Novel Approaches to New Analyses

Brian Cottier

Director

National Cancer Services Analysis Team

Core Objective #2:
Providing a common national repository for cancer datasets

Cancer Services Analysis

Data Linkage……Analytical Benefits

HES England

- Inpatient 10 Years 150m Records
- Outpatients 4 Years 200m Records

HES (2005/06)

HES	Total	Cancer	%
Admissions (Epiorder =1)	12,508,845	1,583,709	13%
FCEs	14,237,926	1,750,606	12%
FCEs (Day Case)	4,112,543	782,992	19%
FCEs (In Patient)	10,125,383	967,614	10%
FCEs (In Patient) Emergency	4,565,021	409,228	9%
FCEs (In Patient) Elective	5,560,362	558,386	10%
Bed days	44,358,492	5,263,210	12%

Total Excludes Mental Health

UGIT Cancers

HES

Microsoft Excel - IOG HES Cancer 9 UGIT All Procedures PD by Network of Trust PC V4.0 PP

File Edit View Insert Format Tools Chart Window Help

Type a question for help

UGIT Centre (All) | Diagnostic G (All) | SHA of Trus (All) | Network of T (All) | Trust (All) | Specialty (All) | Admission M (All) | Discharge M (All) | Procedure Le (All) | Diagnosis Le (All)

Gastrectomies Per Annum (HES)

HES Cancer Data Extract 9 (1997/087 to 2006/07)

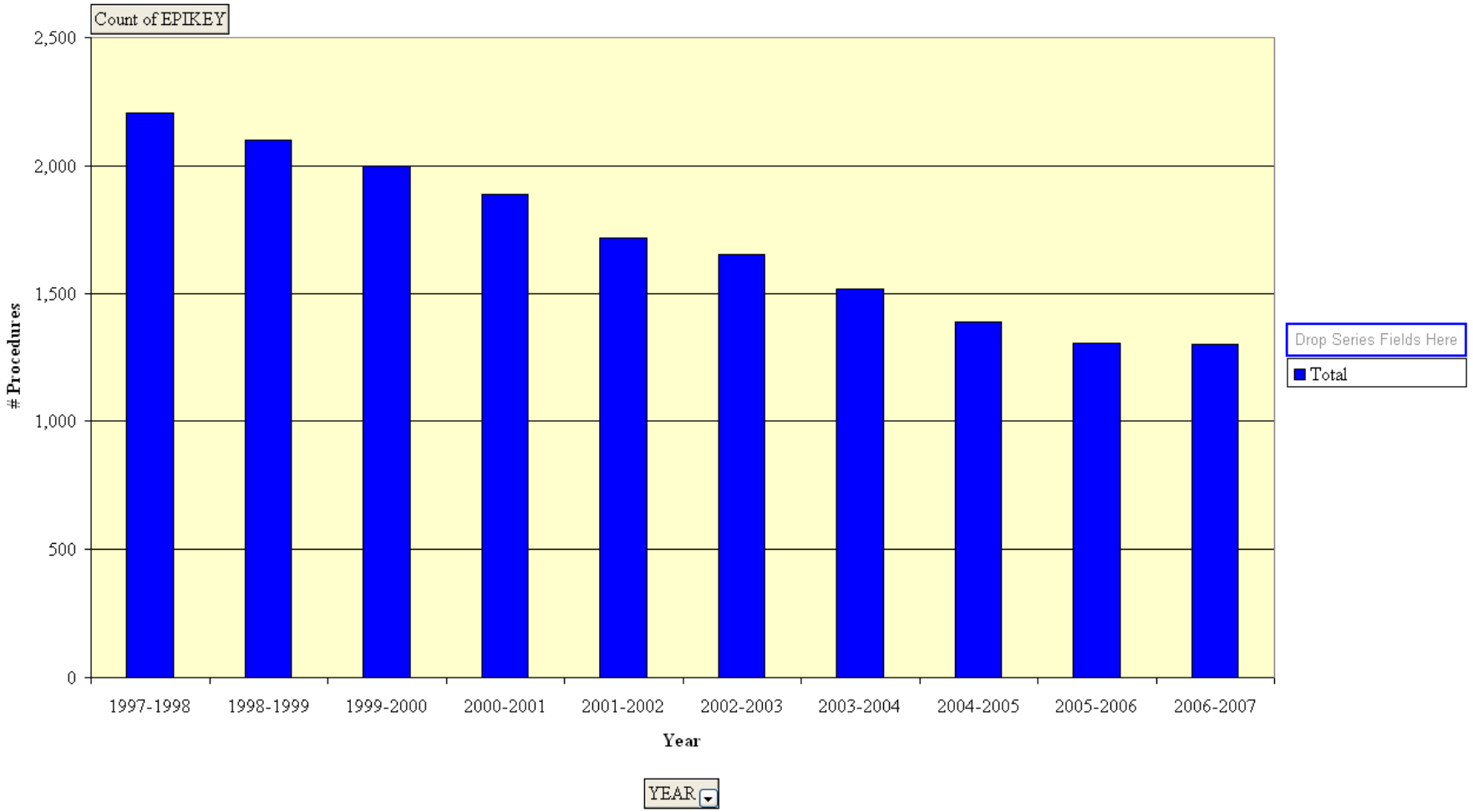


Chart Summary by Year (1) | Summary by Year | Chart Summary by Year (2) | Chart Summary by Year (3) | Summary by Year (2) | 3 Counties | Anglia | Arden | Avon, Somerset & Wiltshire | Central

Ready

NUM

Microsoft Excel - IOG HES Cancer 9 UGIT All Procedures PD by Network of Trust PC V4.0 PP

File Edit View Insert Format Tools Chart Window Help

UGIT Centre (All) | Diagnostic G (All) | SHA of Trus (All) | Network of T (All) | Trust (All) | Specialty (All) | Admission M (All) | Discharge M (All) | Procedure Le (All) | Diagnosis Le (All)

Oesophagectomies Per Annum (HES)

HES Cancer Data Extract 9 (1997/087 to 2006/07)

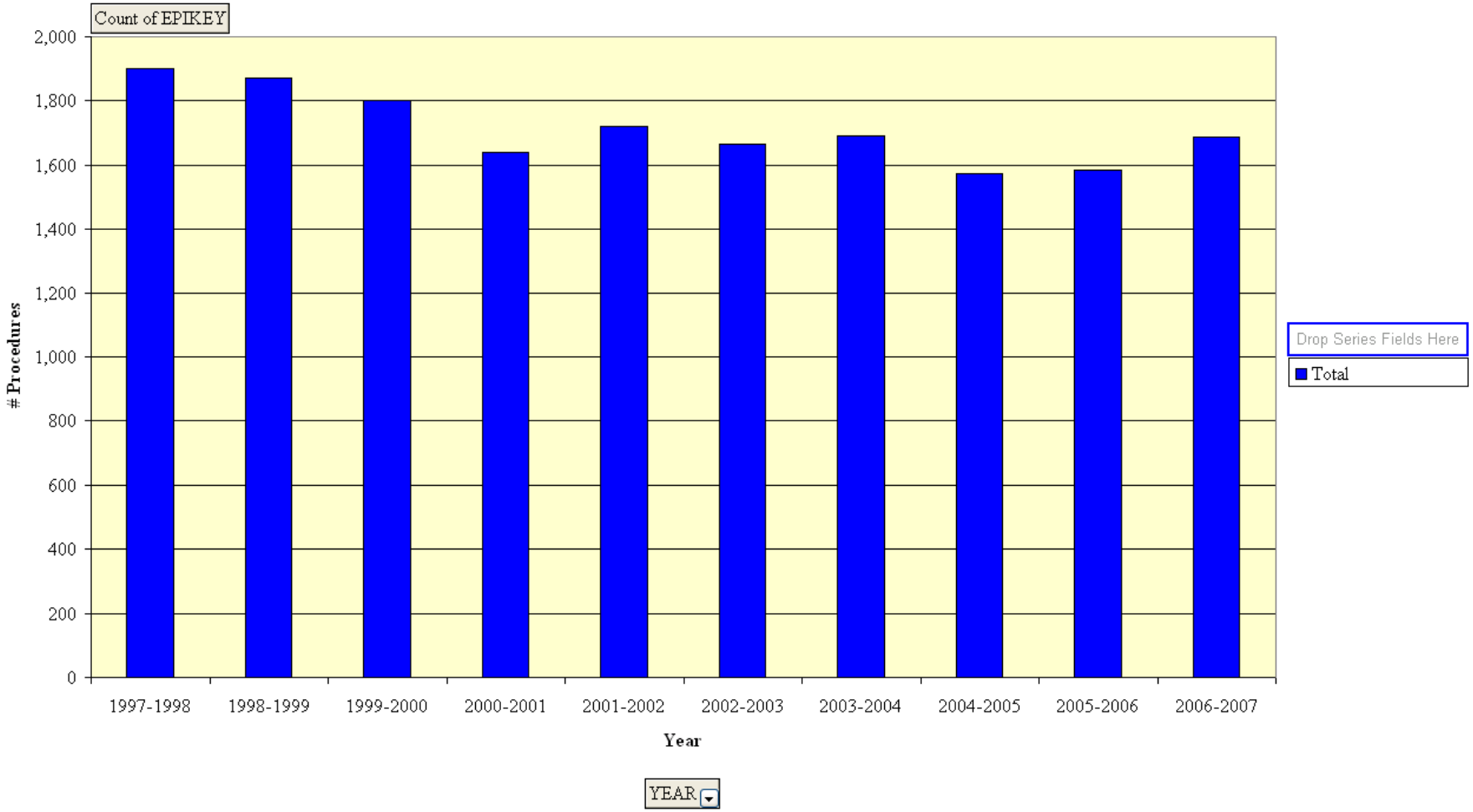


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Ready NUM

Microsoft Excel - IOG HES Cancer 9 UGIT All Procedures PD by Network of Trust PC V4.0 PP

File Edit View Insert Format Tools Chart Window Help

Type a question for help

UGIT Centre? (All) | Diagnostic Group (All) | SHA of Trust (All) | Network of Trus (All) | Trust (All) | Specialty (All) | Admission Metho (All) | Discharge Metho (All) | Diagnosis Level (All)

Pancreatectomies Per Annum (HES)

HES Cancer Data Extract 9 (1997/087 to 2006/07)

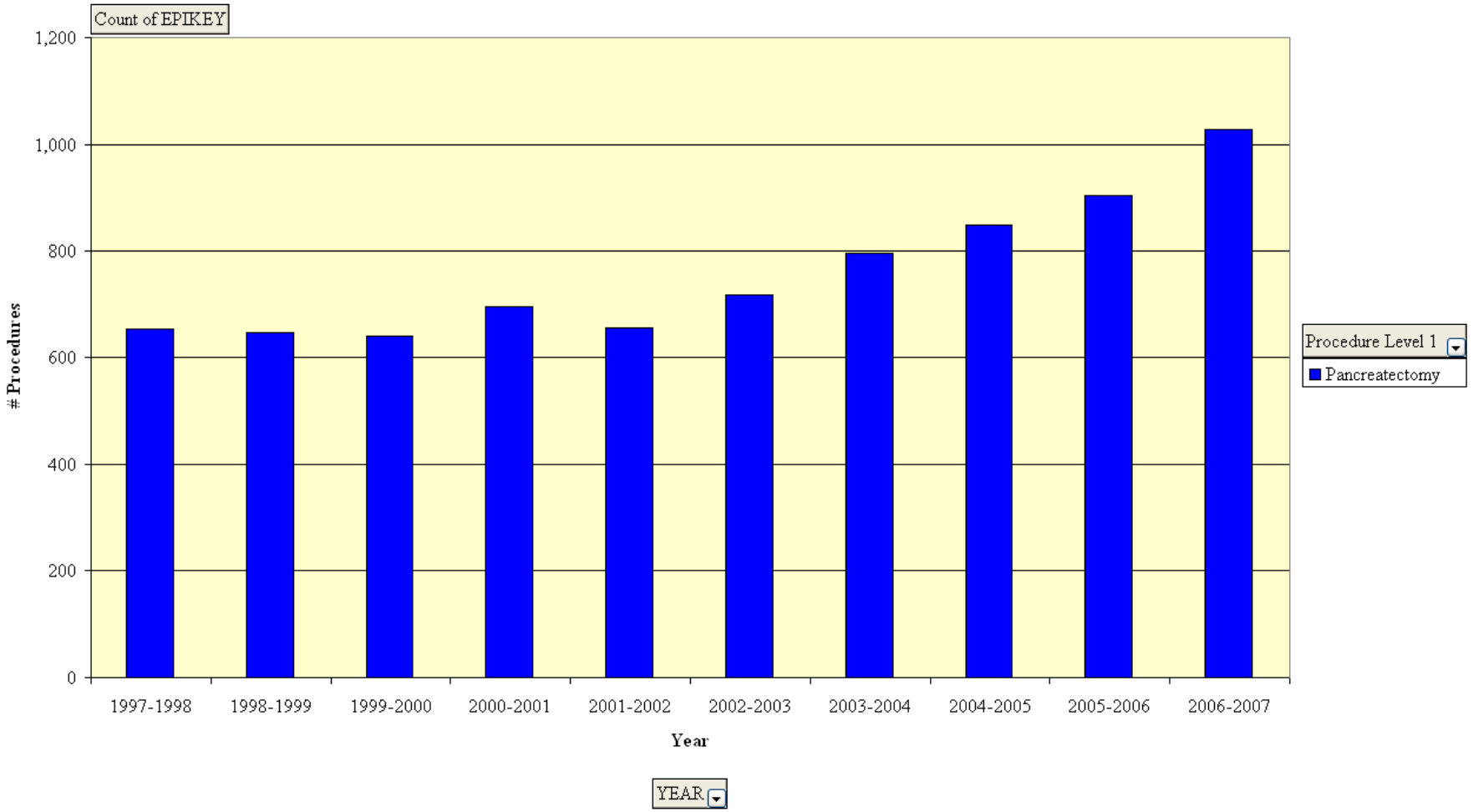


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Ready NUM

Microsoft Excel - IOG HES Cancer 9 UGIT All Procedures PD by Network of Trust PC V4.0 PP

File Edit View Insert Format Tools Chart Window Help

Type a question for help

Diagnostic Gro (All) | Diagnosis Leve | UGIT Neopl (All) | SHA of Trust (All) | Network of Tru (All) | Trust (All) | Specialty (All) | Admission Met (All) | Discharge Meth (All) | Procedure Lev (All)

Major UGIT Surgical Procedures for UGIT Neoplasms

HES Cancer Data Extract 9 (1997/087 to 2006/07)

