	84.92	33.04	57.50	11.12	54.08	13.32	70.50
	XB	14.19	73.45	48.80	187.47	20.87	43.54	15.60	294.59
Diff	(H-XB)	+37.25	-16.61	-2.54	-75.37	+15.63	+19.91	+7.45	-266.11
Diff	(All-XB)	+33.44	-15.13	-1.92	-72.74	+15.02	+19.34	+7.09	-243.59

Graph B


MEAN LENGTH OF STAY 10% SAMPLE HAA 84
CASES IN NON REG NON GER SPECIALTIES
DAYS
10
9
8
7
6
5
4
3
CB
PB
WS
ES
NO
GY
WN
HU
DISTRICT OF TREATMENT
ALL
HOST
XD
XR

very different. Although in overall terms they cancel out (i.e. bed-days saved by the easy group can be used for the more serious group), without more detailed information on the resources used by the two groups, one could not conclude whether there would be a gain or a deficit to a district with a significant 'serious' subgroup.

Appendix 4 gives some detail for Cambridge and Norwich, the two districts doing most of the regional specialty work who might thus attract the more complex non-regional cases. Even in these districts, the percentile points of the length of stay distribution for all non-regional cases are very similar, with the exception of the extreme tail, where although numbers are small there may be slightly longer length of stay for some specialties particularly haematology and infectious diseases at Cambridge.

There is also evidence on the proportions of patients in different age groups. The tables have been divided on the basis of age groups, in broad groups of clinical relevance - 0-4, 5-14, 15-44, 45-64, 65+. Our analysis in this section excludes geriatrics which is dealt with separately later.

Of the four main importing districts, only Cambridge shows much difference in the proportion treated in each age group and the proportion of residents treated (i.e. for which it was funded).

The analysis of age effects is summed up in Table D. What tentative conclusions can be drawn from the information on age? For the Cambridge district the information suggests that the length of stay should be shorter since patients crossing boundaries have a greater proportion in the younger age group. However the length of stay of patients between 15 and 44 in

Cambridge and for all age groups in Peterborough crossing district boundaries is higher than that of home patients.

The age evidence does point to the possibility of a severity factors affecting discharge. The length of stay of cross district patients in Cambridge and in Peterborough is higher. Cross district patients aged 15-44 in Cambridge stay on average 8.4 days compared to 4.7 days for home patients. The geographical data suggested that cross boundary flow patients were drawn from adjacent districts making it less likely that there would be a severity effect: the age data point in the other direction towards a severity effect, for some districts. Numbers of cross regional cases at Norwich are relatively small but the indications are that the older age groups stay longer: similarly cross regional cases in the elderly group into West Suffolk stay longer.

The use of data on diagnosis presents great difficulties and is unlikely to be possible on a comprehensive basis for the 200,000 cases on HAA. One complication is that the figures include the regional specialties. There is an argument for excluding those treated in regional specialties since these cases are funded separately, but <u>not all</u> cases with a given diagnosis are treated in a regional specialty. It depends on the district of treatment, whether a regional specialty exists and the severity of the patients. A good example is 'concussion' mostly treated in neurology in Cambridge, but not in a district which does not have neurology as a regional specialty. The main conclusion is that the diagnostic mix of cross boundary patients in Cambridge and in Norwich is somewhat different than the mix for home patients. A lower proportion of cross boundary patients are accounted for by the top 20 diagnoses: but this is almost entirely because of the different flows within the obstetric specialty. A much lower proportion of cross district patients are admitted for

Table D

Mean Length of Stay Cases in Non-Regional Geriatric Specialties

Source 10% Sample HAA 1984

Differences Between Host and XB Group Means within District

	DISTRICT OF TREATMENT							
AGEGP	CB	PB	WS	ES	NO	GY	WN	HU
HOST-XD								
0-4	-0.77	1.88	2.25	4.03	-1.29	*	1.54	1.74
5-14	0.56	-1.20	0.58	0.72	0.49	1.58	0.63	2.58
15-44	-3.70	-1.01	0.84	0.08	0.00	1.64	0.09	0.99
45-64	1.13	-1.54	0.58	3.74	-1.27	3.49	3.53	0.16
65+	-1.15	-2.13	1.70	3.49	-0.39	2.31	3.59	-0.48
All	-1.56	-1.27	0.32	2.29	-0.73	2.83	1.64	-0.65
HOST-XR								
0-4	1.86	0.87	2.89	4.33	2.59	4.31	-2.46	-2.93
5-14	1.02	0.27	1.35	2.39	-0.72	1.58	0.02	0.58
15-44	-2.01	0.65	0.60	1.67	0.44	1.62	-0.91	0.39
45-64	-0.58	0.75	-0.09	0.97	-6.82	0.44	3.26	-2.36
65+	1.92	-1.43	-15.59	6.09	-2.94	3.00	2.57	-4.20
All	-0.14	-0.34	-2.57	3.30	-2.22	2.91	0.48	-1.88

* No XD cases in sample

obstetrics. Fuller use of diagnostic data must await the development of a DRG based system. The main conclusion from current data is that of variety as between districts.

B3 The Possible Impact of Severity on Length of Stay

In the absence of direct evidence on severity, we have had to examine the data on age, diagnostic mix and specialty. It is important to bring the data together to get an overall measure of the differences in terms of workload. There are various ways in which this could be done to produce a measure of excess bed days. Such a calculation implies the selection of a norm and the key difficulty lies in selecting this norm. The four main alternatives are:

- A district average. This had the advantage of allowing for treatment policy differences within districts.

- A resident or host within district average. This may give a guide to the district's real length of stay before being distorted by cross boundary flow.

- Some regional average either for in-district patients or cross boundary patients collectively. This may provide for a fair standard for all districts but doesn't take into account the different policy options.

- The national average within specialty. This allows for specialty case mix and some weighting for the different structure of costs between specialties.

We present in Table E the different lengths of stay by specialty. In practice summed over all the specialties, there is not much difference in the final outcome although individual specialties will show an effect.

The detailed information by specialty is summarised in Table F. For comparative purposes, the calculations were made both in relation to national averages and to host patient averages within districts. In practice the differences are not great especially for the two districts where overall cross-boundary cases length of stay are greater. Using the host district average might be more realistic in terms of treatment policies: but it does not take into account the possibility that the hospitalisation rate for host patients may be greater in some districts implying that length of stay will be shorter. We would therefore recommend concentrating on excess bed days in relation to the national average length of stay. We have also examined the effects of age distribution. The results show that Cambridge and Peterborough are keeping patients for longer than might be expected from the age distribution of patients.

Cambridge and Peterborough are the only two districts for which both the XD and XR groups stay longer than expected. In Great Yarmouth, West Norfolk and East Suffolk both the XD and XR groups stay less than expected due to their age casemix.

In Appendix 6, we set out a multi-variate statistical approach to compensation, for severity we are grateful to Dr. Roy Carr-Hill for assistance with this. The results suggest that most of the differences in length of stay can be explained by differences in case mix.

Table E

Length of Stay in Days by Specialty

Source HAA Special Tables 1984

Specialty	District of Treatment																EAR		National Average**
	CB		PB		WS		ES		NO		GY		WN		H				
	All	Host	All	Host	All	Host	All	Host	All	Host	All	Host	All	Host	All	Host	All	Host	
G Med	11.7	11.7	9.9	9.6	10.1	9.8	11.1	11.2	8.6	8.7	7.3	7.6	6.9	7.1	6.9	7.0	9.5	9.5	9.8
Paed	4.7	4.3	3.2	3.3	3.2	3.2	2.9	3.0	2.8	2.7	3.2	3.4	3.0	3.0	3.5	3.5	3.2	3.3	3.8
G Surg*	6.9	6.5	7.0	6.8	7.2	7.2	7.7	7.8	8.8	8.9	6.3	6.4	6.5	6.5	4.4	4.5	7.3	7.3	7.0
Urol	5.2	5.1	6.4	6.4	-	-	-	-	6.2	6.2	-	-	-	-	-	-	5.2	6.0	6.4
ENT	3.7	3.3	3.4	3.2	3.0	3.1	3.0	3.0	2.6	2.6	3.2	3.2	2.2	2.2	2.4	2.4	3.0	2.9	3.5
T/O	11.0	11.1	12.5	16.6	9.6	9.8	14.0	14.1	9.9	9.9	8.6	9.0	13.7	14.7	6.0	6.1	11.0	11.2	11.3
Opth	4.8	5.1	5.9	5.9	5.3	5.2	6.3	6.3	5.0	4.7	6.1	6.1	3.5	3.5	3.2	3.2	5.1	5.1	5.6
Gyn	4.2	4.0	4.1	4.2	3.6	3.7	3.5	3.5	3.5	3.5	4.2	4.3	5.4	5.4	3.7	3.8	3.9	3.9	4.1
Obst	4.6	4.3	5.1	5.1	4.9	5.0	5.5	5.5	4.4	4.4	-	-	5.7	5.6	4.5	4.4	4.9	4.9	4.9

* Includes urology where this is not separately identified

** Source DHSS Financial Matters 1986 Appendix 15

Table F

Excess Bed-Days

Difference between Expected and Actual Bed-Days within Specialty
Cumulated over Major Acute Specialties Excluding
Urology and Geriatrics

1. Expected values for specialty based on national average - 1984

District	Excess (Exp-Act) Bed-Days			District Total Bed-days	Excess as % total		
	XD	XR	XB	Host + XB	XD	XR	XB
CB	-3414	-1128	-4702	165917	-2.1	-0.7	-2.8
PB	-337	-2160	-2471	159703	-0.2	-1.4	-1.5
WS	937	1268	2195	125404	0.7	1.0	1.8
ES	37	707	736	209571	0.0	0.3	0.4
NO	1687	960	2567	241538	0.7	0.4	1.1
GY	1243	3051	4265	88540	1.4	3.4	4.8
WN	764	1132	1888	94106	0.8	1.2	2.0
HU	964	351	1305	34679	2.8	1.0	3.8

2. Expected values for specialty based on host cases average within district - 1984

District	Excess (Exp-Act) Bed-Days			District Total Bed-days	Excess as % total		
	XD	XR	XB	Host + XB	XD	XR	XB
CB	-3095	-1093	-4348	165917	-1.9	-0.7	-2.6
PB	-295	-1883	-2151	159703	-0.2	-1.2	-1.3
WS	-251	866	605	125404	-0.2	0.7	0.5
ES	423	1271	1686	209571	0.2	0.6	0.8
NO	659	622	1201	241538	0.3	0.3	0.5
GY	754	2020	2745	88540	0.9	2.3	3.1
WN	740	809	1542	94106	0.8	0.9	1.6
HU	402	-37	354	34679	-0.1	1.0	1.0

The inclusion of geriatrics would greatly alter the picture. The proportion of total bed days used by geriatric patients is much lower in Cambridge and in Peterborough than in the other districts.

