The First Annual Report of the National Cancer Patient Registry-Colorectal Cancer 2007-2008

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- The registry coordinating centre team and technical support team, for their continuous commitment and contribution. Special appreciation goes to Ms Lorna Tang, Ms Nor Hafiza Johari and Mr Mohd Rethwan Omar for their assistance in preparing this report.

About NCPR-Colorectal Cancer in Malaysia

Introduction

The National Cancer Patient Registry-Colorectal Cancer (NCPR-CC) is a multi-centre, multi-disciplinary project involving several hospitals throughout Malaysia. The registry began recruitment in October 2007, and includes all histologically confirmed primary colorectal cancer cases. The cases are identified by gastroenterologists, colorectal surgeons, pathologists and oncologists.

The NCPR-CC is funded by a MOH grant disbursed through the Clinical Research Centre (CRC) MOH and its registry coordinating centre/office is based in CRC Hospital Sultanah Bahiyah, Alor Star, Kedah.

Rationale

At present, the National Cancer Registry only collects data on the prevalence and incidence of colorectal cancer by age, sex and ethnicity.

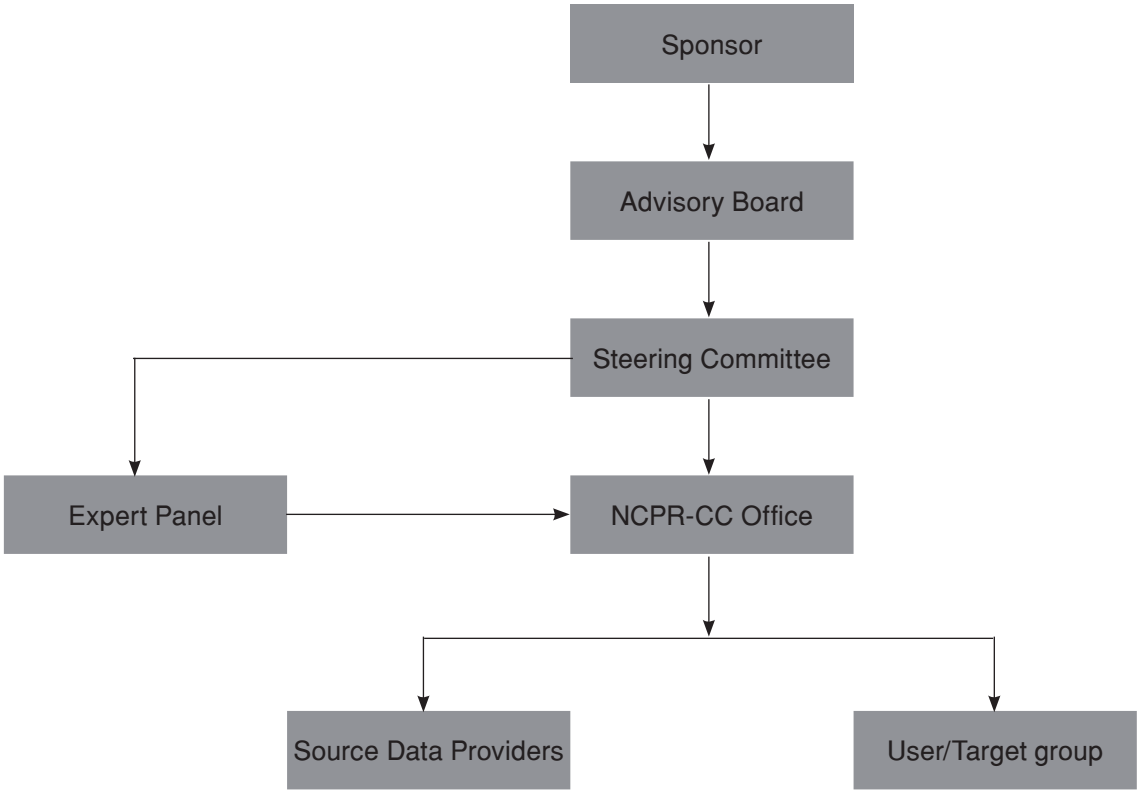
The National Cancer Patient Registry-Colorectal Cancer (NCPR-CC) was established as the first colorectal cancer registry in Malaysia to systematically collect data on all aspects of colorectal cancer relevant to its prevention, management and treatment evaluation in Malaysia. This information is useful in assisting the Ministry of Health (MOH), Non-Governmental Organizations, private healthcare providers and industry in program planning and evaluation, leading to improved colorectal cancer prevention, management and control.