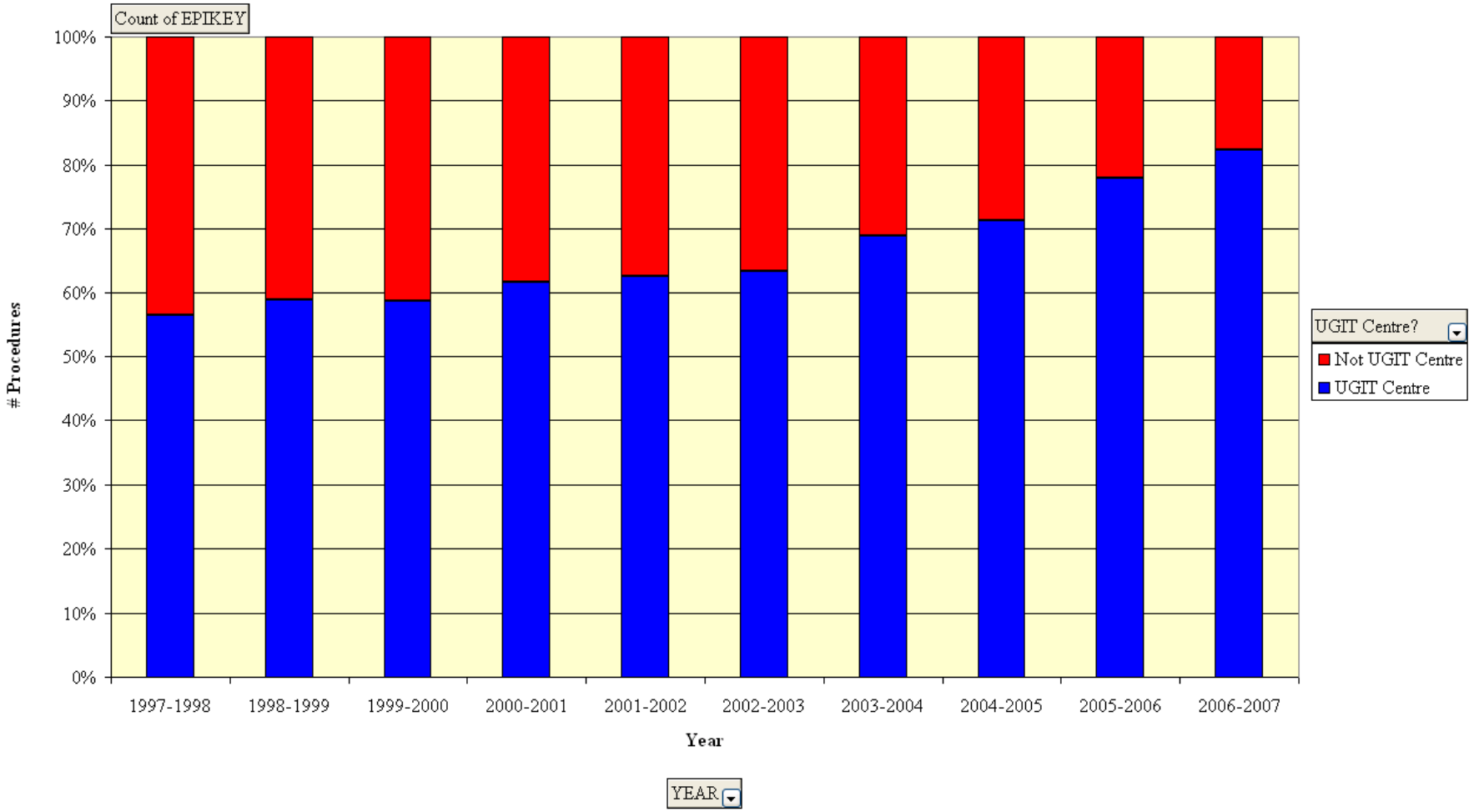
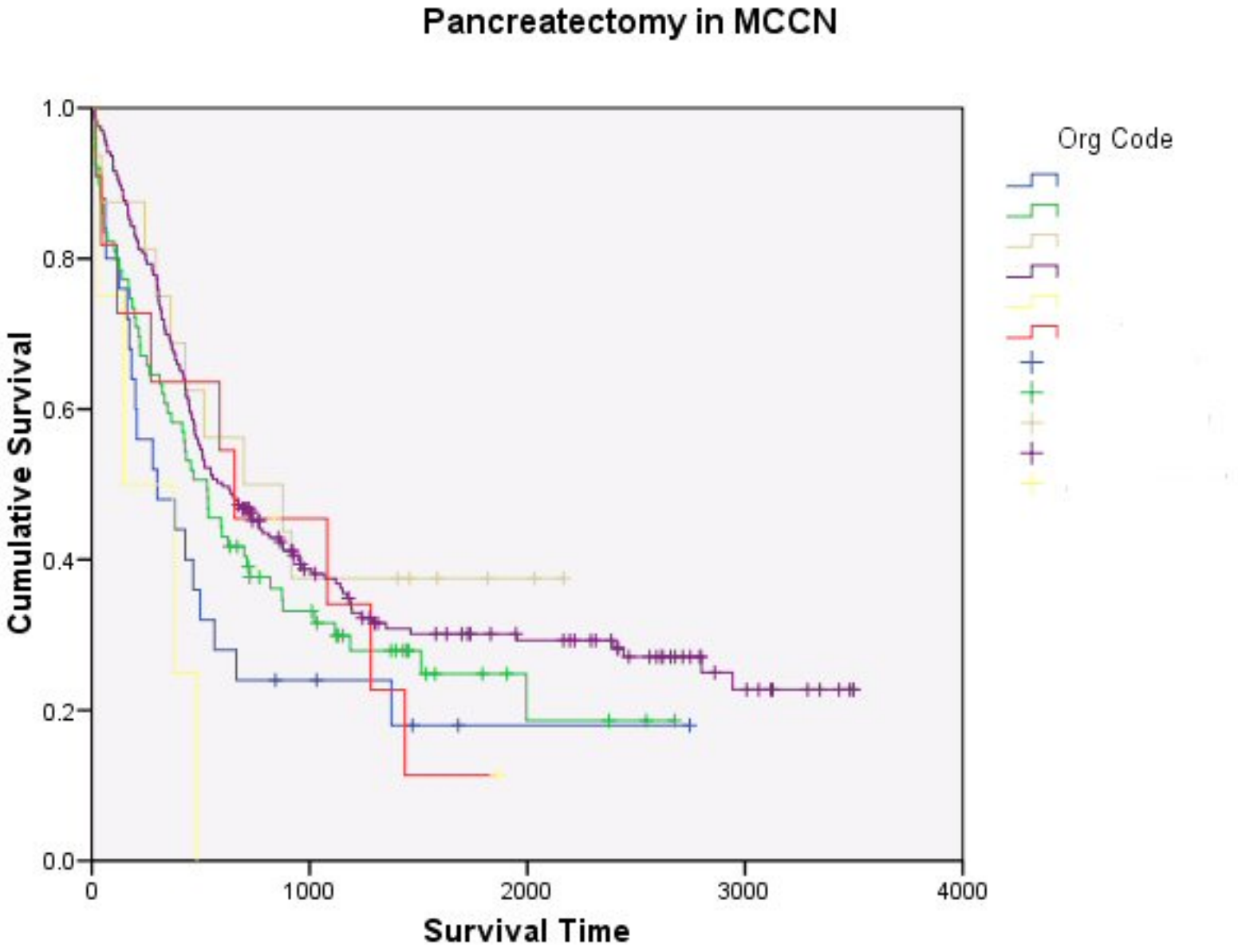


Chart Summary by Year (1) | Summary by Year | Chart Summary by Year (2) | Chart Summary by Year (3) | Summary by Year (2) | 3 Counties | Anglia | Arden | Avon, Somerset & Wiltshire | Central

Ready NUM


Pancreatectomy in MCCN
Cumulative Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
1000
2000
3000
4000
Survival Time
Org Code

Microsoft Excel - IOG HES Cancer 9 UGIT All Procedures PD by Network of Trust PC V4.0 PP

File Edit View Insert Format Tools Chart Window Help

Type a question for help

UGIT Centre? (All) | Diagnostic Group (All) | SHA of Trust (All) | Network of Trus (All) | Trust (All) | Specialty (All) | Admission Metho (All) | Discharge Metho (All) | Procedure Level (All)

Pancreatectomies Per Annum (HES)

HES Cancer Data Extract 9 (1997/087 to 2006/07)

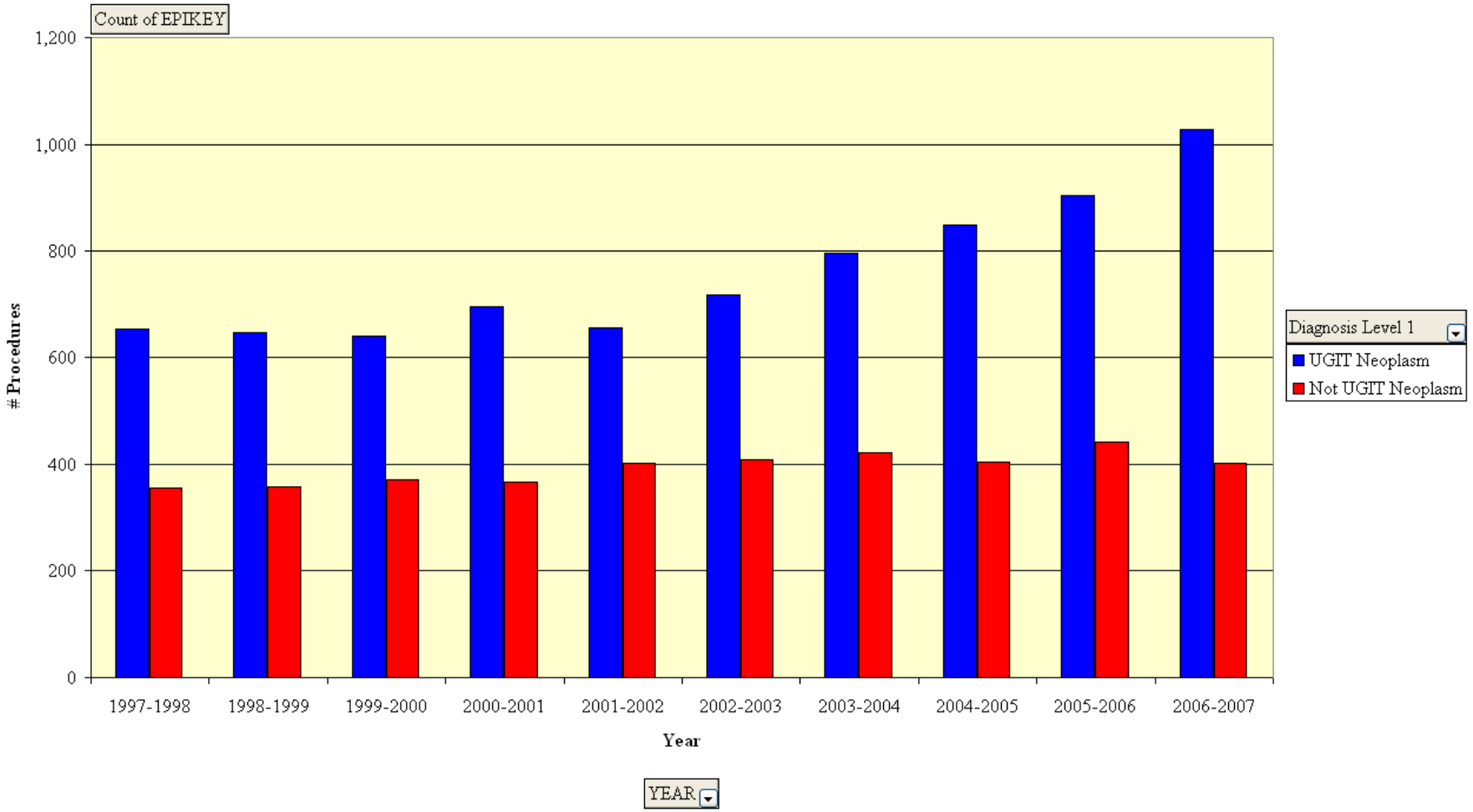


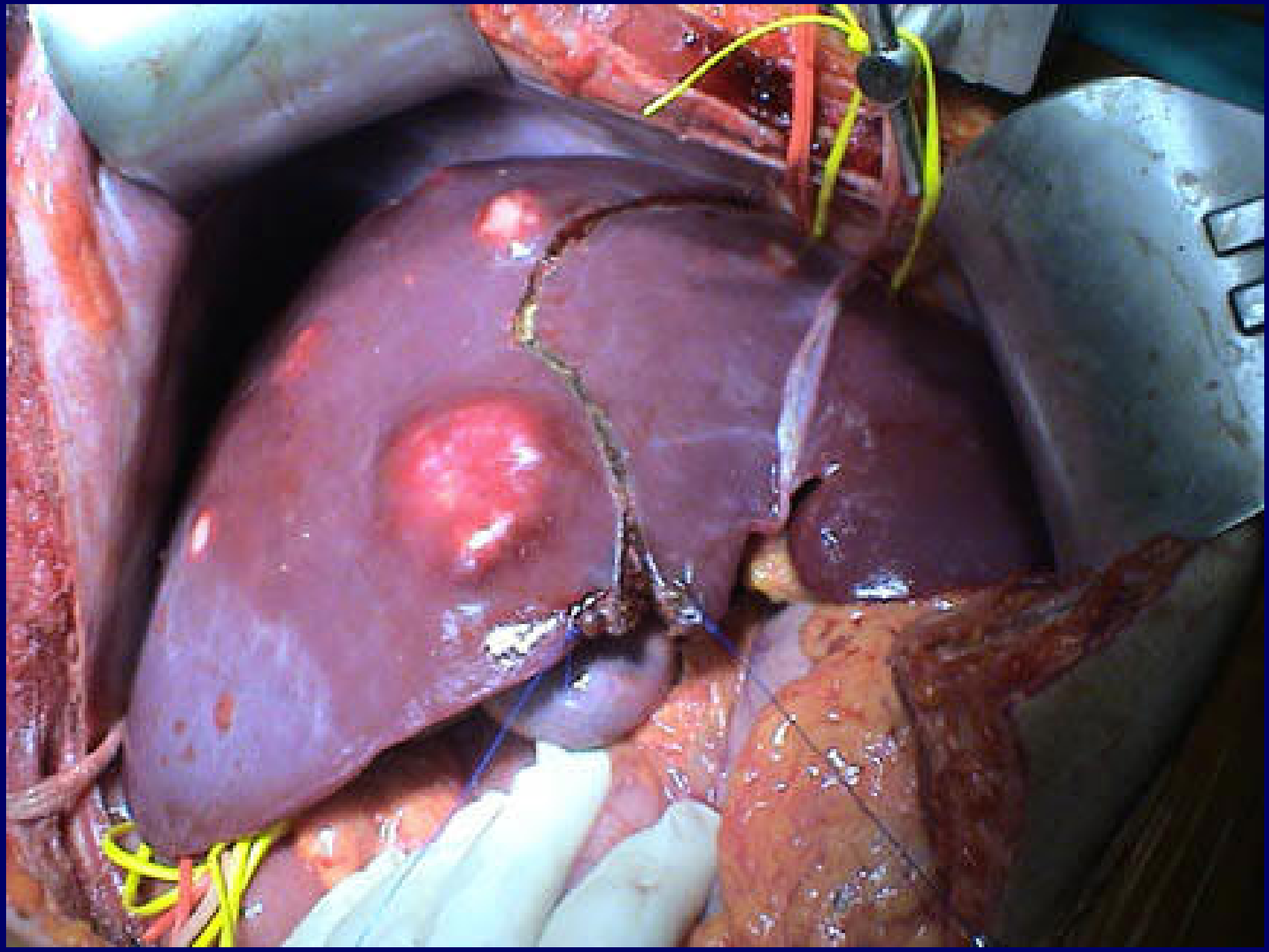
Chart Summary by Year (1) | Summary by Year | Chart Summary by Year (2) | Chart Summary by Year (3) | Summary by Year (2) | 3 Counties | Anglia | Arden | Avon, Somerset & Wiltshire | Central