B4 The Impact of Geriatrics

In considering lengths of stay it is important to take geriatrics separately from other specialties because the pattern here is rather different. The differences are much greater and more varied than in any other specialty. Cambridge is a net exporter of geriatric cases and those that are treated there do not stay very long. In some other districts ex-district cases stay very much longer than host cases. There are variations in the availability of long-stay beds between districts which make these figures very hard to interpret.

Some districts have long-stay hospitals, some treating geriatrics in acute wards in DGH; also there is great variation both in the length of stay of residents and XBF cases across districts. They may well be worth examining in more detail. The differences may well be due to the historical pattern of provision of geriatric facilities. It is notable that Cambridge is not only a net exporter of geriatric cases, but also, that of those it does treat, the average length of stay is much shorter than other districts. It is also the case that allocation to the geriatric specialty is variable; some districts referring a much greater proportion of its elderly to the geriatric specialty, others using it as more of a convalescent specialty after treating elderly people in other specialties. Doubtless the provision of care for XBF geriatrics should form part of a much wider study of the provision of geriatric care in general. However, for the purpose of this study, it is the actual numbers of XBF cases treated as geriatrics, however, and under whatever set of

policies they came to be included, that is of interest, because it is on these net figures that the present adjustment for funding XBF is made.

The relative importance of geriatrics in terms of the bed-days used in comparison with the major acute specialties can be summed up as follows:

Among all patients treated in major acute specialties in EAR 41% of bed-days are in the geriatric specialty. This rises to 42% for those treated in their own district, and is 33% for XBF cases, (40% for cross district cases and 27% for cross regional cases). Although in numbers of cases and casemix, patients in geriatrics appear to represent a fairly small proportion (4% of all non reg spec XBF cases), because of their long length of stay, they account for a much higher per cent of bed-days (and hence hotel cost) than any other specialty.

Appendix 7 presents data on source of admission, to see whether a higher proportion of cross boundary patients are transfers or immediate admissions. The data are mainly useful in confirming that the number of transfers are quite small.

C Cross Boundary Flows and Severity: Some Evidence from the Cambridge District

In this section of the Report we look at the problem of severity from a rather different angle. The starting point is how costs are broken down in acute hospitals. The break-down of cost per day for large acute hospitals in 1983/84 was roughly as follows:

Table H: Cost Per In-Patient Day : England
(Acute Hospitals over 300 beds)

	£ per day
Direct Treatment	
Medical	9.90
Nursing	30.29
Medical and Surgical	
Supplies and Equipment	5.00
Pharmacy	4.84
Radiology	1.57
Pathology	3.43
Other Direct Treatment	4.43
General Services	
(Hotel and other overhead costs)	29.79
TOTAL	89.45

Source: DHSS Hospital Costing Returns NHS, 1984, p.36.

The figures show that about a third of total cost is an overhead not related to patients condition or diagnosis. Most of the rest - 67 per cent of total cost excluding hotel cost - is accounted for by medical and nurse

staffing. We decided to collect some evidence at ward level on perceptions of severity by experienced ward sisters.

Interviews were carried out with the sister (or charge or staff nurse) on all wards in Addenbrookes with the exception of geriatric and dermatology wards in the period November/December 1986.

The interviews took the form of an open discussion, lasting from 10 - 20 minutes to cover the following topics:

1. Size of ward, nursing cover, nature of cases
2. Proportion of cases who were crossing boundaries - an impression to gauge 'awareness' of the problem
3. If a significant proportion of patients cross boundaries, what is source of referral - geographical and medical?
4. Problems for nurses in their workload in general - nature of severity, special nursing needs, practical problems
5. Additional problems connected with XBF cases - if any
6. Any other information related to XBF cases.

1. There was great variation in casemix within the wards, which makes it difficult to disentangle severity of illness from problems of cross boundary flow per se.

2. Some wards are coping with cases which are regional specialty cases, as well as non-regional and A/E, so that it is difficult to apportion time spent between types of cases - the regional specialty cases may be more in need of special nursing techniques leaving less resources for the non-regional cases.

3. Some patients come for particular medical/surgical treatment which is not available in all districts - this does not always count in financial terms as a regional specialty but may well need medical or nursing expertise with associated extra costs.

4. Some cases are admitted several times in the course of treatment, initially for investigation, subsequently for main treatment and some for follow-up. Very different time spans and nursing needs would cover these different episodes for the same patient. In other words, even for the same patient in the same specialty there would be a variation in hotel cost for the different stages of treatment, leading to a wide variation in average length of stay and nursing dependency even on the same ward.

5. Awareness of cross boundary flow cases is patchy - it is assumed that if the techniques needed are rare, there will be a natural XBF. Many cases, crossing regional or local boundaries i.e. from Royston, Saffron Walden, Newmarket, etc. are regarded as 'local' and are not perceived as more difficult than in-district cases - difficulties arise only in personal response to treatment and presenting condition. It is felt that those who come from further away are by definition likely to need special care or they would not have needed to come. Awareness of whether these cases are cross boundary cases is usually only related to those with personal problems (see 7 below), or to their familiarity with the patient, due to long-stay or repeat visits. There is little perception at ward level of the actual extent of cross boundary flow and of lengths of stay, apart from a few individual cases which presect extraordinary problems with discharge or special nursing technique.

6. Referral tends to be consultant led, except for the A/E admissions who are either self-referred from casualty or by their GP. Most of the local cross boundary admissions arise from the joint clinics held by consultants in neighbouring districts. Those coming for special techniques or expertise are usually consultant-led, depending on the consultant's contacts and reputation. Some cases come following a research interest of a particular consultant - although initially these may have constituted only a few cases, as the technique becomes more widely accepted there is again a natural XBF. A few cases are transferred in - again mainly for expertise reasons in either medical or nursing techniques.

7. Problems for the nursing staff were very different on the different wards - mostly connected with the medical severity and casemix on the ward regardless of where the patients came from. Problems ranged from the highly practical - shortage of beds, extent of surgical cases on one day, variation in workload on 'take' days, to the longer term shortage of staff with sufficient training to cope with the extent of medical and nursing complexity of the cases on the more specialised wards. This in turn has led to problems in coping with training of students, and having adequate time for the psychological support of patients and relatives. However there was great variation between the wards as to how this affected their day to day work - some were not over-stretched, others, in the words of one sister 'well organised chaos'.

Additional pressure is put on staff by the necessity to discharge patients as soon as practicable - this not only means more effort to arrange discharge in a short space to time, but results in fewer convalescent stage patients on the wards (who may be assumed to lighten the nursing load and in some cases even support the other patients). This has implications for the overall staffing levels needed to cope with a large

ward with few 'easy' cases. On some wards it was felt that they were only able to do the bare minimum by way of essential care and that there was little opportunity for morale boosting, which may often aid recovery.

8. Problems specific to cross boundary cases, apart from the medical ones which they share with other patients (as in 7 above) are almost always associated with problems of discharge. Again there was variation between the wards - those dealing primarily with routine 'planned' care could on the whole organise the discharge in advance. Those with an unpredictable casemix, particularly in Trauma or A/E admissions, with elderly or confused patients or those with great individual response to treatment had more trouble organising transport, liaison with community nurses, follow-up appointments at alternative clinics. This necessitated extra work for ward clerks but additional demands are made on the nursing staff when the arrangements are complex or often, as in the case of transport, not forthcoming at the speed which is required to discharge cases.

The other problems which arise in the case of cross boundary cases who come a long distance are the difficulties in making arrangements for relatives - this again takes up time of ward clerks in arranging visits, accommodation and in some cases financial support for relatives. If the relatives are far away, there is more need for psychological and in some wards, - such as paediatric - practical support for patients, which increases the workload for the nursing staff for cross boundary cases as compared to in-district or local cases.

On some wards it is more difficult to arrange continuing care for people with long-term illness if they are not in-district cases, if suitable aftercare is not available. This means that other districts'

long-term or convalescent cases can effectively block beds for acute care if no appropriate discharge option is available.

It is difficult to quantify the extent of these problems or to put a cost on them without more detailed study of particular issues. Dependency ratings, which are being obtained as part of the nurse Monitor study, should provide a more accurate picture of which cases, whether for medical or nursing severity or social reasons, need extra nursing resources. We have made some preliminary use of data for wards on the general medical unit. The results are set out in Appendix 8. The results suggest that high levels of dependency are concentrated on certain limited diagnostic groups, regardless of place or residence, e.g. in haematology.

The more practical issues, outlined in 8 above are difficult to quantify - in simple terms one has to add in for cross boundary cases an extra ward clerk time factor, transport factors and extra nurse support, due to less relative support, for more distant cases, in addition to any medical and nursing resources they may need by virtue of their medical condition.

D Conclusions and Recommendations

In essence the brief was to answer three questions. First do the available data suggest that there are severity factors related to patients who cross district boundaries? Secondly do these factors lead to higher costs in treatment? Thirdly do these costs justify a budgetary re-adjustment within the Region? Our summing up deals with each of these three questions in turn.

Severity cannot be directly measured from the data currently available. To make some estimate of the severity effect, circumstantial evidence was studied from HAA and from local surveys. This evidence covered the following points:

The size and origins of cross boundary flows

Specialty mix

Length of stay

Age by length of stay

Use of nursing and medical resources at hospital level

The views of nursing staff on severity, and evidence of nursing dependency in relation to cross boundary flows

The effects of geriatrics

The main conclusions from each of these types of evidence can be summed up as follows:

- Cross boundary in-flows are concentrated on four districts, Cambridge, Peterborough, West Suffolk and Norwich. There are some compelling geographical reasons for many of these flows which arise from adjacent districts. It is possible to estimate for Cambridge the size of

the flows which do not come from adjacent districts and therefore have no obvious explanation in terms of geographical convenience. It is likely that some of the flow from Huntingdon and West Suffolk to Cambridge can be explained in terms of geographical convenience. From other districts there are fewer natural lines of communication and it is likely that patients will have had to travel longer distances to get to Cambridge. From the five districts - other than West Suffolk and Huntingdon with large flows - 1253 cases were treated in Cambridge or about 25 per cent of total in-flows. Some of these will in fact be people whose main motive was geographical convenience. On the other hand within the flows set by geographical convenience there will be some people sent to a larger teaching hospital because of greater concern about their condition. 'Severity' here at time of admission is an implied demand for treatment of higher quality or one that is not available elsewhere and some greater concern about a patient's condition.