Ready

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Resection of Liver Metastases

Colorectal Cancer



Microsoft Excel - HES 8 1997-2006 Liver Procedures v2.2 Play

File Edit View Insert Format Tools Chart Window Help

Type a question for help

Hepatectomy & Destruction of Liver Lesions (HES History of LGIT Cancer)

Rates Per 100,000 Population (2004 Mid Year Estimates)

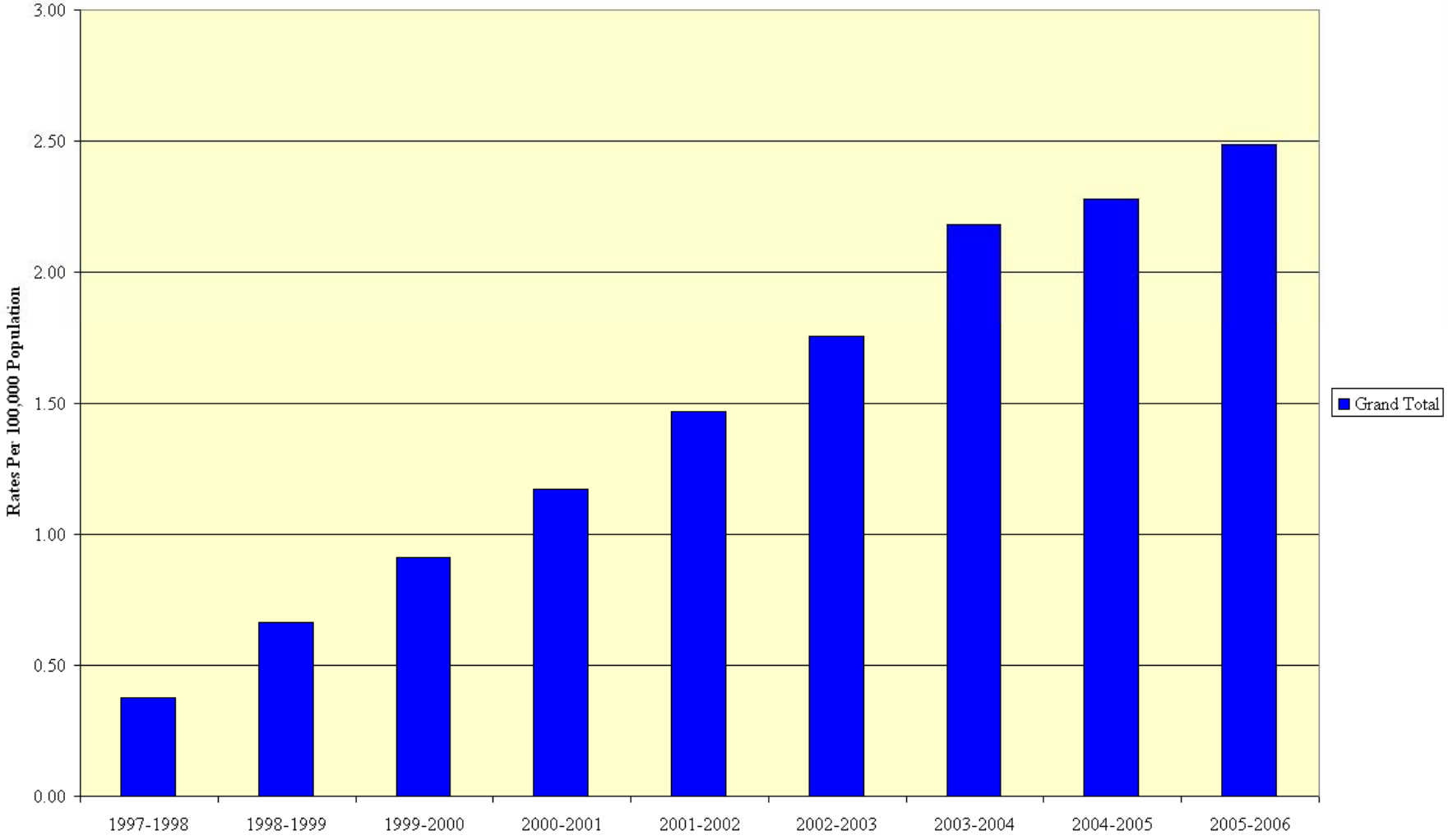
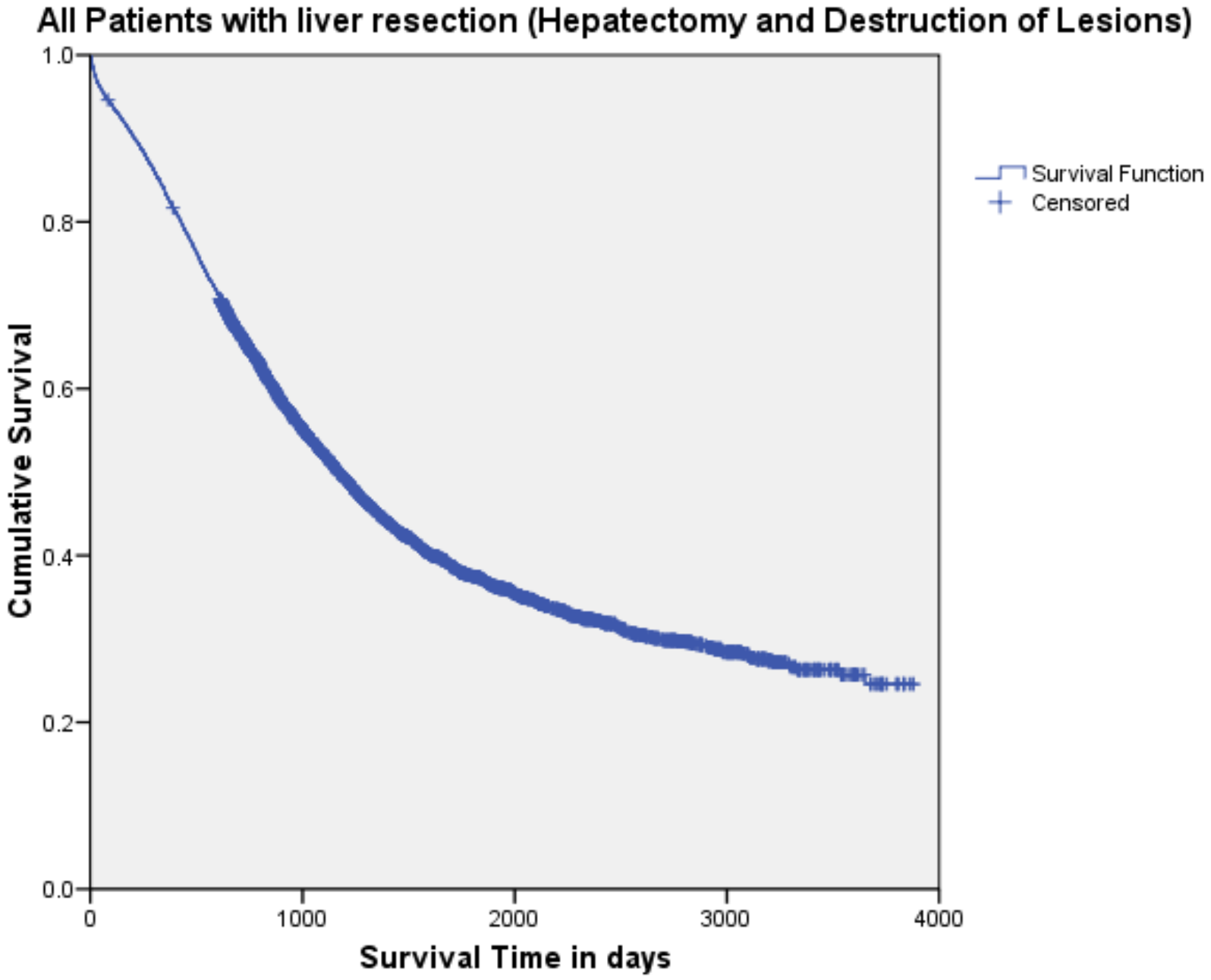


Chart Rates SHA(R) LGIT (2) | Rates Hep & Dest SHA(R) LGIT | Chart Rates SHA(R) LGIT (3) | Rates Hep & Dest SHA(R) LGI (2) | SHA Populations

Ready

NUM


All Patients with liver resection (Hepatectomy and Destruction of Lesions)
Cumulative Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
1000
2000
3000
4000
Survival Time in days
Survival Function
Censored

Liver Resections (LGIT Cancer)

Year of Diagnosis	No liver resection		Liver resection		Total
	n	%	n	%	
1998	19,002	98.2	340	1.8	19,342
1999	19,059	97.7	452	2.3	19,511
2000	18,933	97.6	467	2.4	19,400
2001	18,017	97.3	493	2.7	18,510
2002	17,850	96.9	568	3.1	18,418
2003	18,200	97.5	469	2.5	18,669
Total	**111,061**	**97.6**	**2,789**	**2.4**	**113,850**