- The pattern of in-flows by specialty is generally rather similar to the pattern for host district patients: however, there are some clear specialty effects so that some districts are attracting large numbers of patients in areas where they have special expertise as with orthopaedics in West Suffolk, thoracic medicine in Huntingdon and opthalmology in Cambridge.

- In general the differences in average length of stay between districts are greater than any variations by place of residence within districts. Within districts average length of stay is higher for cross boundary patients than for residents in Cambridge and in Peterborough, allowing for differences in specialty mix. Most of the differences in

length of stay between districts can be explained by differences in the mix of cases treated.

- The evidence on length of stay by specific age groups shows that Cambridge has a relatively low proportion of elderly patients in the inflow. There are few strong differences in length of stay within age group: perhaps the most striking is that younger patients tend to stay longer in Cambridge and Peterborough. Most of these differences reflect differents in case mix, between districts.

- Nursing staff at ward level were more concerned with particular kinds of treatment than with places of origin. They see problems as arising from a small group of patients who present serious problems in terms of nursing care: they do not see any general medical severity problem arising from cross district patients unless they are in the special group. It is unlikely that the special group is more than 10 per cent of cross boundary patients but this varies from ward to ward and the Nurse Monitor Study should allow a more precise measure. However nursing staff did see certain administrative and discharge problems as more likely to arise from the majority of cross district patients. Such difficulties probably contribute to greater length of stay both in Cambridge and in Peterborough.

- Most of the study has been carried out excluding geriatrics. The patterns of service are very different in geriatrics and it requires separate treatment and costing as recommended below.

Patients cross district boundaries for different reasons. In some cases the patient and his family doctor may simply be following the line of geographic convenience. The boundaries of some health districts in East

Anglia are not natural boundaries and the actual lines of communications cross them. In other cases the patient may be directed to what his advisers consider to be more appropriate treatment for his condition. A large hospital with a world wide reputation will be offering a bigger range of specialist services than a smaller and more local one. Such a hospital is bound to attract some admissions for this set of reasons. The origin of the main cross boundary flows suggests that geographic convenience is the most important reason for admission. Most flows take place between adjacent districts and in total represent high proportions of the demand for hospital services within certain limited geographic areas; yet there is also some evidence for admissions for other reasons so that more appropriate treatment is sought for patients whose condition is more severe. The evidence on the length of stay of younger patients in Cambridge for example suggests there is greater severity - as does the evidence from nursing staff about a minority of cross-boundary cases.

We come now to the second question. Does severity lead to extra costs?

A third of costs are overhead costs and many of the rest are divided between various types of cost for which there are limits for what any one patient can absorb. In principle there could be two types of extra cost arising from cross boundary patients which could be called a 'severity' cost and a 'practical' cost. The severity cost could arise from complexity in illness. The practical cost arises from the difficulty of treating and discharging patients who live further away. The severity cost probably affects a minority, but could be large and should be costed on an individual basis. The practical cost is more general and for the present could be the subject of a budgetary allowance. Our conclusion is that the combination of the severity and practical costs justifies some adjustment

and we make recommendations for how this could be done on an interim basis using existing data and also how this could be done in the future, by more satisfactory methods.

What form should this budgetary adjustment take? At present districts are reimbursed for cross boundary flows on a net basis according to the average cost of treatment in the specialty. Such a measure does underestimate the extra costs imposed by a minority of cross boundary flow patients. It would be possible to reimburse districts for the excess bed days compared to some agreed average. At this stage we would suggest taking the national average for each specialty since this is already used in the budgeting system. The higher length of stay is due to a combination of 'severity' and practical costs: it does not reflect age effects. On 1984 data the 'excess bed days' would have been as set out in Table I for each district.

These excess bed days should be multiplied by total cost per day. However it would be wrong to treat this as a pure exercise in redistribution with districts losing money if they had length of stay below the national average. If money were simply redistributed in this way this would give an incentive to inefficiency - to raising length of stay. Nor would such redistribution take adequate account of the complexity of the reasons for cross boundary flows.

The compensation would be as follows multiplying 1983/4 cost by excess bed days as in Table F.

Cambridge	£420,594
Peterborough	£221,031

Table I
Excess Bed Days As % of Total in Major Specialties*

	Cross District	Cross Region	All Cross Boundary
Cambridge	2.1	0.7	2.8
Peterborough	-0.1	1.4	1.5
West Suffolk	-0.7	-1.0	-1.8
East Suffolk	-0.0	-0.3	-0.4
Norwich	-0.7	-0.4	-1.1
Great Yarmouth	-1.4	-3.4	-4.8
West Norfolk	-0.8	-1.2	-2.0
Huntingdon	-2.8	-1.0	-3.8

* Excess Bed-Days

Specialties included in Table F and used for the calculation of compensation in Table N are as follows

General medicine
Paediatrics
General Surgery
ENT
Trauma/Orthopaedics
Opthalmology
Gynaecology
Obstetrics

Calculations are available which show the excess bed-days for the three districts which do Urology, and for the SCBU's as well as a number of specialties which are not done in all districts such as thoracic medicine, GP medical and GP maternity units.

The influence of SCBU would make a difference to Cambridge (increasing its level of compensation). However the SCBU presents special costing problems and should be costed and monitored separately.

No other district would qualify for compensation at present but the position would need to be monitored on an annual basis and might well change.

This recommendation should be seen as a short-term measure which will need to be supplemented by other forms of adjustment in the longer term. We have two main recommendations to make here:

1. Geriatrics should be dealt with separately and explicitly given the great variations in length of stay and the lack of district self-sufficiency in terms of long-stay care. Adjustment for geriatrics should be dealt with on a total bed days basis possibly by means of a long stay register. The present system under compensates some districts for their long-stay cases.

2. In the longer term it is important to identify separately the small number of patients who present genuine severity and length of stay problems including those who have stayed a very long time and are still not discharged. It would be important to target any additional funds on those wards and types of treatment which present special problems and in particular special attention should be given to levels of nurse staffing and support in certain areas. The long-term aim should be that compensation should cease to be general and should become targeted on particular groups of patients. This could be done as an extension of the work of the Regional Specialties Working Party - once more adequate data on individual patient costs are available. The aim is to identify a small number of conditions which are not regional specialties which contribute excess costs. The experience gained with regional specialties could quite

easily be extended to this group. A possible method of adjustment for the longer term is set out in Appendix 6.

The pattern of cross boundary flows is bound to change over the years particularly where it is consultant led. Even the flow induced by geography will change with changed patterns of residence and of transport. For example housing developments around Stansted are likely to bring about changes in flows. In our view a good management tool is required and the concept of an excess bed day supplies this in the short term. The budgetary compensation can be adjusted on an annual basis. As the Korner information becomes available it will be possible to refine this through using more data on treatment patterns. But there is a case for an immediate adjustment and this should concentrate on a simple measure of the work actually done.

APPENDICES

APPENDIX 1 The Report of the Regional Working Party on Resource Allocation

APPENDIX 2 Workload.

APPENDIX 3 Analysis of Long Stay Patients.

APPENDIX 4 Is There an Expertise Effect? The Evidence from Cambridge and Norwich.

APPENDIX 5 Differences in Hospitalisation Rates Between Districts.

APPENDIX 6 A Statistical Approach to Compensation for Severity.

APPENDIX 7 Sources of Admission.

APPENDIX 8 Nurse Dependency Ratings. Addenbrookes, February 1987.

Appendix 1. The Report of the Regional Working Party on Resource Allocation.

The following extract from East Anglian Region Report of the Regional Working Party on Resource Allocation gives some background.

Information on the net cross boundary flows of in-patients is obtainable from Hospital Activity Analysis (HAA) data and Mental Health Enquiry (MHE) data which are routinely collected. The regional target allocation is already adjusted in respect of inter-regional cross boundary flows and we recommend as previously that the same procedure should be adopted for District allocations. The DHSS produce national average costs for each of the thirty one different specialties, and we recommend that the DHSS figures reproduced at Appendix V should, when suitably updated for inflation, be utilised in calculating District targets.

The Working party considered a research paper by Mr. J. Beresford from the Civil Service College which showed that some patients admitted to Addenbrookes Hospital from other Districts within the Regional had significantly longer lengths of stay than patients from the Cambridge District. A paper produced by the Cambridge District also demonstrated greater use made of the Addenbrookes Intensive Therapy Unit by patients from outside the District than from Cambridge District patients. These findings were said to reflect the greater severity of outside cases using the teaching hospital. We debated at some length whether this was so and in that case how to take this factor into account. We considered whether for example, the adjustment for cross boundary flows might be based on a cost per day rather than a cost per case basis. We recognised however, that the cost per day was not consistent throughout the length of stay but there was in fact a core cost with marginal costs for the extra length of

stay. Apart from the costing difficulties, we have no evidence to show whether patients admitted to the larger hospitals in non teaching Districts from other Districts in East Anglia also stayed longer than average and in the time available we could do no more than identify this problems as a candidate for further research.

Source: East Anglian Region, Report of Regional Working Party on Resource Allocation, RAWP, September 1983, p. 8.

APPENDIX 2 WORKLOAD

Table 2.1 Summary table for numbers of cases treated by district divided by resident and cross boundary cases: within specialty grouping.

Table 2.2 Summary table as 2.1 divided between cross region and cross district patients.