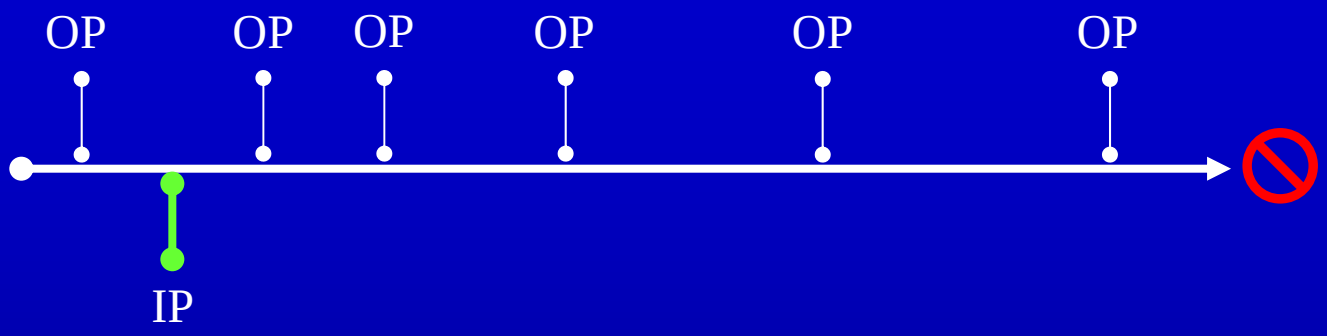
NYCRIS

Patient

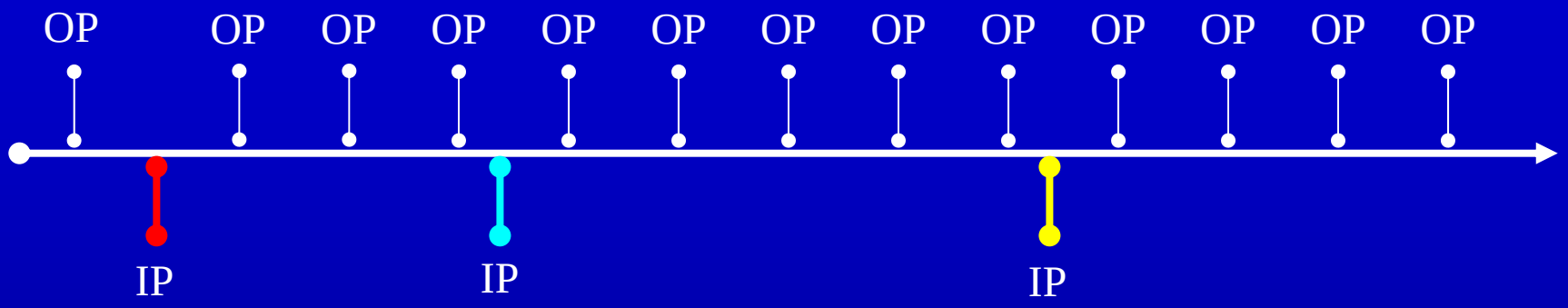
NHS Footprints



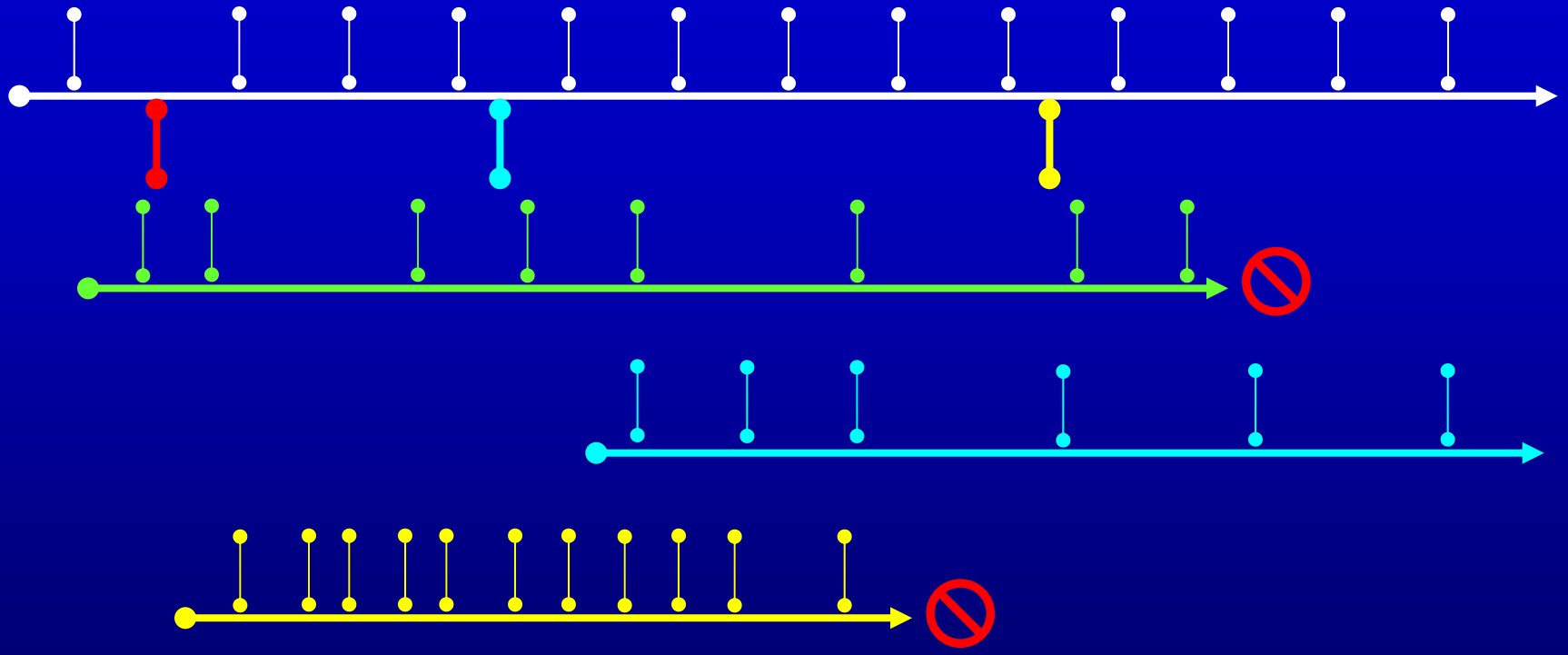
HES Pathway Analysis



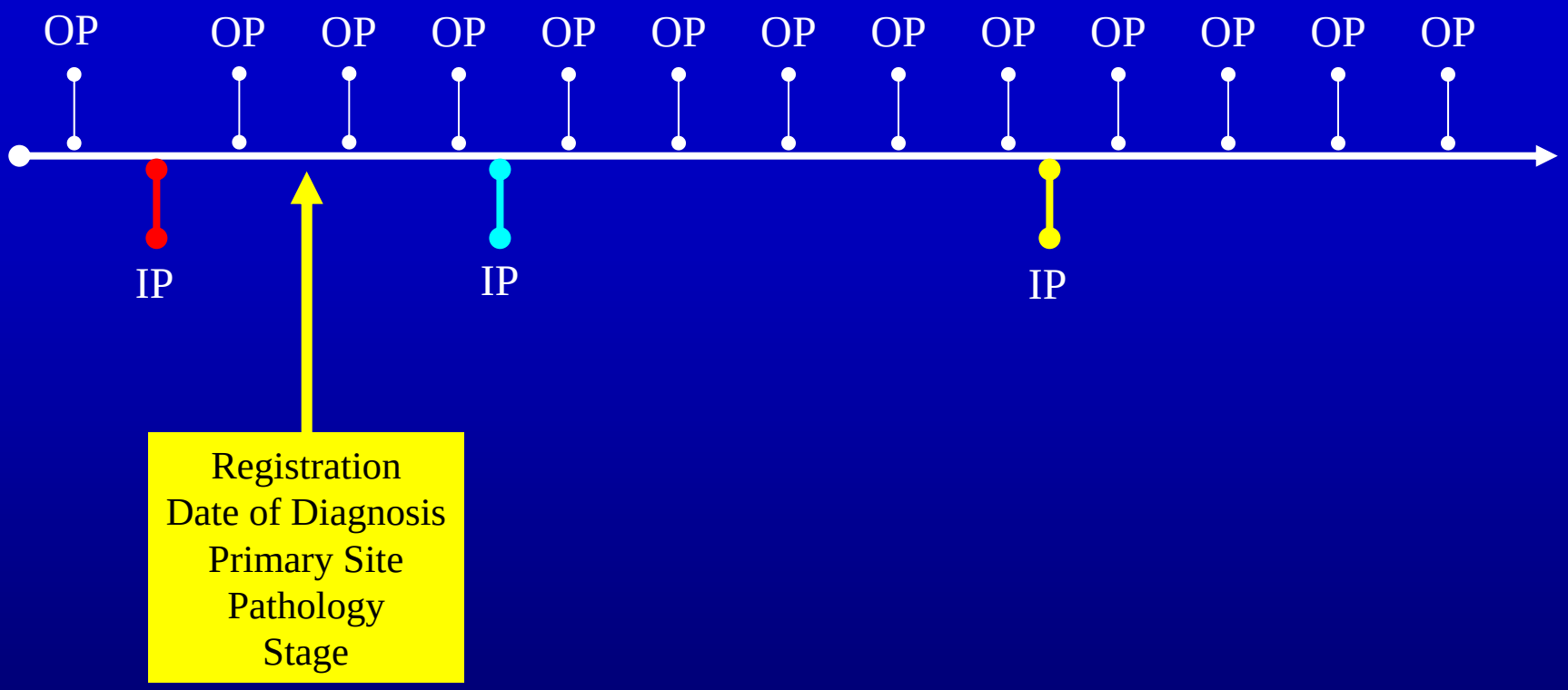
HES Pathway Analysis



HES Pathway Analysis



Data Linkage using NHS#



HES Careers

Patient X

HES ID 2562506

HES ID 2562506

Diagnosis = Acute myeloid leukaemia

HES Events = 225

Date of Diagnosis = 06/11/2003

Alive at 31/01/2007

Count of EPIKEY	YEAR				
Type of Attendance	2003-2004	2004-2005	2005-2006	2006-2007	Grand Total
Day case admission	27	77	41	49	194
Ordinary admission	5	5	8		18
Out Patient	1	9	1	2	13
Grand Total	33	91	50	51	225

HESID	Order	Date	Type of Attendance	Main Specialty	Ca Diag Level 3
2562506	1	06/11/2003	Ordinary admission	Clinical Haematology	Acute myeloid leukaemia
2562506	2	08/12/2003	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	3	12/12/2003	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	4	15/12/2003	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	5	16/12/2003	Ordinary admission	Clinical Haematology	Acute myeloid leukaemia
2562506	6	20/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	7	21/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	8	22/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	9	23/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	10	24/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	11	25/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	12	26/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	13	27/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	14	28/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	15	29/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	16	30/01/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	17	02/02/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	18	05/02/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	19	09/02/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	20	12/02/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	21	16/02/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	22	19/02/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	23	23/02/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	24	24/02/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	25	27/02/2004	Day case admission	Clinical Haematology	Acute myeloid leukaemia

HESID	Order	Date	Type of Attendance	Main Specialty	Ca Diag Level 3
2562506	201	18/10/2006	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	202	25/10/2006	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	203	03/11/2006	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	204	17/11/2006	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	205	20/11/2006	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	206	06/12/2006	Out Patient	Dermatology	Acute myeloid leukaemia
2562506	207	06/12/2006	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	208	13/12/2006	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	209	20/12/2006	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	210	27/12/2006	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	211	03/01/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	212	10/01/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	213	17/01/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	214	18/01/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	215	19/01/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	216	20/01/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	217	22/01/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	218	23/01/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	219	24/01/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	220	31/01/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	221	16/02/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	222	23/02/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	223	02/03/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	224	09/03/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia
2562506	225	16/03/2007	Day case admission	Clinical Haematology	Acute myeloid leukaemia

HES ID 2562506

Diagnosis = Acute myeloid leukaemia

Procedure Level 1	(Multiple Items)
Count of EPIKEY	
Procedure Level 2	Total
Other Blood Transfusion	52
Continuous Infusion of Therapeutic Substance	40
Blood Withdrawal	19
Other Intravenous Injection	8
Diagnostic Puncture of Bone	8
Other Vein Related Operations	3
Grand Total	130


PAUSED
The House of Julii
Early Legionary First Cohort [Heavy Infantry]
(122)
Idle
Eager, Fresh
121 80 81 80 82 81 81 40 81 81
82 32 122 122 80 80 81 81 96 96

Cohort Analysis

Haematological Neplasms

Haematological Cohort

- Registries (NWCIS, NYCRIS, SWCIS)
  - 2,270 Patients
  - Haematological Neoplasm (C000 to D489)
  - Date of Diagnosis 01/10/2003 to 31/12/2003

Haem. Cohort by Diagnosis

Diagnosis Level 2	Total
Non-Hodgkin's	872
Lymphoid Leukaemia	331
Multiple myeloma and malignant plasma cell neoplasms	329
Other Haematology	296
Myeloid Leukaemia	281
Hodgkin's	110
Other Leukaemias	24
Immunoproliferative diseases	15
Multiple ICD10 Codes	9
Monocytic Leukaemia	3
Grand Total	2,270

Microsoft Excel - H9 Haem Cohort Q3 2003-04 Patients V1.0

File Edit View Insert Format Tools Chart Window Help

Type a question for help

DoDiag-DOD(m) (All)

Patient Age Band at Diagnosis

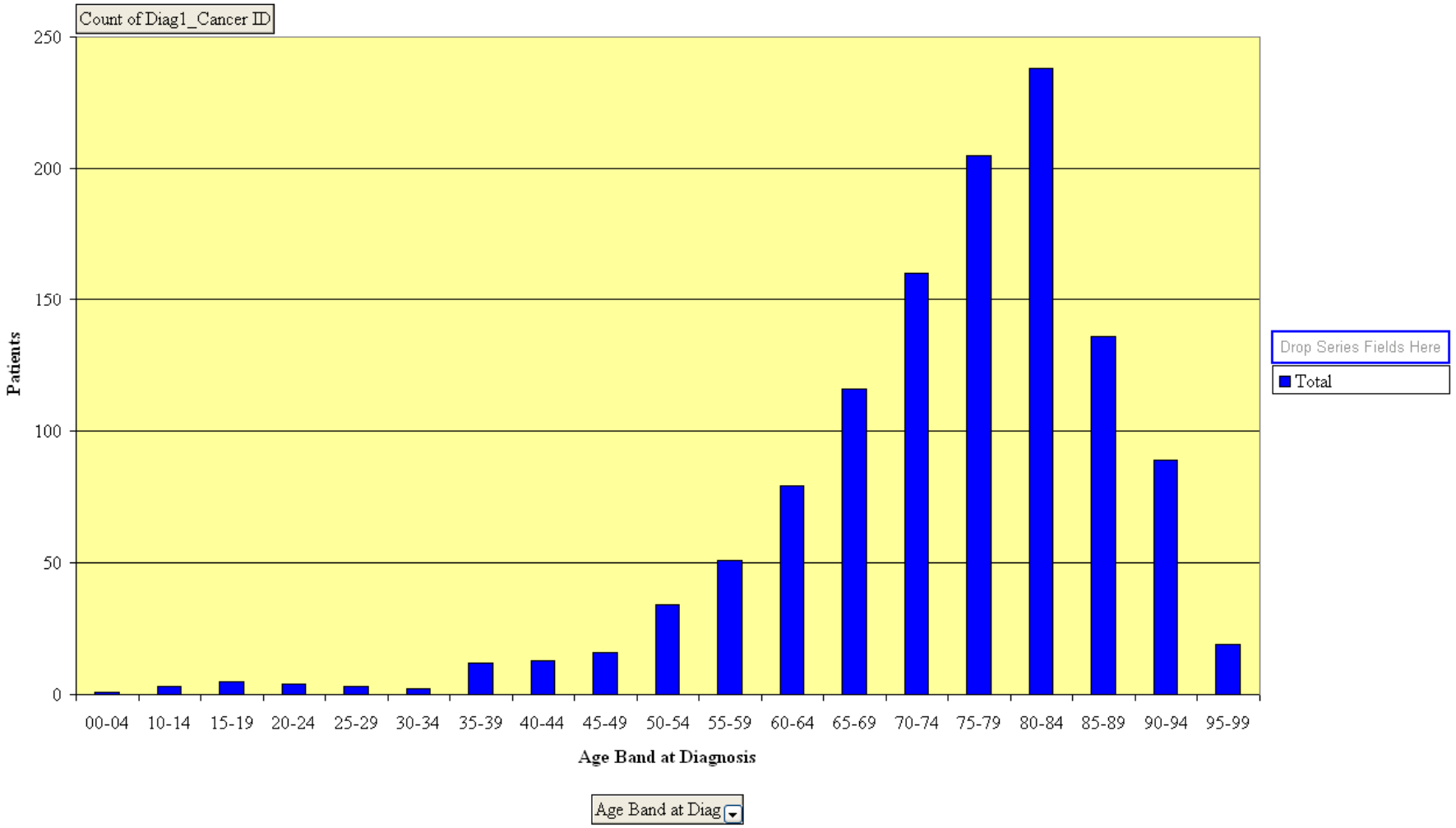


Chart1 Sheet1 Chart1 (4) Sheet1 (6) Sheet1 (2) Sheet1 (5) Chart1 (2) Sheet1 (3) Chart1 (3) Sheet1 (4) Sheet2 Sheet3

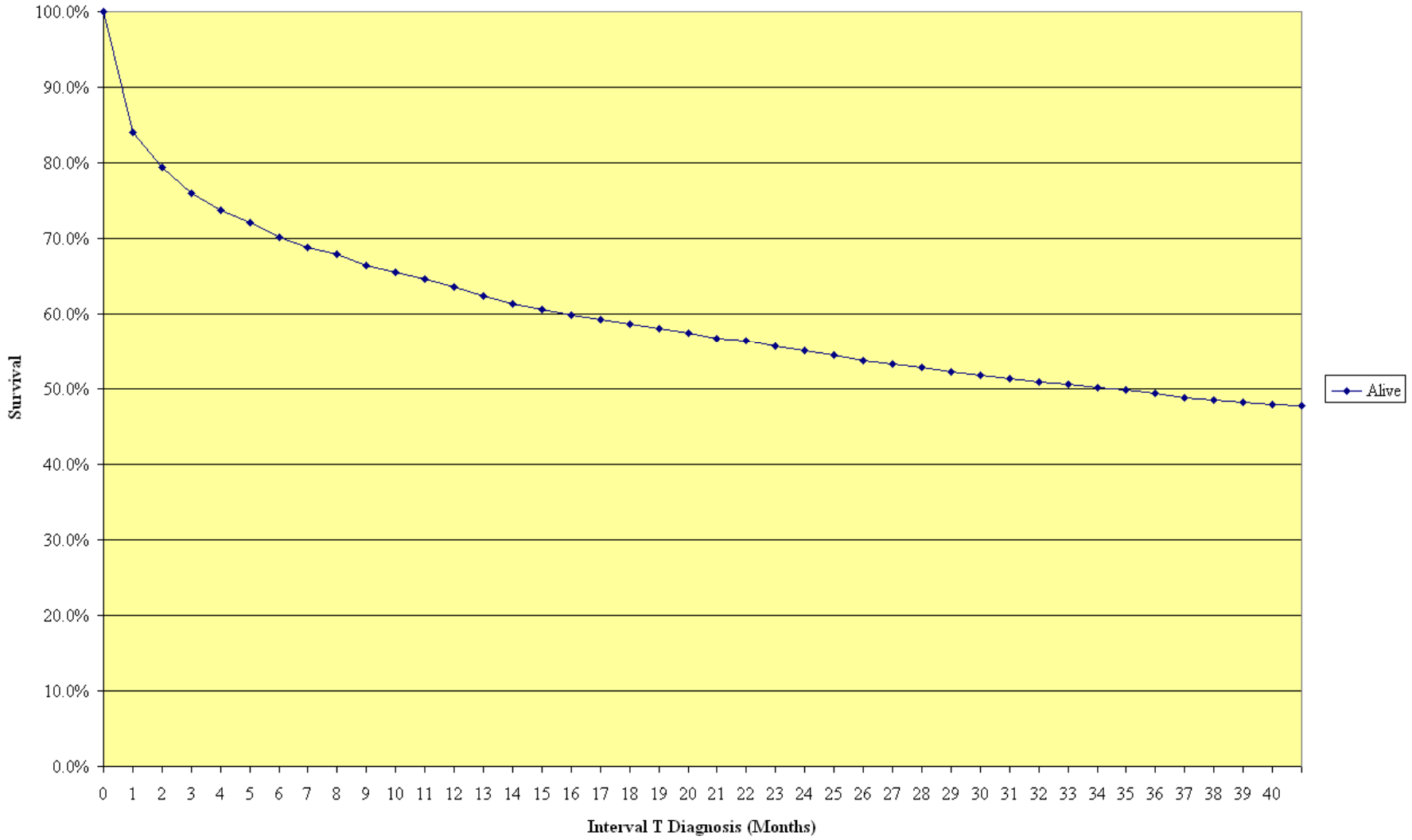
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Microsoft Excel - H9 Haem Cohort Q3 2003-04 Patients V1.0

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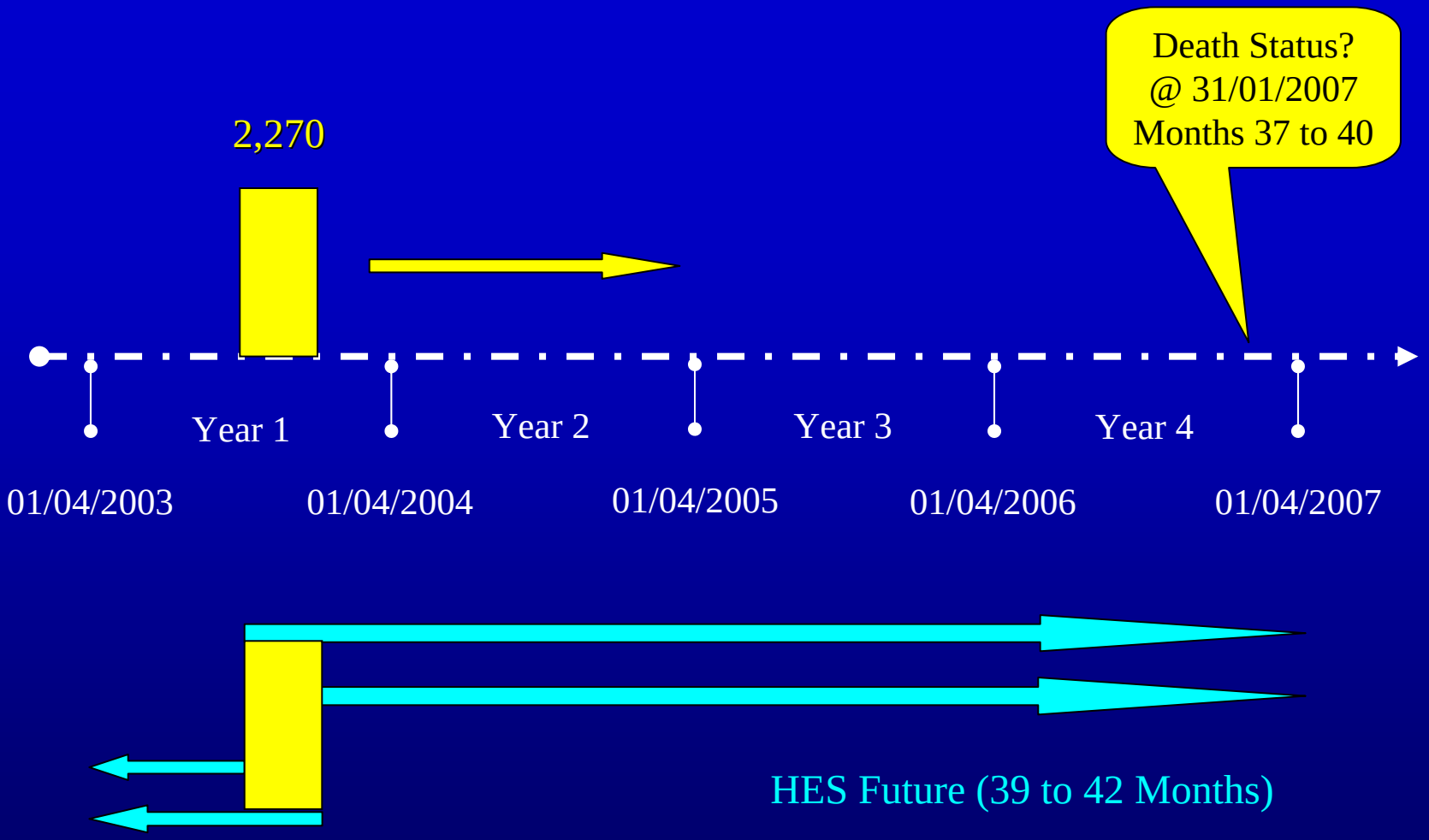
Crude Survival: Haem Cohort



Sheet1 (5) / Chart1 (2) / Sheet1 (3) / Chart1 (3) / Chart2 / Sheet1 (4) / Chart2 (2) / Sheet1 (7) / Chart2 (3) / Sheet1 (8) / Sheet2 / Sheet3

Ready NUM

Haematological Cohort



Haematological Cohort

Death Status?
@ 31/01/2007
Months 37 to 40

2,270

Year 1 | Year 2 | Year 3 | Year 4

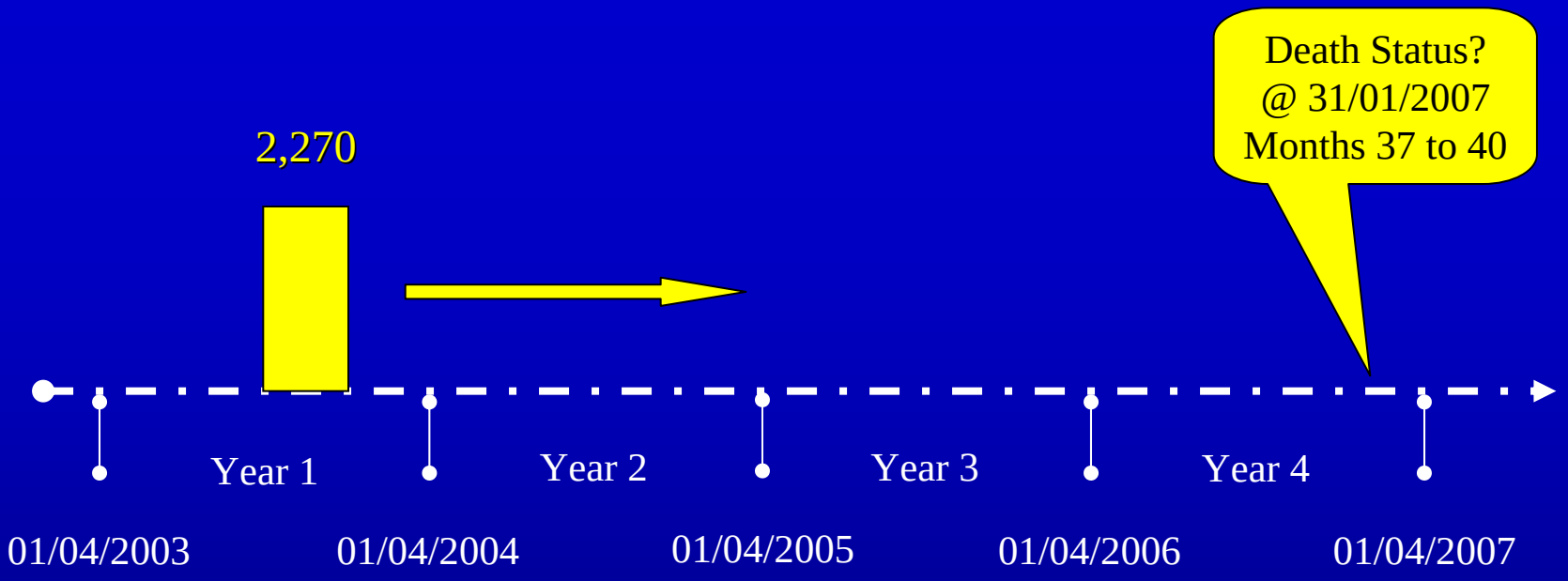
01/04/2003 | 01/04/2004 | 01/04/2005 | 01/04/2006 | 01/04/2007



HES Future (39 to 42 Months)

HES Past (6 to 9 Months)

Haematological Cohort





HES Future (39 to 42 Months)



HES Past (6 to 9 Months)

Interval T Diagnosis

(Date of Diagnosis – Date of HES Event)

Microsoft Excel - H9 Haem Cohort Q3 2003-04 Episodes Pivot V1.0

File Edit View Insert Format Tools Chart Window Help

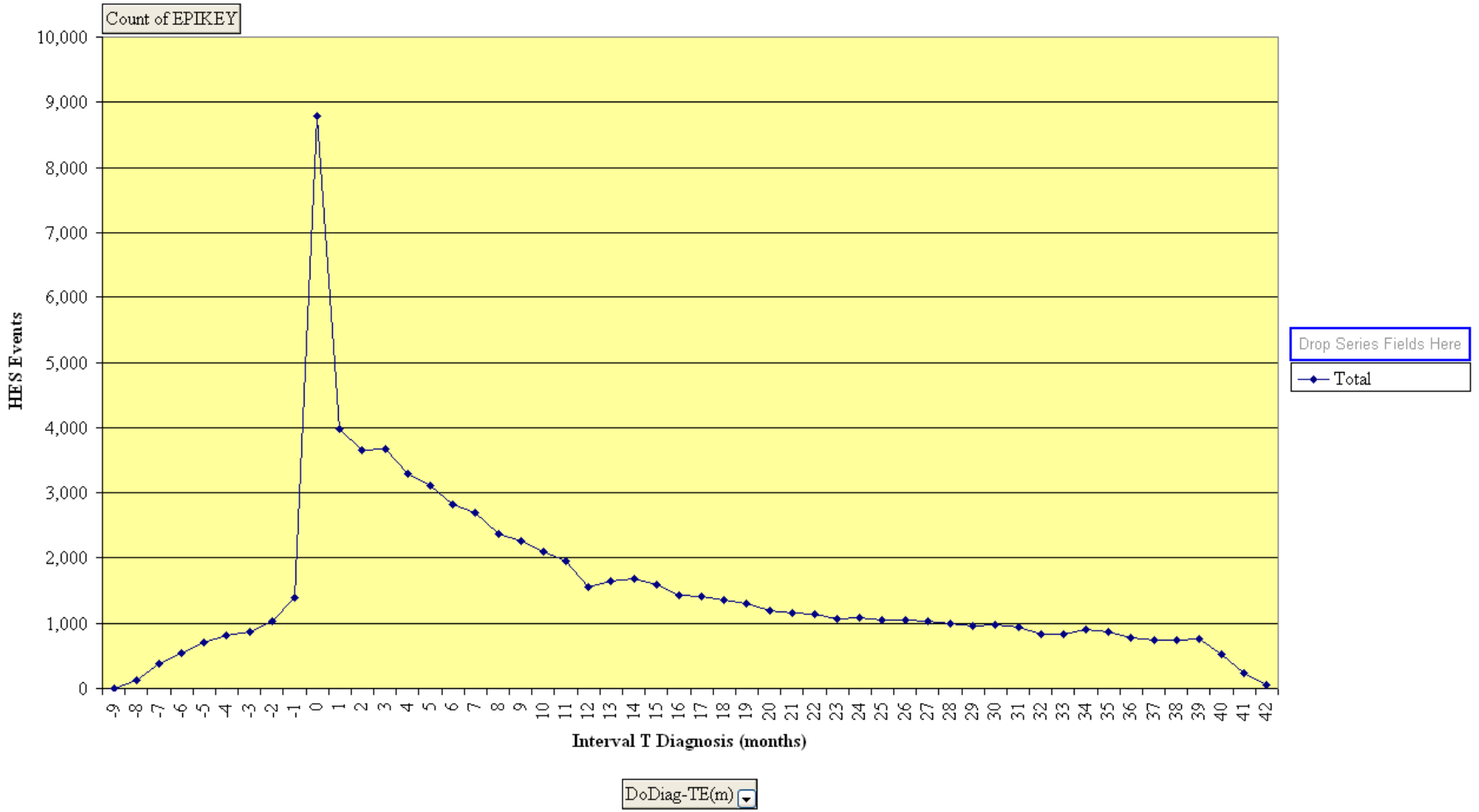
Type a question for help

Type of Attendance (All) Main Specialty (All)

All Specialties

HES Activity Before and After Registry Data of Diagnosis (Haem Cohort)

2,270 Patients 78,435 HES Events



DoDiag-TE(m)

Sheet1 Sheet1 (2) Sheet1 (3) Sheet1 (20) Chart1 Sheet1 (4) Chart1 (13) Sheet1 (18) Chart1 (14) Sheet1 (19) Chart1 (2) Sheet1 (5) Chart1 (3) Sheet1 (6) Chart1 (4) Sheet1