Table 2.3 Net flow into each district: all cases (Graph A is based on this table)

Table 2.4 District of treatment by district of residence: in-flows and out-flows in non-regional specialties excluding geriatrics (Map in text based on these figures)

[Sources: Tables 2.1 - 2.4 HAA]

TABLE 2.1

WORKLOAD SUMMARY TABLE FOR ALL CASES TREATED IN EACH DISTRICT
XBF 84 TABLES SUBDIVIDING HOME AND XB CASES

DISTRICT OF TREATMENT

	CB			PB			WS			ES			NO			GY			WN			HU			EAR		
RES GROUP	ALL	H	XB	ALL	H	XB	ALL	H	XB	ALL	H	XB	ALL	H	XB	ALL	H	XB	ALL	H	XB	ALL	H	XB	ALL	H	XB
SPEC GROUP																											
MAJOR ACUTE	28187	18274	9913	25072	20779	4293	19171	14660	4511	26077	24985	1092	38931	35226	3705	16504	15369	1135	14487	12762	1725	7652	7063	589	176081	149118	26963
OTHER NREG	2188	1282	906	2157	1693	464	1978	1375	603	4306	4034	272	7135	5690	1445	2249	2017	232	1656	1509	147	1780	553	1227	23449	18153	5296
SUBTOT NREG	30375	19556	10819	27229	22472	4757	21149	16035	5114	30383	29019	1364	46066	40916	5150	18753	17386	1367	16143	14271	1872	9432	7616	1816	199530	167271	32259
GERIATRIC	2076	1854	222	1332	1197	135	2206	1667	539	1712	1658	54	4491	4310	181	979	953	26	2910	2776	134	924	862	62	16630	15277	1353
ALL NREG	32451	21410	11041	28561	23669	4892	23355	17702	5653	32095	30677	1418	50557	45226	5331	19732	18339	1393	19053	17047	2006	10356	8478	1878	216160	182548	33612
REGIONAL	5786	1988	3798	22	17	5				814	761	53	2948	1949	999							2250	173	2077	11820	4888	6932
ALL CASES	38237	23398	14839	28583	23686	4897	23355	17702	5653	32909	31438	1471	53505	47175	6330	19732	18339	1393	19053	17047	2006	12606	8651	3955	227980	187436	40544
%ALL NREG EAR	15.0	11.7	32.8	13.2	13.0	14.6	10.8	9.7	16.8	14.8	16.8	4.2	23.4	24.8	15.9	9.1	10.0	4.1	8.8	9.3	6.0	4.8	4.6	5.6			
%REG EAR	49.0	40.7	54.8	.2	.3	.1	.0	.0	.0	6.9	15.6	.8	24.9	39.9	14.4	.0	.0	.0	.0	.0	.0	19.0	3.5	30.0			
%ALL CASES EAR	16.8	12.5	36.6	12.5	12.6	12.1	10.2	9.4	13.9	14.4	16.8	3.6	23.5	25.2	15.6	8.7	9.8	3.4	8.4	9.1	4.9	5.5	4.6	9.8			

TABLE 2.2

WORKLOAD
XBF 84 TABLES

SUMMARY TABLE FOR XBF CASES TREATED IN EACH DISTRICT
SUBDIVIDING XD AND XR CASES

DISTRICT OF TREATMENT

	CB			PB			WS			ES			NO			GY			WN			HU			EAR		
RES GROUP	XD	XR	XB	XD	XR	XB	XD	XR	XB	XD	XR	XB	XD	XR	XB	XD	XR	XB	XD	XR	XB	XD	XR	XB	XD	XR	XB
SPEC GROUP																											
MAJOR ACUTE	5053	4860	9913	956	3337	4293	3461	1050	4511	572	520	1092	5194	511	3705	433	702	1135	635	1090	1725	350	239	589	14654	12309	26963
OTHER NREG	581	325	906	228	236	464	487	116	603	233	39	272	1296	149	1445	195	37	232	71	76	147	963	264	1227	4054	1242	5296
SUBTOT NREG	5634	5185	10819	1184	3573	4757	3948	1166	5114	805	559	1364	4490	660	5150	628	739	1367	706	1166	1872	1313	503	1816	18708	13551	32259
GERIATRIC	49	173	222	23	112	135	463	76	539	50	4	54	132	49	181	15	11	26	57	77	134	39	23	62	828	525	1353
ALL NREG	5683	5358	11041	1207	3685	4892	4411	1242	5653	855	563	1418	4622	709	5331	643	750	1393	763	1243	2006	1352	526	1878	19536	14076	33612
REGIONAL	2443	1355	3798	2	3	5				33	20	53	942	57	999							1515	562	2077	4935	1997	6932
ALL CASES	8126	6713	14839	1209	3688	4897	4411	1242	5653	888	583	1471	5564	766	6330	643	750	1393	763	1243	2006	2867	1088	3955	24471	16073	40544
%ALL NREG EAR	29.1	38.1	32.8	6.2	26.2	14.6	22.6	8.8	16.8	4.4	4.0	4.2	23.7	5.0	15.9	3.3	5.3	4.1	3.9	8.8	6.0	6.9	3.7	5.6			
%REG EAR	49.5	67.9	54.8	.0	.2	.1	.0	.0	.0	.7	1.0	.8	19.1	2.9	14.4	.0	.0	.0	.0	.0	.0	30.7	28.1	30.0			
%ALL CASES EAR	33.2	41.8	36.6	4.9	22.9	12.1	18.0	7.7	13.9	3.6	3.6	3.6	22.7	4.8	15.6	2.6	4.7	3.4	3.1	7.7	4.9	11.7	6.8	9.8			

TABLE 2.3

HAA NET FLOW
HAA 84 XBF

NET FLOW INTO EACH DISTRICT

DISTRICT OF TREATMENT

	CB	PB	WS	ES	NO	GY	WN	HU	EAR
SPEC									
GMED	1472	615	62	-105	184	38	-35	-363	1868
PAED	542	172	-108	-20	62	12	51	-106	605
GS/U	1782	1079	428	-162	760	-438	-97	-657	2695
ENT	663	168	-61	22	365	-341	-6	-416	394
T/O	514	366	634	-137	327	-130	-121	-474	979
OPTH	601	55	-5	-44	95	-110	-3	-196	393
GYN	383	303	708	-62	82	-174	-42	-145	1053
OBST	1424	425	99	-63	126	-234	171	-54	1894
SUBT MAJOR	7381	3183	1757	-571	2001	-1377	-82	-2411	9881
OTHER NR	-344	133	23	-189	1089	-431	-239	698	740
SUBT NRG*	7037	3316	1780	-760	3090	-1808	-321	-1713	10621
GER	-269	96	441	-46	105	-51	31	25	332
ALL NR	6768	3412	2221	-806	3195	-1859	-290	-1688	10953
REG	3402	-795	-789	-501	363	-932	-605	1661	1804
ALL CASES	10170	2617	1432	-1307	3558	-2791	-895	-27	12757

* Graph A

TABLE 2.4

IN/OUT FLOW CASES IN MAJOR ACUTE SPEC - MORE THAN 2000 IN EAR
XBF 84
SPECIAL TABLES NON REGIONAL SPECS EXC GERIATRICS

DISTRICT OF TREATMENT

DISTRICT OF RESIDENCE	CB	PB	WS	ES	NO	GY	WN	H	OUTFLOW
CB	17559	32	2050	22	31	20	17	729	2901
PB	461	22628	17	6	33	13	117	177	824
WS	1659	9	15747	301	167	21	61	136	2354
ES	128	8	684	29196	412	235	6	16	1489
NO	146	9	468	226	40227	312	494	8	1663
GY	52	5	13	233	2233	15995	8	4	2548
WN	466	135	450	12	675	17	14388	19	1774
H	1925	853	54	1	7	4	1	7420	2845
NWT	2055	46	94	38	83	104	36	217	
NET	1800	34	827	256	108	115	27	74	
TR	138	1946	29	30	104	104	982	27	
OX	62	902	18	18	43	44	16	34	
OTHER XR	535	146	161	226	279	389	119	59	
TOTAL	26986	26753	20612	30565	44402	17373	16272	8920	
XR	4590	3074	1129	568	617	756	1180	411	
XD	4837	1051	3736	801	3558	622	704	1089	
XB	9427	4125	4865	1369	4175	1378	1884	1500	
NET XD	1936	227	1382	-688	1895	-1926	-1070	-1756	
XR%TOT	17.0	11.5	5.5	1.9	1.4	4.4	7.3	4.6	
XD%TOT	17.9	3.9	18.1	2.6	8.0	3.6	4.3	12.2	
XB%TOT	34.9	15.4	23.6	4.5	9.4	7.9	11.6	16.8	
OUT%TOT	10.8	3.1	11.4	4.9	3.7	14.7	10.9	31.9	

These figures used for map of in/out flow

APPENDIX 3

Table 3.1 Analysis of proportions by specialty still in hospital after 28 days and proportions discharged by 3 weeks: by specialty and district of treatment.

Table 3.2 Proportions by residence sub-group staying more than 28 days.

Table 3.3 Proportions of residence sub-group discharged within 3 weeks.

Table 3.4 Length of stay: differences between home and XB patients: by specialty within district.

Table 3.5 Length of stay distribution for major acute specialties excluding geriatrics.

Table 3.1

Long Length of Stay Source 1984 HAA Special Tabulations

ALL CASES TREATED

A: % all discharged after more than 28 days

District	G.Med	Paed.	G.Surg.	ENT	T/O	Ophth.	Urol.	Gyn.	Obst.
C	5.54	1.42	2.5	.87	8.4	.9	1.4	.54	.68
P	6.50	.59	3.8	.97	8.6	1.0	3.8	.45	.52
WS	6.48	.13	3.5	.39	6.7	O	-	.15	.81
ES	6.49	.31	3.1	.24	11.8	.4	-	.41	1.4
N	2.88	.47	3.5	.68	7.0	.2	2.0	.39	.56
GY	2.77	.13	2.6	.38	6.4	.2	-	.28	-
WN	2.45	.72	2.3	.17	13.0	0	-	.67	1.4
H	2.58	.66	1.5	-	2.4	-	-	.61	.67

B: % all discharged by 3 weeks.

C	91.5	97.2	95.3	98.7	86.7	98.9	97.4	98.7	98.4
P	89.9	99.3	94.0	99.0	84.6	98.6	93.8	99.1	98.9
WS	90.7	99.6	94.4	99.6	89.5	99.8	-	99.6	98.3
ES	89.6	99.3	94.4	99.8	82.0	98.9	-	99.4	97.6
N	94.4	99.1	94.0	99.2	89.0	99.7	96.0	99.5	98.9
GY	94.4	99.6	95.6	99.4	90.9	99.6	-	99.4	-
WN	95.1	99.3	95.8	99.8	80.5	99.8	-	98.4	97.9
H	95.7	99.1	97.2	100.0	96.0	99.2	-	99.1	98.8

Table 3.2 Long Length of Stay

% residence subgroup staying longer than 28 days*

	G Med			Gen Surgery			T/O		
	H	XD	XR	H	XD	XR	H	XD	XR
Camb	5.3	6.7	5.4	2.2	3.3	3.4	8.8	8.9	6.4
P'bro	6.7	5.4	6.1	3.6	3.6	4.3	8.4	6.5	9.4
WS	6.5	6.9	3.7	3.3	4.6	2.4	7.1	6.4	3.9
ES	6.4		2.2	3.2	2.3	1.2	11.9		
N	2.9	3.8		3.5	2.9		7.0	6.3	7.8
GY	3.0			2.7			6.9		1.2
WN	2.5		2.2	2.3		2.7	14.2		6.7
H	2.7			1.5			2.0		
Highest	Pb	WS	Pb	Pb	WS	Pb	WS	Cb	Pb
Lowest	WN	N	ES/WN	H	ES	ES	H	N	GY

* blank indicates %<1 or <100 in subgroup.

Nb. Peterborough data was calculated including Trent overlap with XR cases.

Source: '84 HAA Special Tabulations.

Table 3.3

Long Length of Stay

Proportions of Residence Sub-Groups Discharged Within Three Weeks

	G Med			Paed			Gen Surg			T/O		
	H	XD	XR	H	XD	XR	H	XD	XR	H	XD	XR
Camb	91.7	90.5	91.6	97.5	96.1	97.6	95.8	92.8	95.5	86.3	86.1	89.5
P'bro	89.7	89.2	90.5	99.3	98.5	99.7	94.2	91.2	93.9	84.7	82.2	84.8
WS	91.0	87.7	96.3	99.6	100	100	94.5	93.7	95.2	89.1	90.0	92.3
ES	89.4	92.9	96.4	99.3	100	100	94.3	96.9	97.0	81.8	87.0	84.7
N	94.2	95.5	99.2	99.3	98.3	97.4	93.9	95.2	94.9	88.9	89.3	88.7
GY	93.9	96.9	97.3	99.6	100	100	95.4	98.4	98.3	90.2	94.4	98.2
WN	94.7	98.9	97.4	99.3	100	98.9	95.7	98.2	95.5	78.7	90.4	88.2
H	95.6	93.8	100	99.0	100	100	97.2	100	93.2	96.1	100	87.0
lowest	ES(89.4)	WS(87.7)	P(90.5)	C(97.5)	C(96.1)	C(97.6)	N(93.9)	P(91.2)	H(93.2)	WN(78.7)	P(82.2)	ES(84.7)
highest	H(95.6)	WN(98.9)	H(100)	WS,GY (99.6)			H(97.2)	H(100)	GY(98.3)	H(96.1)	H(100)	GY(98.2)

Nb. P'bro data calculated including Trent overlap with XR cases.

Source 1984, HAA Special Tabulations

Table 3.4

Districts in Which XB Cases Stay Longer Than Most Cases. Difference in Mean LOS (measured in days)

Source: 1984, HAA, Special Tabulations

Specialty	District C	P	WS	ES	N	GY	WN	H
Gen Med	-.16	-1.96	-.43					
Paed	-1.08				-.31			
GS*	-1.33	-1.09	-.14					
Urol*	-.21	-.05						
GS & Urol	-.70	-.61						
ENT	-.85	-1.08						-.97
T/O								
Opth			-.62	-1.67	-2.42		-.78	
Gyn	-.70				-.09		-.04	
Obst**	-.88	-.31		-.16	-.10	-	-.35	-.31
Geriat		-16.61	-2.54	-75.37				-226.11
Number of specialties where XB cases stay on average longer	6/9	5/9	4/9	3/9	4/9	0/8	3/9	3/9
Exc geriat	6/8	4/8	3/8	2/8	4/8	0/8	3/8	2/8

* shown separately where these are recorded separately

** not done in Great Yarmouth

Table 3.5

Length of Stay Distribution for Major Acute Specialties Excluding Geriatrics
Mean, median, 90% ile (approx)

Source 1984, HAA, Special Tabulations

(NB 3.4 W
between 3 and 4 weeks)

		Gen Med			Paed			Gen Surg			Urology			T/O		
		mean	med	90%	mean	med	90%	mean	med	90%	mean	med	90%	mean	med	90%
C	H	11.7	6	19	4.3	2	9	6.5	4	14	5.1	3	11	11.1	4	3.4w
	XD	11.9	5	20	6.0	3	12	8.0	5	18	5.5	3	13	11.4	6	3.4w
	XR	11.8	6	20	4.5	2	11	7.8	4	15	4.8	3	11	9.7	4	3.4w
	All	11.7	6	19	4.7	2	10	6.9	4	15	5.2	3	11	11.0	5	3.4w
P	H	9.7	5	3.4w	3.4	2	7	6.6	3	14	6.6	3	17	12.7	7	3.4w
	XD	10.6	7	3.4w	2.3	1	4	7.0	3	18	5.2	2	15	12.2	7	3.4w
	XR	10.4	6	21	2.7	2	7	7.9	4	15	6.3	2	15	12.2	7	3.4w
	All	9.9	5	3.4w	3.2	2	6	7.0	3	15	6.4	3	16	12.5	7	3.4w
WS	H	10.0	5	20	3.2	2	7	7.2	4	15				9.8	4	3.4w
	XD	11.1 } 10.4	7	3.4w	2.9	1½	8	7.7	4	16				9.2	3	21
	XR	7.3 }	4	17	3.2	2	9	6.4	3	14				8.8	3	20
	All	10.1	6	21	3.2	2	7	7.2	4	15				9.6	3	3.4w
ES	H	11.2	7	3.4w	3.0	2	6	7.8	4	16				14.1	7	4.5w
	XD	11.5	5	15	2.0	2	x	6.4	4	15				10.8	5	x
	XR	6.4	4	15	1.6	1	x	5.0	3	10				13.3	7	x
	All	11.0	7	3.4w	2.9	2	6	7.7	4	16				14.0	7	4.5w
N	H	8.7	6	16	2.7	2	6	8.9	5	16	6.2	3	13	9.9	4	3.4w
	XD	7.8	6	15	3.3	2	8	7.8	5	16	5.9	3	14	9.3	4	3.4w
	XR	5.6	4	12	2.2	1	4	6.0	3	x	4.2	2	x	10.0	4	3.4w
	All	8.6	6	16	2.8	2	6	8.8	5	16	6.1	3	13	9.9	4	3.4w
GY	H	7.6	5	17	3.4	2	7	6.4	5	15				9.0	4	21
	XD	5.3	3	x	2.2	1½	x	4.3	2	9				6.5	3	x
	XR	5.1	4	10	1.8	1	4	3.2	1	9				4.8	2	10
	All	7.3	5	16	3.2	2	7	6.3	3	14				8.6	3	20
WN	H	7.1	4	15	3.0	2	6	6.5	4	14				14.7	6	4.5w
	XD	5.8	3	x	2.1	2	x	5.5	4	13				9.3	4	x
	XR	5.8	3	14	2.7	1	x	6.7	4	13				8.6	3	3.4w
	All	6.9	4	15	3.0	2	5	6.5	4	14				13.7	6	4.5w
H	H	7.0	4	13	3.5	2	7	4.4	2	10				6.1	3	14
	XD	6.1	4	x	1.8	2	x	3.1	2	x				2.7	2	x
	XR	4.3	3	x	3.1	2	x	4.3	2	x				10.8	3	x
	All	**6.9**	**4**	**13**	**3.5**	**2**	**7**	**4.4**	**2**	**10**				**6.0**	**2**	**14**

Nb. X - no in res group<100

Table 3.5 (continued)

		ENT			Opth			Gyn			Obst		
		mean	med	90%	mean	med	90%	mean	med	90%	mean	med	90%
C	H	3.3	3	5	5.1	4	7	4.0	2	10	4.3	3	9
	XD	3.7	3	6	4.6	4	7	5.4	2	11	5.9	4	12
	XR	5.3	3	6	4.5	3	6	4.2	2	10	4.8	3	9
	All	3.7	3	6	4.8	4	7	4.2	2	10	4.6	3	9
P	H	3.2	2	4	5.9	5	11	4.2	3	9	5.1	4	9
	XD	4.9	2	4	5.4	5½	x	3.6	2	9	6.6	4½	x
	XR	3.8	2	5	6.0	6	13	3.8	2	10	5.1	4	8
	All	3.3	2	4	5.9	6	12	4.1	2	9	5.1	4	9
WS	H	3.1	2	3	5.2	6	9	3.6	2	9	5.0	4	9
	XD	2.4	2	4	5.8	6	8	3.5	2	9	4.6	4	8
	XR	2.7	3	x	4.9	x	x	3.8	2	10	3.9	3	x
	All	3.0	2	4	5.3	6	8	3.6	2	9	4.9	4	9
ES	H	3.0	3	4	6.3	6	12	3.5	2	8	5.5	4	9
	XD	3.0	3	x	4.5	5	x	3.9	2	x	5.3	3	x
	XR	2.7	2	x	6.0	x	x	2.5	2	x	6.4	6	x
	All	3.0	3	4	6.3	6	11	3.5	2	8	5.5	4	9
N	H	2.6	2	4	4.7	4	9	3.5	2	9	4.4	3	8
	XD	2.5	2	3½	7.3	5	9	3.5	2	9	4.5	3	8
	XR	2.7	2	x	4.8	x	x	4.8	2	x	4.9	x	x
	All	2.6	2	4	5.0	4	9	3.5	2	9	4.4	3	8
GY	H	3.2	3	6	6.1	6	9	4.3	2	9			
	XD	2.9	x	x	5.6	x	x	4.1	2½	x			
	XR	3.3	x	x	4.8	x	x	2.3	2	x			
	All	3.2	3	6	6.1	6	9	4.2	2	9			
WN	H	2.2	2	3	3.5	2	7	5.4	4	11	5.6	4	9
	XD	1.9	2	x	4.1	4	x	5.6	5	x	5.4	4	8
	XR	2.0	2	x	4.4	4	x	5.4	4	11	6.6	4	10
	All	2.2	2	3	3.5	3	7	5.4	4	11	5.7	4	9
H	H	2.4	2	x	3.2	2	5	3.8	2	9	4.4	4	8
	XD	3.3	x	x	2.3	x	x	2.7	1	x	3.8	3	x
	XR	-	-	-	2.0	x	x	3.1	2	x	6.2	3	x
	All	2.4	2	x	3.2	2	5	3.7	2	8	4.5	3	8

APPENDIX 4 IS THERE AN EXPERTISE EFFECT? THE EVIDENCE FROM CAMBRIDGE AND NORWICH

In order to investigate whether the two districts which carry out the majority of the regional specialty work are also treating some of the more difficult or complex cases in the non-regional specialties, and to see whether this would be likely to affect the length of stay of cases crossing into these districts a more detailed set of statistics were obtained to describe the length of stay of all cases treated in non-regional non-geriatric specialties, subdivided into host and cross boundary cases.