Ready NUM

Microsoft Excel - H9 Haem Cohort Q3 2003-04 Episodes Pivot V1.0

File Edit View Insert Format Tools Chart Window Help

Type a question for help

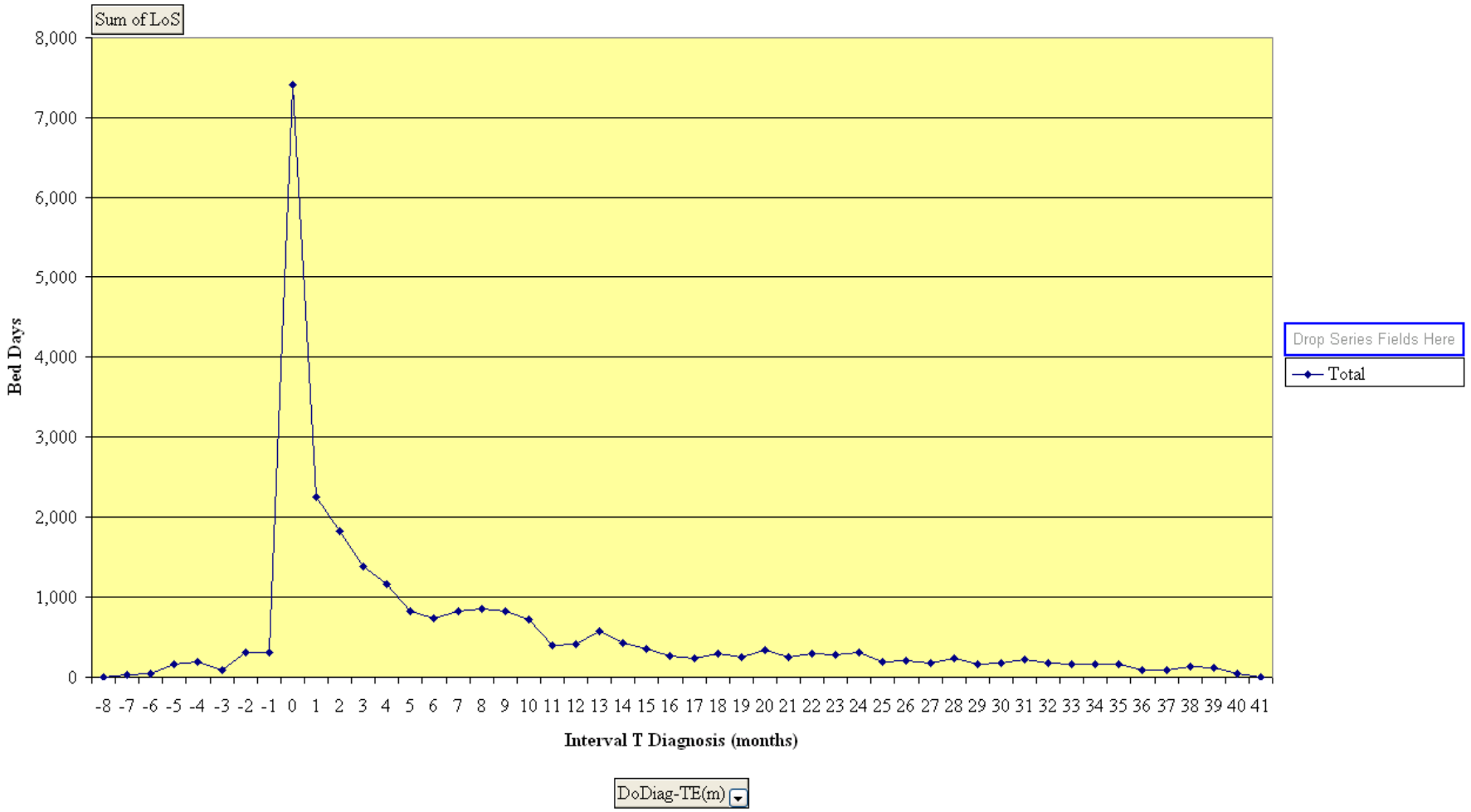
Main Specialty | Clinical Haematology | Type of Attendance | Ordinary admission

Clinical Haematology

Bed Days

HES Activity Before and After Registry Data of Diagnosis (Haem Cohc

2,270 Patients 78,435 HES Events



Sheet1 (20) Chart1 Sheet1 (4) Chart1 (15) Sheet1 (21) Chart1 (16) Sheet1 (22) Chart1 (17) Sheet1 (23) Chart1 (13) Sheet1 (18) Chart1 (14) Sheet1 (19) Chart1 (2) Sheet1 (5

Ready NUM

Interval T Death

(Date of Death – Date of HES Event)

Microsoft Excel - H9 Haem Cohort Q3 2003-04 Episodes Pivot V1.0

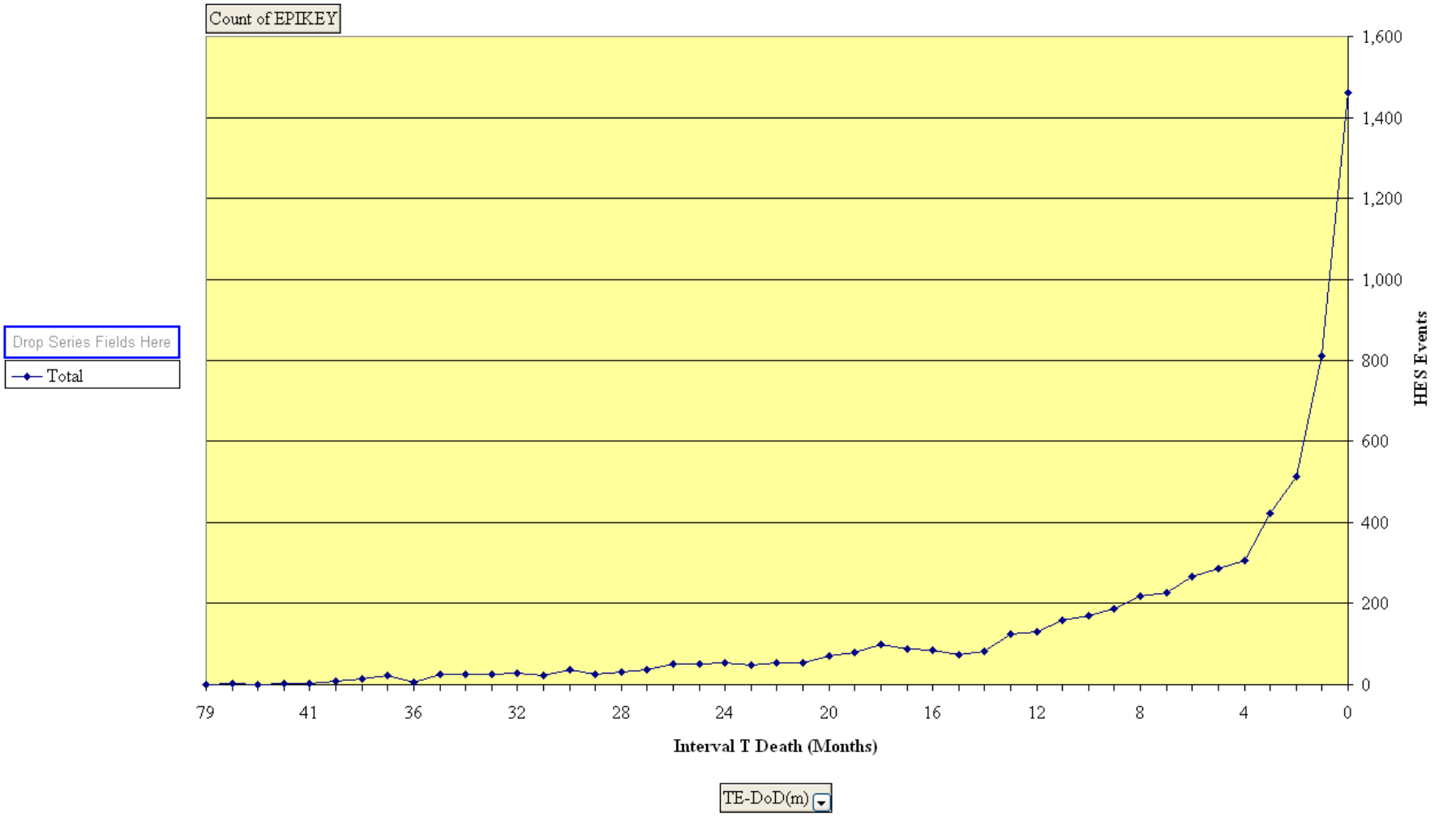
File Edit View Insert Format Tools Chart Window Help

Type a question for help

Type of Attendance | Ordinary admission | Death Status | Dead | Main Specialty | (All)

IP Episodes

Interval Between HES Events and Date of Death



Sheet1 (5) | Chart1 (3) | Sheet1 (6) | Chart1 (21) | Sheet1 (27) | Chart1 (5) | Sheet1 (8) | Chart1 (4) | Sheet1 (7) | Chart1 (6) | Sheet1 (9) | Chart1 (19) | Sheet1 (25) | Chart1 (18) | Sheet1 (24)

Ready NUM

Haem. Cohort HES Footprint

	#	Avg		Year 1	Year 2	Year 3	Year 4
# Patients	2,270						
# Events	78,445	34.6		27,874	24,770	15,683	10,118
#Events (Key Specs.)	54,361	23.9		17,502	19,238	11,184	6,437
# HES OP Events	33,882	14.9		9,718	12,020	7,670	4,474
# HES DC Events	12,862	5.7		4,562	4,590	2,308	1,402
# HES IP Events	5,248	2.3		2,317	1,781	825	325
# HES RDA Events	2,369	1.0		905	847	381	236
Total HES Events	**54,361**	**23.9**		**17,502**	**19,238**	**11,184**	**6,437**
HES Bed Days (CH)	27,105	11.9		13,692	8,190	3,363	1,860
HES Bed Days (H)	3,585	1.6		2,088	1,133	258	106
HES Bed Days (Paed)	3,257	1.4		1,364	1,353	425	115
HES Bed Days (CO)	2,310	1.0		1,349	637	238	86
HES Bed Days (MO)	1,531	0.7		642	531	179	179
Total HES Bed Days	**37,788**	**16.6**		**19,135**	**11,844**	**4,463**	**2,346**

Haem. Cohort HES Footprint

	#	Avg		Year 1	Year 2	Year 3	Year 4
# Patients	2,270						
# Events	78,445	34.6		27,874	24,770	15,683	10,118
#Events (Key Specs.)	54,361	23.9		17,502	19,238	11,184	6,437
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Total HES Events	**54,361**	**23.9**		**17,502**	**19,238**	**11,184**	**6,437**
HES Bed Days (CH)	27,105	11.9		13,692	8,190	3,363	1,860
HES Bed Days (H)	3,585	1.6		2,088	1,133	258	106
HES Bed Days (Paed)	3,257	1.4		1,364	1,353	425	115
HES Bed Days (CO)	2,310	1.0		1,349	637	238	86
HES Bed Days (MO)	1,531	0.7		642	531	179	179
Total HES Bed Days	**37,788**	**16.6**		**19,135**	**11,844**	**4,463**	**2,346**

Haem. Cohort HES Footprint

	#	Avg		Year 1	Year 2	Year 3	Year 4
# Patients	2,270						
# Events	78,445	34.6		27,874	24,770	15,683	10,118
#Events (Key Specs.)	54,361	23.9		17,502	19,238	11,184	6,437
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NHS Footprints

Significance?

Implications?



NHS Patient Footprints

- Commissioning
- Clinical Trials?
- Laboratory Research….Prognostic Factors?

Radiotherapy

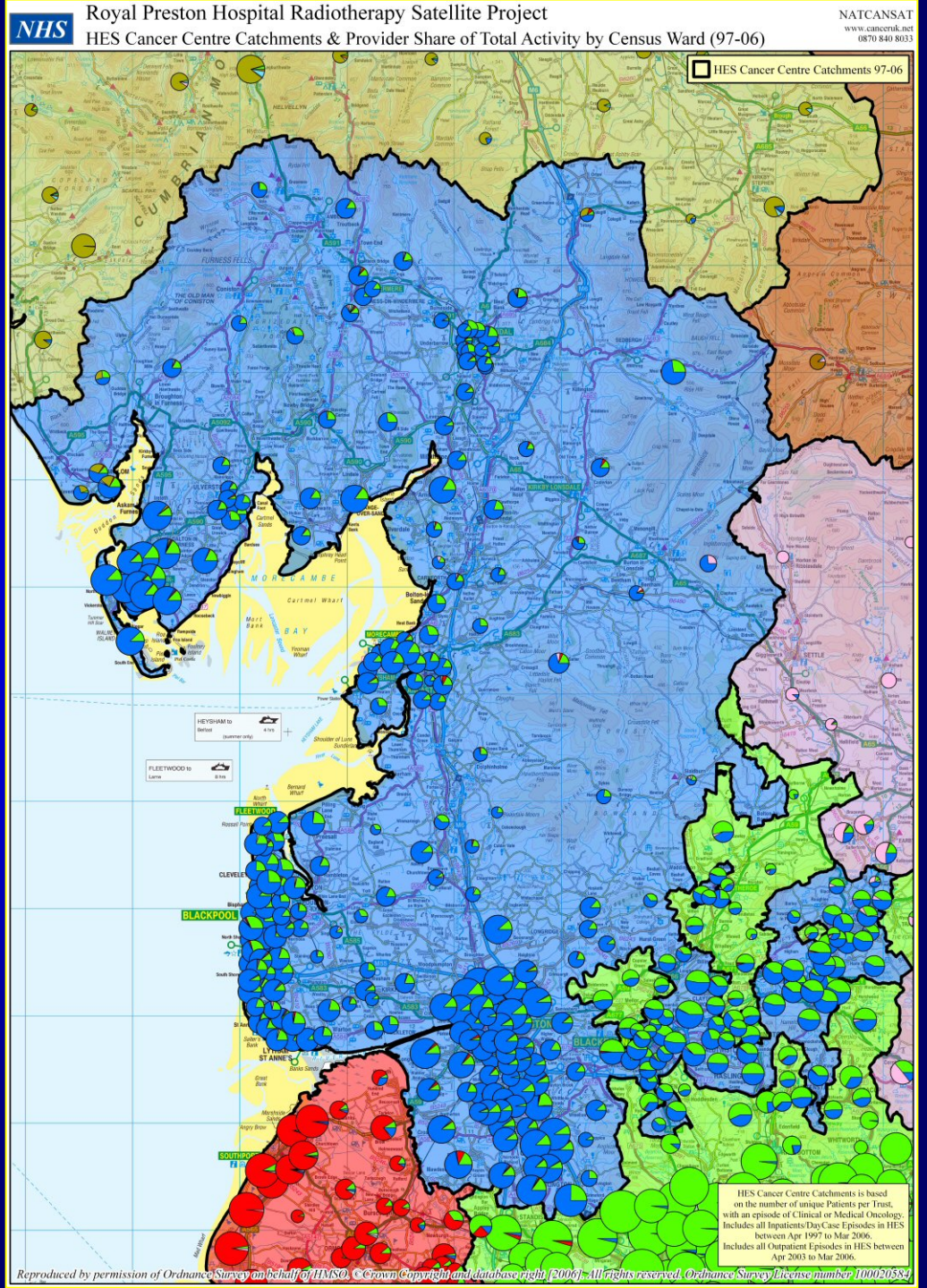
% of Cancer Patients Undergoing RT?