It is possible that there would be no great difference in length of stay even if the districts were treating more complex cases if they were only seen for a short time, either on a transfer basis, with subsequent convalescence in the exporting district, or if the complex cases were seen forinvestigative, or second opinion, with subsequent treatment in the exporting district. The cost, in terms of consultant time, or special investigative techniques might be quite great, but such cost data can only be obtained at the hospital source, and not from HAA.

This analysis is to see whether we can detect any shift in the shape of the distribution which might lead one to conclude that there was a distinct subset of XB cases who stayed signficantly longer than district residents.

There are also tables available which show the length of stay for each of the specialties to see whether any specialties are giving rise to substantially different lengths of stay for XB cases, or whether it is likely that disproportionate numbers of cases in these specialties could cause a signficant shift in the overall length of stay.

Results

From the distribution statistics (Table 4.1) it can be seen that in both districts the XB cases stay on average longer than the residents, the order of magnitude of the difference being just less than a day, 0.84 for Cambridge and 0.95 for Norwich, however the standard error of these estimates is fairly large due to the non-normality of the distribution.

An examination of the percentile points of the distribution does not indicate any substantial difference in the shape of the distribution between resident and cross boundary cases at either district, until one reaches the extreme right hand side of the distribution at the 95 percentile point for Cambridge, and the 90 percentile point for Norwich, where the XB cases do have slightly higher percentile points in both districts. This might be evidence in favour or the argument that there are a few more extreme cross boundary cases than residents, but that they only form a small percentage of the cross boundary cases in general.

Comparison of the mean length of stay in the different specialties is difficult to assess with much precision as the number in the subgroups for some specialties are very small, particularly at Norwich. Table 4.2 shows the average length of stay in longer -stay specialties (i.e. in which the overall district mean was greater than 10 days). This shows that in very few of these specialties do both the cross boundary cases stay longer on average than the residents; with the exceptions of infectious diseases and haematology at Cambridge.

It would probably be worth investigating these two specialties further, since nursing staff interviews and dependency pilot work have indicated that these specialties are also specialties in which the nursing

demands are increased. However with only small numbers available in the HAA sample it would be better to investigate cases on a hospital record basis to provide more substantial cost-related information, and assess the financial signficance of any differences.

TABLE 4.1

ALL NON-REGIONAL NON-GERIATRIC CASES
CAMBRIDGE AND NORWICH LENGTH OF STAY
FREQUENCY DISTRIBUTION STATISTICS
Source 10% Sample HAA 1984

	Cambridge		Norwich	
	Host	XB	Host	XB
mean	6.960	7.804	6.996	7.950
sd	12.128	20.047	23.902	11.172
sc	0.282	0.618	0.362	0.472
no in sample	1855	1052	4364	561
median	3.345	3.572	3.309	4.148
90%	14/15	15/16	14/15	17/18
95%	22/23	24/25	22	25/26
99%	57	67	49	46/50
range	189	376	1382	115
10%	1	1	1	1
20%	1	1	1	1/2
30%	1/2	1/2	1/2	1/2
40%	2	2	1/2	2/3
50%	3.345	3.572	3.309	4.148
60%	4/5	4/5	4/5	5/6
70%	5/6	5/6	6/7	7/8
80%	8/9	8/9	8/9	11/12
90%	14/15	15/16	14/15	17/18

TABLE 4.2

CAMBRIDGE AND NORWICH LONG-STAY SPECIALTIES

(i.e. District Mean > 10 days)

MEAN LENGTH OF STAY BY SPECIALTY AND RESIDENCE GROUP

Source 10% Sample HAA 1984

CAMBRIDGE					
Spec Code	Length of Stay - days			Numbers in Sample	Whether XB Subgroup > H
	All Cases	Res Groups			
Spec 3	13.333	5.84	H	19	
		41.75	XD	4	XD
		20.50	XR	4	XR
Spec 5	15.25	33.5	H	2	
		10.0	XD	4	
		7.5	XR	2	
Spec 8	28.229	30.57	H	21	
		27.78	XD	9	
		19.20	XR	5	
Spec 10	16.00	17.2	H	5	
		13.0	XD	2	
		-	XR	-	
Spec 28	14.995	18.2	H	14	
		7.6	XD	5	
		12.0	XR	5	
Spec 43	17.365	18.295	H	95	
		17.001	XD	39	
		12.864	XR	22	
Spec 67	13.757	20.937	H	16	
		9.846	XD	13	
		5.750	XR	8	
Spec 68	10.552	4.25		4	
		9.33		12	XD
		13.62		13	XR
Spec 78	15.889	16.087	H	23	
		18.333	XD	3	XD
		4.000	XR	1	

TABLE 4.2 continued

NORWICH					
Spec Code	Length of Stay - days			Numbers in Sample	XB Subgroup > H
	All Cases	Res Groups			
Spec 5	16.8	16.37	H	8	
		17.75	XD	4	XD
		-	XR		
Spec 8	25.14	25.7	H	44	
		21.2	XD	31	
		35.7	XR	9	XR
Spec 10	17.94	19.0	H	48	
		15.4	XD	20	
		17.5	XR	2	
Spec 12	14.8	15.5	H	15	
		9.3	XD	3	
		-	XR	-	
Spec 28	15.6	16.2	H	27	
		13.8	XD	8	
		-	XR	-	
Spec 35	14.5	14.9	H	55	
		11.4	XD	7	
		-	XR	-	
Spec 36	18.25	12.7	H	3	
		35.0	XD	1	(XD)
		-	XR	-	
Spec 43	15.6	15.7	H	267	
		18.0	XD	12	XD
		9.4	XR	8	
Spec 78	18.76	20.00	H	31	
		5.7	XD	3	
		-	XR	-	

Appendix 5

Admission/Hospitalisation Rates. Major Specialties - Host District Patients

Admission Rates for 1000 Catchment Population

	CB	PB	WS	ES	NO	GY	WN	H
G Med	14.0	15.9	12.5	17.7	9.4	18.3	14.2	13.3
Ped*	22.1	27.5	19.5	21.4	17.6	22.1	28.3	32.7
G Surg	15.6	19.6	18.1	22.6	18.6	23.2	21.7	18.8
ENT	4.5	6.3	5.0	3.9	6.7	8.7	6.7	4.1
T/O	8.0	9.6	10.5	9.2	10.2	7.3	7.2	6.2
Opth	2.8	2.3	2.8	2.4	3.3	3.4	3.3	2.7
Gyn**	27.6	36.3	37.3	38.1	37.4	42.8	29.0	38.1
Obst	68.6	71.1	62.4	65.3	54.5	69.7	64.1	73.7

* Using 0/14 population

** Using 15/64 female population

[Source: EAR]

APPENDIX 6 A STATISTICAL APPROACH TO COMPENSATING FOR SEVERITY

The existing method of compensation allows for costs based on national averages withinspecialities. The issue here is how to measure relative severity and, in particular, the relative severity of cross-boundary flow cases. One major component of severity is the level of dependency and effects on the workload of nurses are discussed in the latter half of the text. The dual problem considered here is whether or not length of stay can be used as a proxy for severity of condition, and, if so, how should it be taken into account when compensating for cross-boundary flows. Both these are considered in a multivariate modelling framework.

The difficulties of comparing data on length of stay as between districts have been discussed in detail in the text; in particular it is suggested that average length of stay will reflect different policies at all stages of treatment, andespecially differences in the rates of admission per capita. If this were true then it would not be appropriate to use length of stay as a proxy for severity.

When faced with a similar problem in the North Western Region, however, Akehurst and Johnson (1980)* argued that it would "not be appropriate to examine actual lengths of stay experienced by patients in different hospitals ... because this implies that an inefficient area or district which kept its patients in longer than necessary should receive greater compensation per case than an efficient authority". They, therefore, proceeded to estimate a relationship between age, sex and diagnostic category and length of stay for all imported cases in the

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* R.L. Akehurst and K.W. Johnson. Cross-Boundary Flows of Patients. Hospital and Health Services Review, October 1980, pp. 334-336.

region. But, for it to be plausible to use length of stay as a proxy for severity, we have to show that length of stay and casemix are related for all cases (both host and cross-boundary) prior to making estimates for compensation. This is because a relationship between mean length of stay and casemix among imported cases might be an artefact of the assignment of diagnosis at discharge to those cases.

The data are very limited but we can investigate the extent to which mean length of stay is related to age, sex and diagnosis on discharge as well as district of treatment and residence category. The appendix shows the breakdown of the main diagnostic groups distinguished within each specialty.

The analysis is based on the average length of stay within cells defined by the cross classification of age (10 categories), sex (2 categories), diagnostic group (varying from 4 to 10 categories), district of treatment (8 categories) and residence coding (3 categories). Given that the distribution is truncated at zero and has a long tail, we have worked with the logarithm of the length of stay as providing a more plausible proxy for severity than the untransformed variable.

There are two stages to establishing the validity of using length of stay as a suitable proxy. First we ask, for all cases, how powerful is the district-of-treatment factors compared to a district-of-residence factor (the latter categorised into host district, other district within the region, and other regions); and separately whether length of stay is affected either by age and sex or by diagnostic treatment group. Second, we ask whether the associations of each of these factors with LOS remain after prior adjustment for the other set.

Analysis of variance by district of treatment and district of residence only (the 'geographic' factors) separately for each of the specialty groups shows that the district of treatment factor far outweighs the residence group factor (Table 6.1). Moreover, these two factors alone clearly account for a substantial proportion of the variance betweencell means in each specialty grouping, with the exception of paediatrics and urology. This result alone would tend to support the view that the differences in mean length of stay between districts are, in large measures, idiosyncratic.

However, the variations of mean length of stay can also be accounted for by a combination of age, sex and diagnostic treatment groups for each of the specialty groupings (Table 6.2). These three factors account for a larger proportion of the variance than did the 'geographical factors' for all specialty groupings with the single exception of opthalmology. There clearly is scope for using logarithm of length of stay as a proxy for severity.

Table 6.3 then compares the additional contributions of each of the two sets of factors after prior adjustment for the other set. For every specialty grouping, the additional variance accounted for by the geographic factors is minimal (and sometimes the residence factor disappears) whilst the additional variance attributable to casemix factors is substantial with the single exception this time of ENT. We conclude that mean length of stay is more related to casemix than to other factors and that the apparent wide variations in mean length of stay between districts can, mostly, be attributed to variations in casemix.