HES

Market Share By RT Centre

Unique Patients

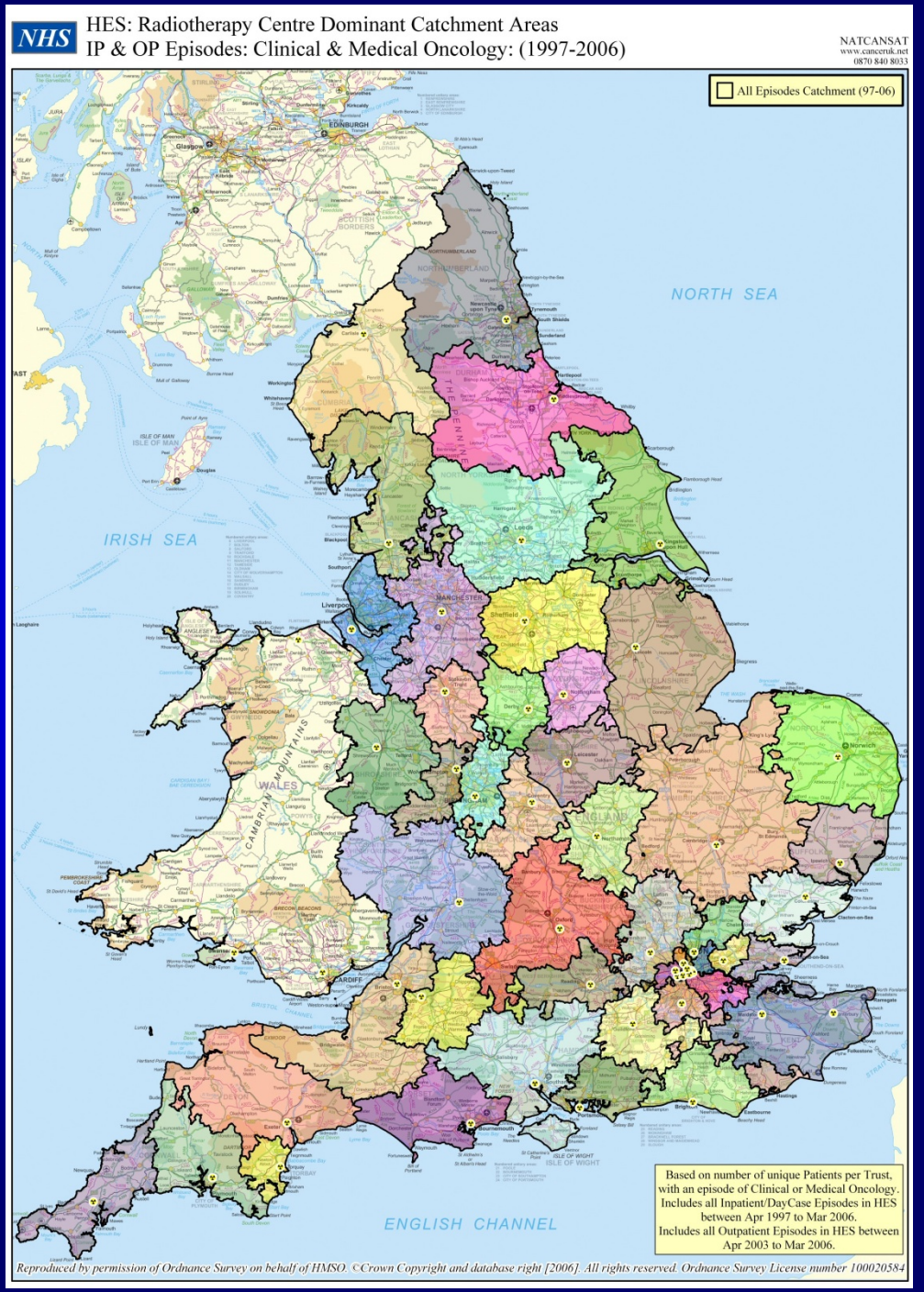
Med or Clinical Oncology



HES

RT Centres

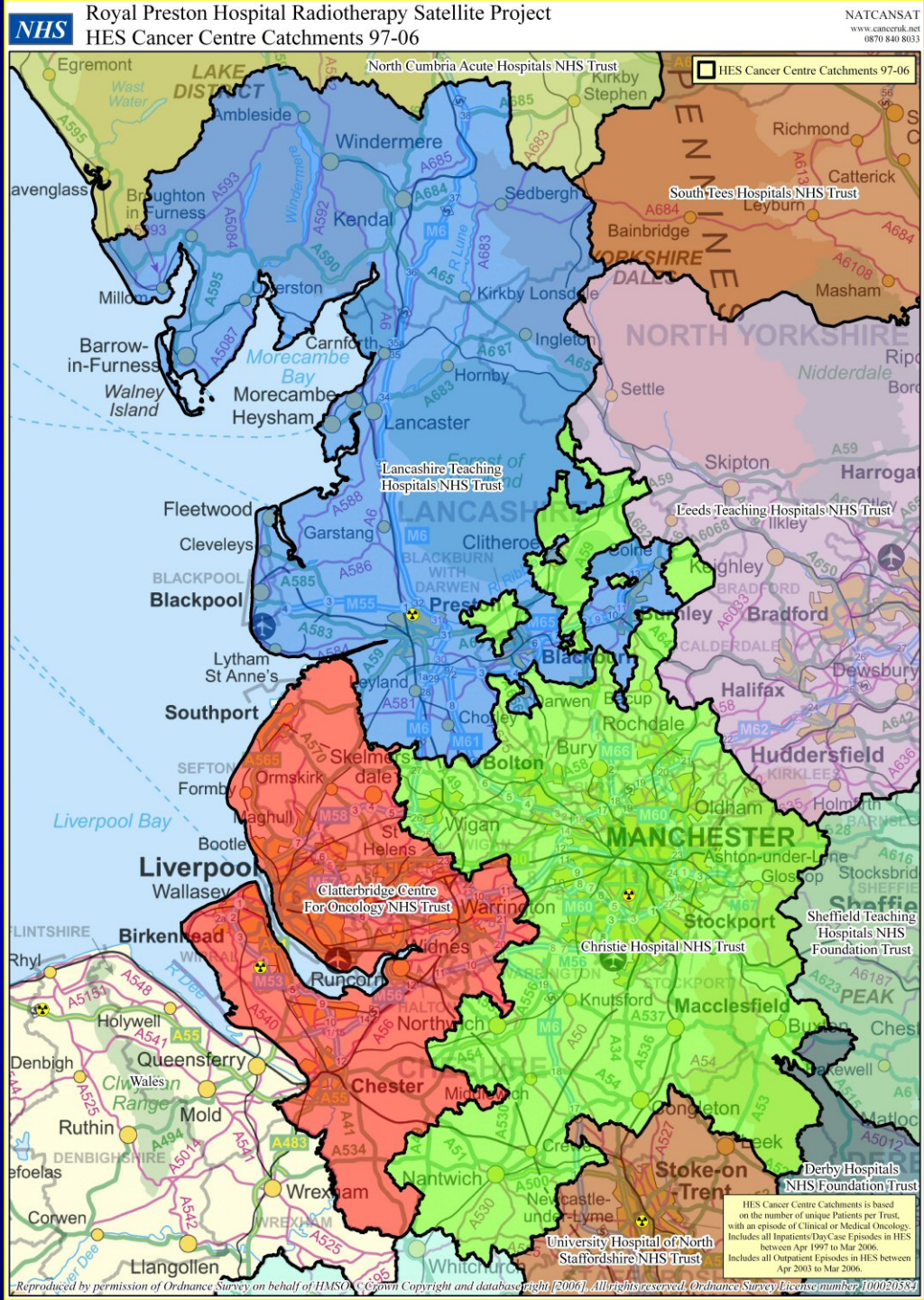
Dominant Catchment Areas



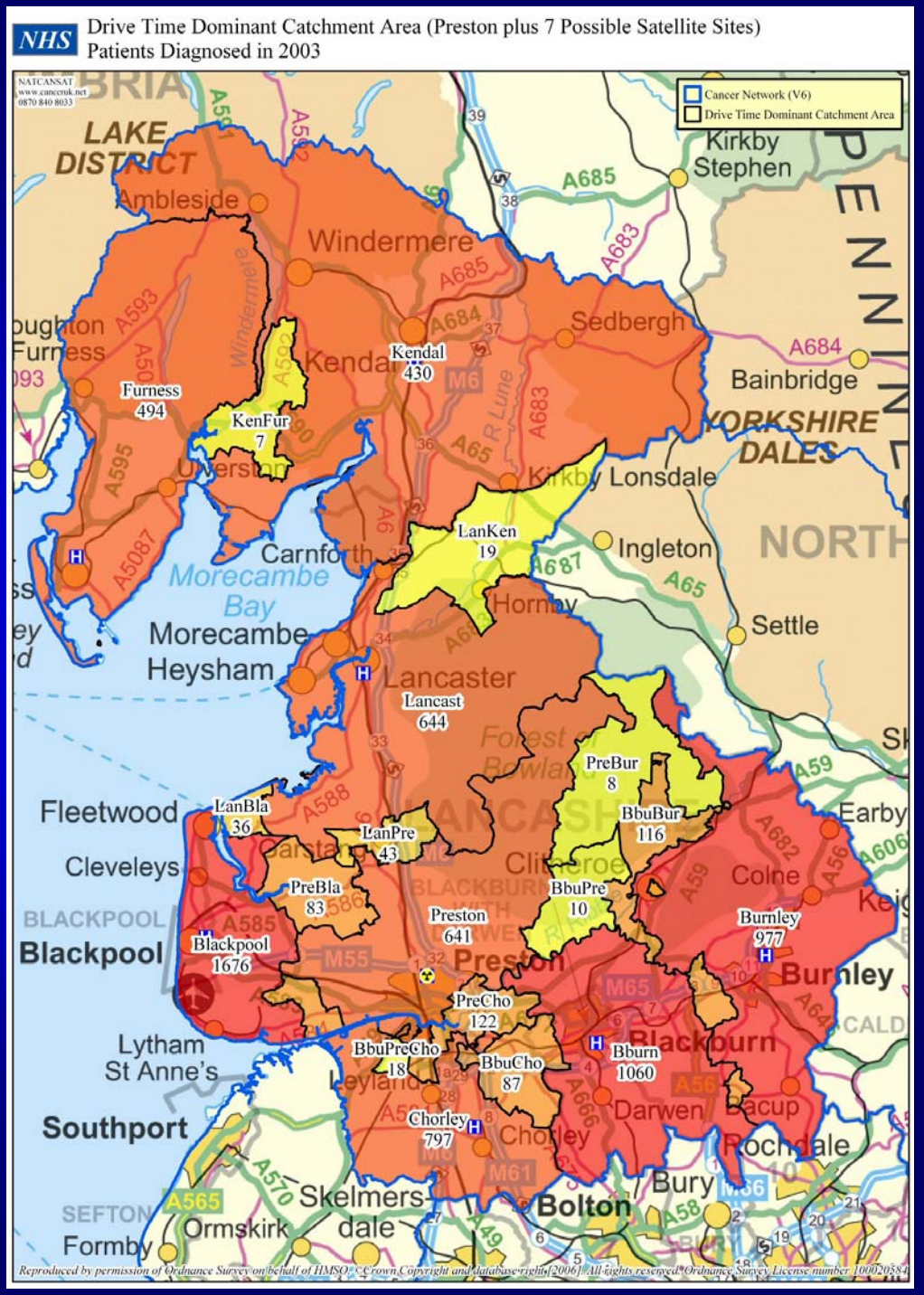
HES

RT Centres (NW SHA)