On this basis, Table 6.4 presents the analyses for imported cases only. For every speciality, the casemix factors account for at least 75%

of the variance in the mean length of stay of imported cases. Check runs have shown that the additional variance attributable to other factors is again minimal. This result holds for all specialties. It implies that observed differences in mean length of stay - here being used as a proxy for average severity - are a function of case mix. Different disticts treat a differentrange of patients and these stay on average longer or shorter accordingly.**

These results, suggesting that average severity can be estimated by average length of stay, can be used to suggest a method of compensating for relative severity via the case mix of imported cases. We have therefore estimated a relationship between the logarithm of the length of stay for each patient and their age, sex and principal diagnosis. These regression equations have been used to calculate an expected value of the logarithm of the length of stay - treated as a proxy for severity - for each detailed specialty grouping, as if cases within that specialty were allocated randomly to hospitals in East Anglia. That could be the basis for compensation for severity regardless of the actual length of stay. These expected values are summed across specialties to estimate an overall average value for each district of the expected severity of imported cases they deal with. The results, given in Table 6.5, should be taken as an estimate of the relative severity of the typical imported cases dealt with by each district. These results suggest that, though Cambridge, Peterborough and West Suffolk deal with seventy per cent of the imported cases in the region, they are not on average more severe in terms of case mix.

** This result also suggests that compensation for the total cost of average length of stay can,on the whole,afford to ignorevariations between districts. But one should be cautious because the estimates so far are based on cell measures and not individual observations.

Obviously this can change from year to year. For years subsequent to 1984, therefore, the same procedure can be followed: that is, for cross-boundary cases in each specialty, on the basis of an agreed classification of diagnostic groups, estimate the regression of the log of length of stay on age (categorised in 10 year age groups), sex and diagnosis (allowing for an other category). The coefficients from this regression can be used to calculate an expected logarithm of length of stay for each imported case and then summed across specialties. Those estimates should be the basis for any comparison of severity of the imported cases treated by each district. We recommend that this method should be developed for use in the longer term, as a development of the interim method described in the text. The method described here would allow compensation to be targeted more precisely on those groups of patients where severity was more important.

Notes to the Tables

(1) Specialty grouping

Code	Specialty Grouping
1.	General Medicine
2.	Paediatrics
11.	Geriatrics
13.	General Surgery
14.	ENT
16.	Trauma and Orthopaedics
17.	Ophalmology
19.	Urology
25.	Gynaecology
26.	Obstetrics

(2) Main diagnostic groups in each specialty singled out for analysis

1	2	11	13	14	16	17	19	25	26
410-411	.20-136		.140-159	.381	.711-715	.36	.188	.140-239	.650
420-426+ 428, 429	.460-466		.170-198	.348-198	.717-719	.365	.598	.618	.679
780-781+ 786-789	.493		.440-458	.474	.Other in 710-738	.366	.Other in 580-629	.Other in 610-629	.Other in 630-678
960-999	.520-569		.520-529+ 540-553	Other in 470-486	.813	.348	.599	.626	.Other
Other	.780-781+ 786-789		.570-577	.784-785	.820	Other in 360-379	.600	.634	
			.580-629	.Other	.823	.Other	.740-759	.635	
			.780-781+ 786-789		.824		.788	.Other in 630-678	
			.850-949		.Other		.Other	.625	
			.Other					.Other	

Table 6.1 : Percentage of Sums of Squares Attributed to District of Treatment and Residence Group in Separate Models for each Specialty (All Cases).

Specialty	District of Treatment	Residence Group	Percent SS due to Model (Adjusted)
1. General Medicine	23.7	46.6	70.2
2. Paediatrics	7.8	37.3	44.9
13. General Surgery	20.7	48.5	69.1
14. ENT	60.9	9.1	69.9
16. Trauma & Orthopaedics	82.4	0.1	82.2
17. Opthalmology	50.2	38.3	88.4
19. Urology	25.6	8.8	34.0
25. Gynaecology	8.5	47.6	56.1
26. Obstetrics	10.2	24.4	69.6

Table 6.2 : Percentage of Sum of Squares Attributed to Age, Sex and Diagnoses in Separate Models for each Specialty (All Cases).

Specialty	Age 8	Sex 1	Diagnosis	Percent SS due to Model
1	16.8	0.0	2.1	78.9
2	50.3	0.0	3.1	53.4
13	59.9	0.5	8.1	68.4
14	63.2	0.2	12.3	74.6
16	32.7	0.2	51.4	84.2
17	78.0	0.2	6.8	86.8
19	42.7	10.5	19.8	72.9
25	63.1	-	7.6	70.7
26	75.6	-	0.8	76.4

Table 6.3 : Incremental Sum of Squares Attributable to Case-Mix factors on Geographical factors after adjustment for the other set (All Cases).

Specialty	% SS due to model	Increment from Geographic	% SS due to model	Increment from Case-Mix
1	78.3	0.8	57.2	21.9
2	53.1	2.0	41.9	13.1
13	49.8	27.8	64.8	12.8
14	24.5	53.1	70.7	6.9
16	73.9	12.3	65.2	21.0
17	66.3	23.8	76.4	13.7
19	72.0	0.1	36.1	36.0
25	71.6	1.3	47.3	25.6
26	76.0	0.4	56.2	20.2

Table 6.4 : Percentage of Sums of Squares Attributed to Age, Sex and Diagnosis in Separate Models for each Specialty (Cross Boundary Cases).

Specialty	Age	Sex	Diagnosis	Percent SS due to Model Adjusted
1	68.4	0.1	10.1	78.1
2	50.7	0.0	2.3	51.4
13	70.9	0.3	7.4	78.0
14	23.7	0.3	57.6	80.9
16	43.3	0.3	35.9	78.4
17	69.2	2.1	13.0	83.3
19	27.8	11.6	35.1	73.6
25	58.9	-	18.4	76.7
26	73.3	-	2.7	75.8

Table 6.5 : Predicted average value of logarithms of length of stay, of imported cases according to district of treatment and specialty grouping, together with an overall comparison of observed and expected.

		1	2	13	14	16	17	19	25	26	Total Expected Log of Bed Days	Actual Observed Log of Bed Days
Cambridge	E(log(los))	1.512	0.905	1.383	0.899	1.878	1.166	1.277	1.030	1.292	1.293	1.332
	N	360	173	412	214	256	288	276	272	376	2627	2627
Peterborough	E(log(los))	1.712	0.893	1.392	0.880	1.896	1.331	1.279	0.953	1.299	1.384	1.412
	N	217	57	230	66	119	36	109	104	164	1102	1102
West Suffolk	E(log(los))	1.735	0.886	1.518	0.778	.	1.493	.	0.892	1.258	1.307	1.288
	N	155	17	357	52	.	37	.	257	141	1016	1016
East Suffolk	E(log(los))	1.674	0.735	1.220	0.834	1.751	1.507	.	0.894	1.333	1.350	1.259
	N	62	6	76	27	50	7	.	29	35	292	292
Norwich	E(log(los))	1.658	0.915	1.512	0.862	1.895	1.398	1.381	0.993	1.333	1.396	1.417
	N	125	44	187	123	172	36	142	110	118	1057	1057
Great Yarmouth and Waveney	E(log(los))	1.682	0.820	1.255	0.860	.	1.615	.	1.034	.	1.334	1.088
	N	90	28	73	2	.	2	.	36	.	231	231
West Norfolk and Wisbeck	E(log(los))	1.445	0.832	1.414	0.816	1.690	1.490	.	1.329	1.320	1.336	1.270
	N	80	35	115	37	51	20	.	33	92	463	463
Huntingdon	E(log(los))	1.570	0.850	1.050	1.003	1.661	0.638	.	0.837	1.315	1.182	1.055
	N	30	8	33	4	11	4	.	33	33	156	156
All Districts		1.618	0.886	1.414	0.867	1.858	1.245	1.305	0.975	1.298	1.330	1.330
		1119	368	1483	525	659	430	527	874	959	6944	6944

APPENDIX 7 SOURCES OF ADMISSION

Two sets of computer printout are available based on HAA analysis of the source (type) of admission to hospital in 1984.

The first is based on the special tabulations of all specialties in which there were more than 2000 cases treated in EAR, for each district of treatment and each specialty. This gives the number of cases in each subgroup - percentage figures have been calculated separately.

The second is based on a 10% sample of cases admitted to Addenbrookes hospital. This set of data was used both to investigate whether there was greater severity at Addenbrookes for XB cases and to give information on 1) specialties which are more likely to occur in a teaching hospital and 2) those regional specialties which are done in the Cambridge District. Note that at Addenbrookes there is less geriatric work when compared with the total for Cambridge District and Obstetric work is not included. In other specialties most of the Cambridge district work is done in Addenbrookes. These tables give the percentages in the subgroups and a significance test indicates whether there were significant differences among the subgroups. A summary table combining 1) the non-regional specialties (excluding geriatrics) and 2) regional specialties is provided, together with a separate printout of the number of cases which were admitted on an immediate basis and a graph showing the % in the NR specialties.

Results

It is sometimes suggested that those being transferred for treatment are medically more severe than others, but care needs to be taken to distinguish those who are transferred as a tertiary referral and others who

are being transferred from another hospital which may be e.g. a geriatric long-stay home. The district with the highest proportion of cases being transferred in general terms is Norwich and the T/O specialty has quite a high proportion of transferred cases for several districts. In general the proportion being transferred ranges from a maximum of the order of 15% in general surgery at Norwich to almost zero in other specialties in other districts.

A comparison was made for the three main net importing districts - Cambridge, West Suffolk and Norwich of those who were either admitted on an immediate basis or transferred in. These cases might be said to be more severe medically than others since they require immediate attention. (Strictly speaking Peterborough is also an importing district but the situation is complicated by the Trent overlap, and the tabulations available at the time did not include the Trent overlap with the host residence group - this could be added in if necessary by obtaining a rerun of the data).

Tables 7.1 and 7.2 show first, the numbers of cases admitted on the immediate and transferred basis together with the combination I/T and the total number of cases admitted for the host and cross boundary cases. The second table shows for three districts the proportion of all cases in the residence group who were admitted on an immediate, transferred or combined I/T basis. For all three districts the combined proportion for XB cases was lower than that for host cases when all the major non-regional specialties are grouped together.

Table 7.1

XBF SOURCE OF ADMISSION BY SPECIALTY
SPECIAL TABLES MORE SERIOUS CASES-IMMEDIATE OR TRANSFERRED
HAA 84 MAJOR ACUTE SPECIALTIES GROUPED TOGETHER

	IMMEDIATE			TRANSFER			I/T			TOTAL		
CAMBRIDGE SPEC	HOST	XB	ALL	HOST	XB	ALL	HOST	XB	ALL	HOST	XB	ALL
GMED	2401	828	3229	20	28	48	2421	856	3277	3010	1285	4295
GSUR	1565	498	2063	12	20	32	1577	518	2095	3523	1381	4904
ENT	341	197	538	0	2	2	341	199	540	1084	765	1849
T/O	1049	595	1644	13	36	49	1062	631	1693	1676	1006	2682
OPTH	123	138	261	0	2	2	123	140	263	714	968	1682
UROL	394	194	588	5	23	28	399	217	616	1297	915	2212
GYN	619	227	846	5	1	6	624	228	852	1913	881	2794
OBST	86	64	150	15	59	74	101	123	224	2709	1250	3959
ALL	6578	2741	9319	70	171	241	6648	2912	9560	15926	8451	24377
WEST SUFFOLK												
GMED	1946	472	2418	31	6	37	1977	478	2455	2238	571	2809
GSUR	1521	398	1919	10	6	16	1531	404	1935	3447	1204	4651
ENT	141	15	156	0	0	0	141	15	156	849	185	1034
T/O	1257	293	1550	34	21	55	1291	314	1605	1986	910	2896
OPTH	113	17	130	1	0	1	114	17	131	496	120	616
UROL	0	0	0	0	0	0	0	0	0	0	0	0
GYN	580	128	708	5	0	5	585	128	713	2415	907	3322
OBST	74	28	102	4	0	4	78	28	106	2555	519	3074
ALL	5632	1351	6983	85	33	118	5717	1384	7101	13986	4416	18402
NORFOLK												
GMED	2817	293	3110	294	23	317	3111	316	3427	3630	394	4024
GSUR	2728	280	3008	1271	84	1355	3999	364	4363	8329	658	8987
ENT	312	33	345	4	0	4	316	33	349	2939	450	3389
T/O	3311	413	3724	456	27	483	3767	440	4207	5816	727	6543
OPTH	210	23	233	24	2	26	234	25	259	1472	172	1644
UROL	870	106	976	141	12	153	1011	118	1129	3065	482	3547
GYN	1289	87	1376	141	2	143	1430	89	1519	5306	350	5656
OBST	46	15	61	269	20	289	315	35	350	4835	356	5191
ALL	11583	1250	12833	2600	170	2770	14183	1420	15603	35392	3589	38981

Table 7.2

XBF SOURCE OF ADMISSION BY SPECIALTY
SPECIAL TABLES MORE SERIOUS CASES-IMMEDIATE OR TRANSFER
HAA 84 MAJOR ACUTE SPECIALTIES GROUPED TOGETHER

DIST	C		WS		N	
RES GP	I/T	TOT	I/T	TOT	I/T	TOT
H	6648	15926	5717	13986	14183	35392
XB	2912	8451	1384	4416	1420	3589
ALL	9560	24377	7101	18402	15603	38981
IT%TOT						
H	41.7431		40.8766		40.0740	
XB	34.4575		31.3406		39.5653	
ALL	39.2173		38.5882		40.0272	
I%TOT						
H	41.3035		40.2688		32.7277	
XB	32.4340		30.5933		34.8286	
ALL	38.2287		37.9470		32.9212	
T%TOT						
H	.439533		.607751		7.34629	
XB	2.02343		.747283		4.73670	
ALL	.988637		.641235		7.10603	

APPENDIX 8 NURSE DEPENDENCY RATINGS - ADDENBROOKES FEBRUARY 1987

Nursing staff at Addenbrookes are introducing the Nurse Monitor Study on some of the wards for nurse management purposes. Part of the Monitor exercise involves a dependency rating for each patient covering several aspects - physical, psychological and time dependency. In order to see whether cross district or cross regional boundary cases were giving rise to additional nursing severity a pilot exercise was carried out on a 'typical' day chosen at random in February 1987, in wards on the medical unit, to see whether those with higher dependency scores were disproportionately represented by cases crossing boundaries for treatment.

It had been hoped to extend this exercise to other wards treating cases in non-regional specialties and to include more days in the study, but due to time factors in the introduction of the Monitor exercise, staff changes and pressure of work on the hospital, only wards on the medical unit had ratings available.

It is necessary at present to code the residence of patients manually, as the links in the PAS system are not fully automated, but if it seemed worthwhile, the pilot exercise could be extended to specific types of case or specific wards. As an example, if one were making a case for inclusion of a nurse severity rating for a given specialty or a particular form of treatment, these cases could be monitored individually for a suitable period to give a weighting factor for budgetary purposes.

The wards which were included in the pilot study were:-

D5 - general medical, including cardiology, rheumatology and respiratory medicine

G5 - general medical

F6 - general medical

G6 - general medical

C10 - haematology

Unfortunately, due to staff changes, ratings were not available for ward F5, which nurses some of the longer stay cases, particularly Wilson's disease and anorexic cases, but lengths of stay were obtained for this ward as an indicator of complexity, whether this is due to dependency or problems of discharge.

Ward D1- - the infectious diseases ward, although strictly part of the medical unit, was not included, since an exploratory exercise had indicated that nearly all cases on this ward are likely to be high dependency due to the extent of barrier nursing necessary for these cases. A better indication of cross boundary cases using this ward could be made from HAA records if needed.

Radiotherapy wards were not included as many cases on these wards are treated in regional specialties.

Results

The results are given in the tables below. A distinction has been made between

cross district cases i.e. EAR residents	-	XD
neighbouring region cases i.e. NET, NWT	-	NE/NW
other cross region cases	-	XR
no fixed abode	-	NK

Dependency ratings are coded I to IV in increasing severity

It is interesting to note that the number of highly dependent cases i.e. codes III or IV is not a high proportion on the general medical wards, approximately 16% overall, but that on the haematology ward, over half the cases were rated III and none rated I. This is regardless of place of residence and gives an indication of the greater level of nursing severity of cases on this ward. A summary table combines the four general wards, but the haematology is shown separately.

Apart from haematology, the results, though admittedly based on very small numbers, do not indicate that the cross boundary cases are very different from the remaining in-district cases. The combined proportion of ratings III and IV are 16% of Cambridge residents and 16% of cross boundary residents.

It is important to note that these wards are the general wards, and have not included cases e.g. on the CCU or ITU - also that some of the more difficult medical cases are on ward F5, which might have given a different picture. It gives some credence to the argument that the 'ordinary' cases are not so different if they come from out of district, and that severity as noted in nursing terms is more a matter of individual response to treatment, and individual circumstances, regardless of place of residence.

There would seem to be a good case for further exploration of the haematology ward, possibly with a view to regional specialty funding.

An indication of the discharge problems from ward F5, and given by the length of stay of cases on the ward, is shown on the attached table. It

indicates how HAA discharge data could be distorted, when some cases are discharged after more than 2 years from a general medical ward with an average length of stay of about 11 days. There could be a case for distinguishing these long-stay cases for budgetary purposes, either by special funding for cases of over a given length of stay, or by removal of these cases from the general budget and funding them according to a bed-day basis.

If nothing else, the fact that these cases are distinguished could be useful in determining the need for suitable continuing care facilities and recharging such care to the appropriate authority rather than relying on the acute budget to support what are effectively long-stay cases.

TABLE 8.1

Time since admission of cases on ward F5 - sample day in February 1987

	District of residence				
	Camb	EAR	NET/NWT	XR	ALL
Time					
up to 2 wks	9	2	2	2	13
2 - 6 wks	3				3
6 wks - 3 mths	1	2		1	4
3 mths - 6 mths		1			1
6 mths - 1 yr		1		1	2
1 - 2 yrs	1				1
2 - 3 yrs				1	1
Total	14	4	2	5	25

Of all cases on the ward, 9 out of 25 had been longer than 6 weeks, 7 of whom were cross boundary cases. 4 of these long stay cases had been longer than 6 months of whom 3 were cross boundary cases. One cross regional case had been nearly three years.

Note - these are not the only long-stay cases in the hospital - merely ones which have been highlighted. A full study could pick out long stay cases in all the EAR acute hospitals, and compensate accordingly.

Table 8.2 Dependency Ratings by Area of Residence (Sample day February 1987)

NUMBERS OF PATIENTS

WARD D5	RES AREA CAMB	XD	NE/NW	XR	NK	ALL
RATING						
I	7	1				8
II	11					11
III	2					2
IV						0
all	20	1	0	0	0	21
WARD G5						
I	6		1			7
II	6	2	2			10
III	3		1			4
IV				1		1
all	15	2	4	1	0	22
WARD F6						
I				2		2
II	9	4	3	2	1	19
III	2	2				4
IV						0
all	11	6	3	4	1	25
WARD G6						
I		1	2	1		4
II	12		4	1		17
III	2		1			3
IV	1					1
all	15	1	7	2	0	25
WARD C10						
I						0
II	4		1			5
III	3	5				8
IV						0
all	7	5	1	0	0	13

WARDS D5,G5,F6,G6 COMBINED

	CAMB	XD	NE/NW	XR	NK	ALL	percent all in rating CAMB	XD	NE/NW	XR
I	13	2	3	3	0	21	61.9	9.5	14.3	14.3
II	38	6	9	3	1	57	66.7	10.5	15.8	5.3
III	9	2	2	0	0	13	69.2	15.4	15.4	.0
IV	1	0	0	1	0	2	50.0	.0	.0	50.0
all	61	10	14	7	1	93	65.6	10.8	15.1	7.5
	percent all on wards									
I	21.3	20.0	21.4	42.9	.0	22.6				
II	62.3	60.0	64.3	42.9	100.0	61.3				
III	14.8	20.0	14.3	.0	.0	14.0				
IV	1.6	.0	.0	14.3	.0	2.2				

combining xd +net/nwt + xr = xb cases

	camb	xb	nk	all
I	13	8	0	21
II	38	18	1	57
III	9	4	0	13
IV	1	1	0	2
all	61	31	1	93
	percent all on wards			
I	21.3	25.8		22.6
II	62.3	58.1		61.3
III	14.8	12.9		14.0
IV	1.6	3.2		2.2

percent all in rating

	camb	xb
I	61.90	38.10
II	66.67	31.58
III	69.23	30.77
IV	50	50
all	65.59	33.33