Dominant Catchment Areas



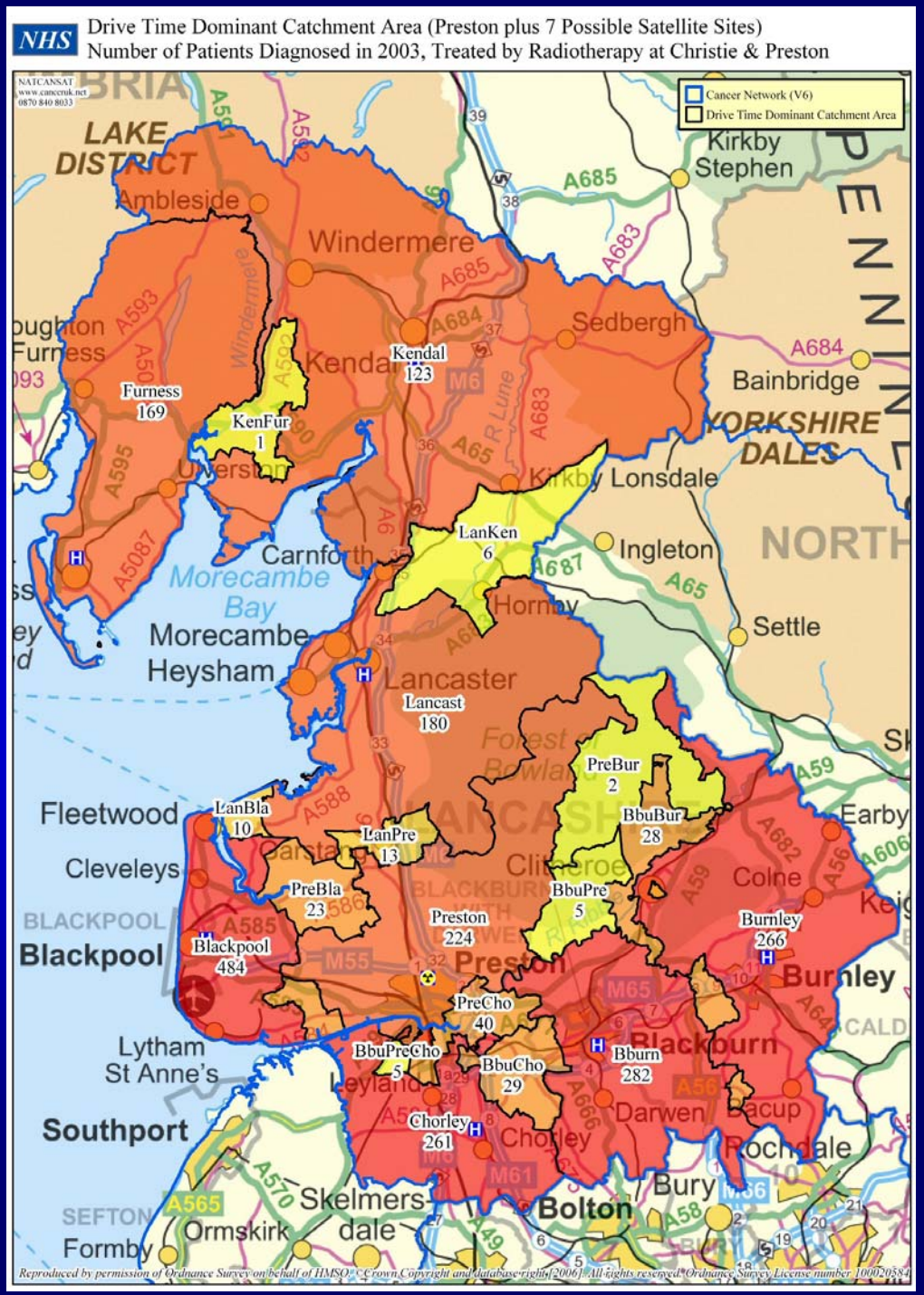
Cancer Registrations 2003



Cancer Registrations 2003

Patients

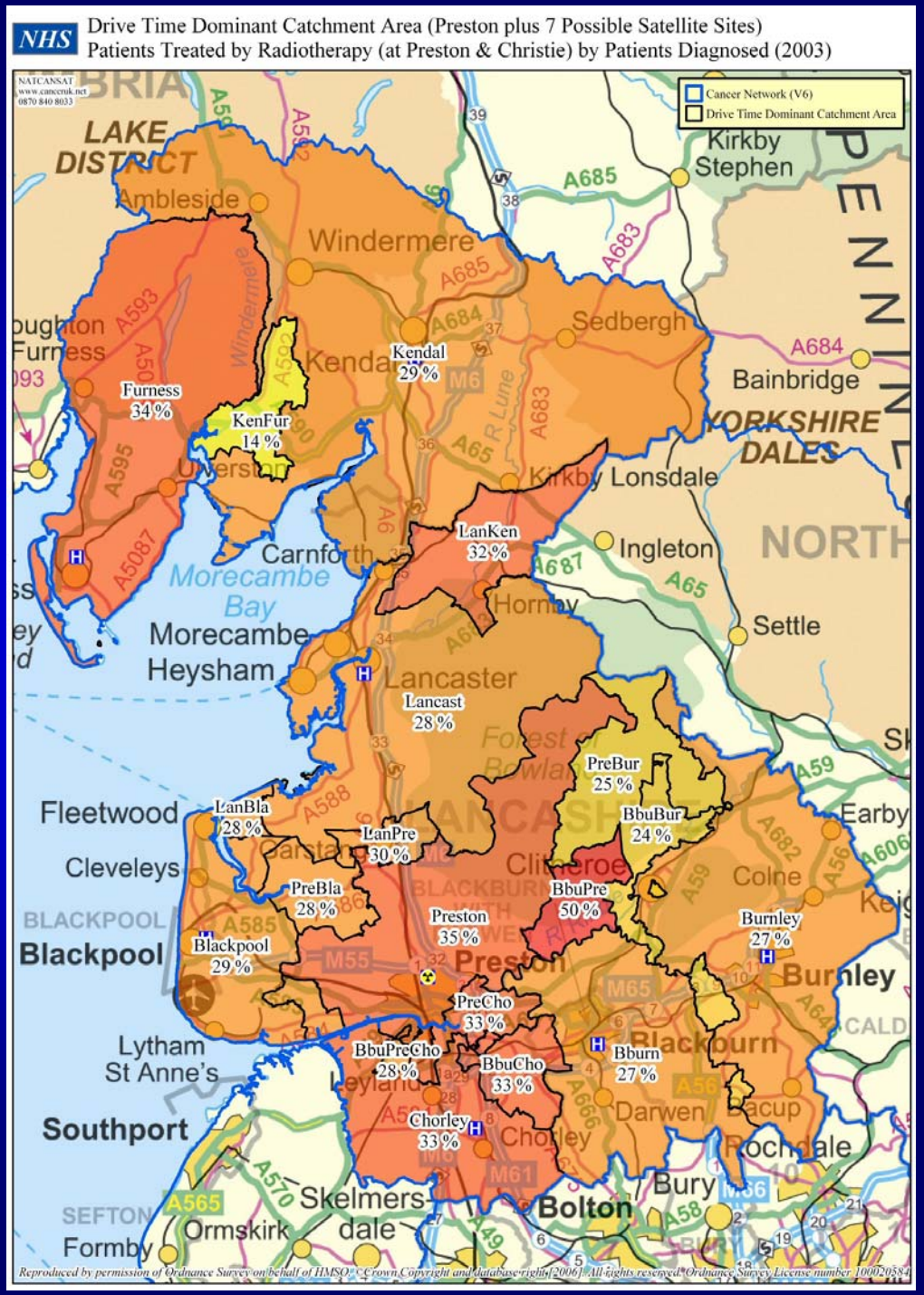
RT at Preston or Christie



Cancer Registrations 2003

% Registrations

RT at Preston or Christie

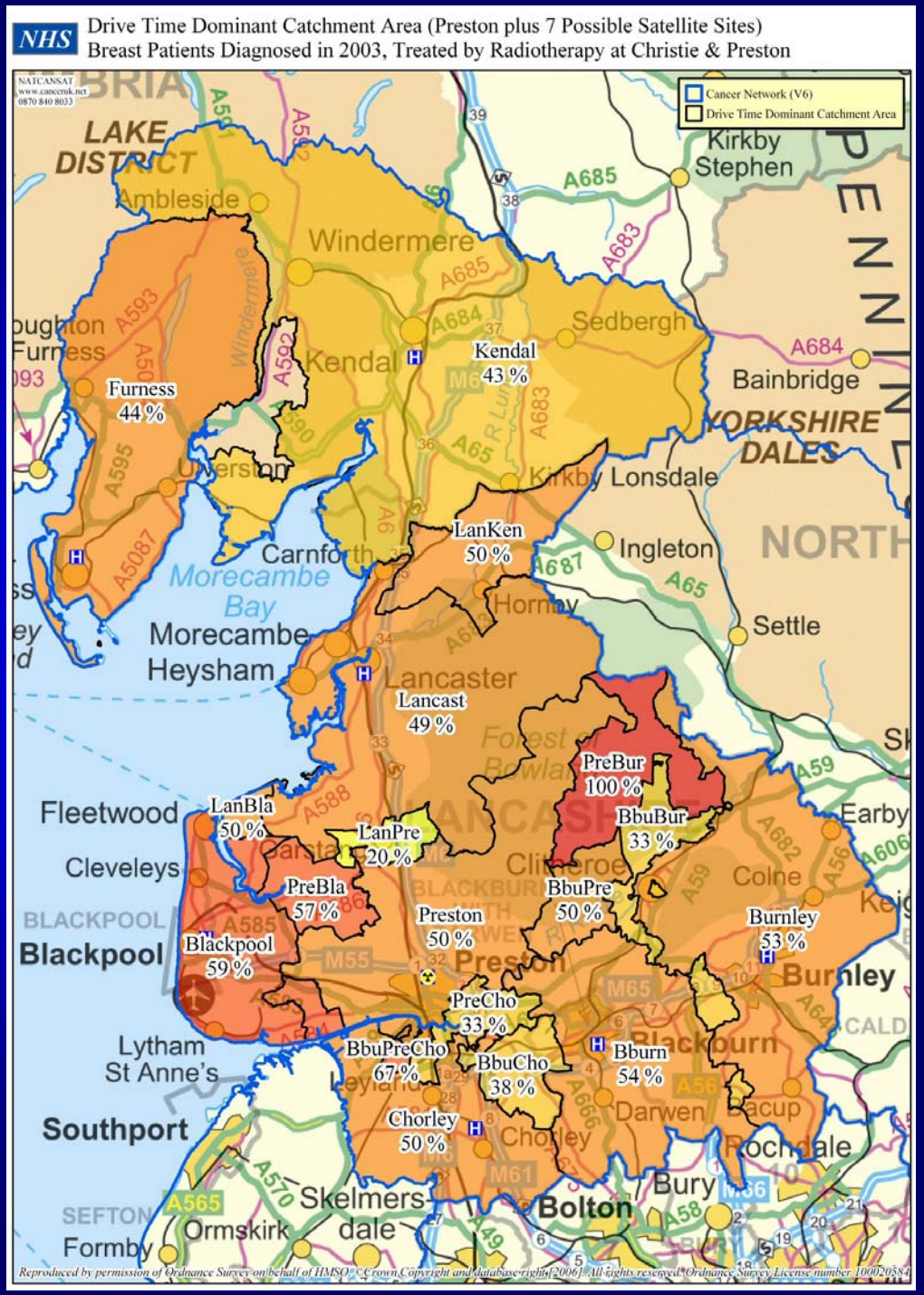


Cancer Registrations 2003

% Registrations

RT at Preston or Christie

Breast

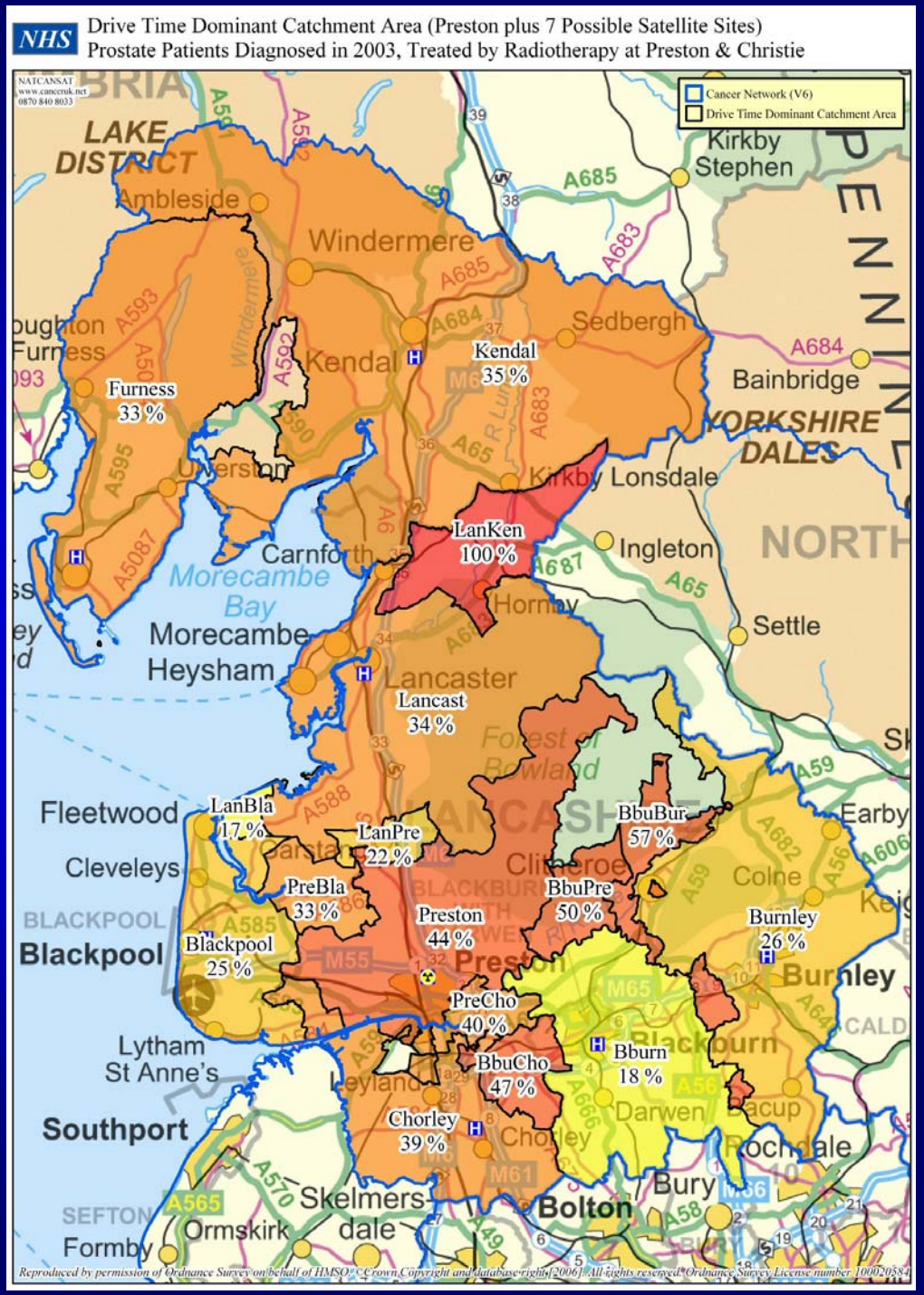


Cancer Registrations 2003

% Registrations

RT at Preston or Christie

Prostate

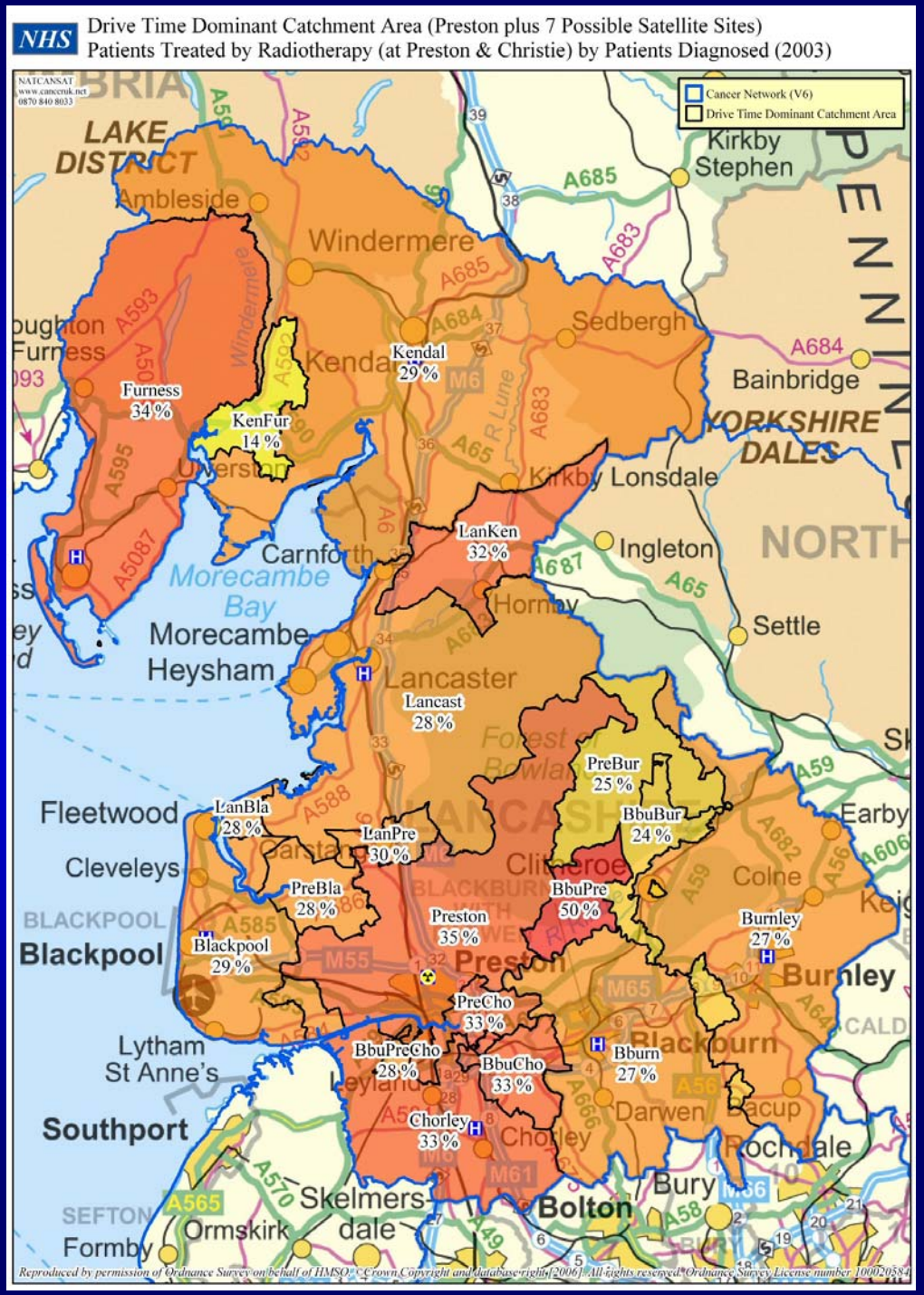


Significance?

% Patient undergoing RT?

Australia 52%

England 30-35%?



Conclusions

NHS Number



Conclusions

- Data Linkage is Synergistic
  - Cancer Registry Data
  - HES
  - ONS
  - Radiotherapy
  - Chemotherapy
  - MDTs
  - Clinical Trials?
  - Laboratory Research?

National Cancer Data Laboratory



b.cottier@btinternet.com