Objectives

The objectives of the registry are to:

1. Estimate the incidence/prevalence of colorectal cancer in selected hospitals in Malaysia.
2. Determine the sociodemographic profiles of these patients.
3. Determine the risk factors in patients with colorectal cancer.
4. Evaluate the histological types and stages of presentation of colorectal cancer.
5. Evaluate and monitor the outcomes of surgery and oncology therapy based on selected performance indicators such as
    1) disease-free survival rates,
    2) mortality,
    3) complications of treatment,
    4) side-effects of treatment and
    5) patient's quality of life.
6. Estimate the cost burden of colorectal cancer to the nation and the cost-effectiveness of treatment and prevention programs.

Organisation



Pilot Sites (Source Data Providers/SDPs)

The initial pilot sites, as listed below, are large hospital centres with heavy case workloads dealing with colorectal cancer. They also provide representation for each region in Malaysia.

- Hospital Sultanah Bahiyah, Alor Star, Kedah
- Hospital Kuala Lumpur, Kuala Lumpur
- Hospital Queen Elizabeth, Kota Kinabalu, Sabah
- Hospital Selayang, Selangor
- Hospital Serdang, Selangor
- Hospital Sultanah Aminah, Johor Bahru, Johor
- Hospital Raja Perempuan Zainab II, Kota Bharu, Kelantan
- Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan
- Hospital Umum Sarawak, Kuching, Sarawak.

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FOREWORD

The National Cancer Patient Registry-Colorectal Cancer is proud to present its first report which incorporates results from 2007-2008.

The latest National Cancer Registry reported colorectal cancer as the most common cancer among males and the third most common among females, beaten only by other gastrointestinal and neuroendocrine tumours. This sobering data prompts us to collect as much information as we can regarding this disease in order to enable us to understand its epidemiology in our country. Therefore we are glad that we managed to establish such an important registry that specifically collects data on colorectal cancer; not just its epidemiological data, but also management and outcome data which will be a source of information for a national plan to combat this dreadful disease.

This information will be important for us when we formulate screening policies. This is especially critical as colorectal cancer can be easily identified and treated if detected early. Hence, prevention will be the most important tenet and strategy employed in the management of colorectal cancer. In addition, it is also a platform that will be used to develop more research with other stakeholders. This is of paramount importance because combating such a prevalent disease will involve multidisciplinary cooperation and effort that this registry can provide.

Needless to say, we hope that the availability of this database allows us to do more than formulate policies. The possibilities in research and investigations in other aspects of colon cancer are endless and hopefully with more data from more centres, this will be realised.

Even though we have only started with data collection, this registry plans to integrate biospecimen collection, genetics and tissue banking in the future. This important information will allow us to fine tune our approach and choose specific targeted therapy for different subpopulations once we can identify them.

We want to thank all the source data providers for their support in making this report possible. We hope that many more centres will participate in the future as we strive for better data collection, coverage and analysis.

Lastly, we would like to extend a special thanks to CRC Director, Dr Lim Teck Onn for his full support for this registry and we really hope that it will carry on for many more years. This gold mine of information will serve us well in the future and we surely will be able to provide insights that will hopefully help us win the war against colorectal cancer.

Dato' Dr Muhammad Radzi Abu Hassan
Principal Investigator

Associate Professor Dr Wendy Lim Wan Dee
Co-Principal Investigator

ABBREVIATIONS

CRA	Clinical Registry Assistant
CRC	Clinical Research Centre
CRF	Case Report Form
CRM	Clinical Registry Manager
eCRF	Electronic Case Report Form
Hosp	Hospital
HUSM	Hospital Universiti Sains Malaysia
MOH	Ministry of Health
NCPR-CC	National Cancer Patient Registry-Colorectal Cancer
NIH	National Institutes of Health
NMRR	National Medical Research Register
SDP	Source Data Provider

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This report presents results from October 2007 to December 2008.

Therefore, reference to 2007 means results from October 2007-December 2007.

For 2008, results were from January 2008-December 2008.

CHAPTER 1: DEMOGRAPHICS

The NCPR-Colorectal Cancer enrolled 131 patients from October to December 2007 and 491 patients from January to December 2008 to make up a total of 622 patients. Sixty percent of all patients were male and 40% were female (Table 1.1). The mean age was 61 years (range 15 to 95 years) and majority of patients were 50 years and above (81%). Most of the patients were Malays (42%) followed by Chinese (38%) and Indians (6%). However, these were absolute numbers and do not conclude that Malays were more at risk for colorectal cancer, as rates were not calculated.

Table 1.1: Characteristics of patients enrolled in the NCPR-Colorectal Cancer

	2007 (n=131)		2008 (n=491)		Total (n=622)	
Characteristics	**n**	**%**	**n**	**%**	**n**	**%**
Gender						
Male	88	67	283	58	371	60
Female	43	33	208	42	251	40
Age						
Mean (SD)	60 (13)		61(14)		61(13)	
Median	59		62		61	
Range	22-95		15-91		15-95	
Age group (years)						
≤ 19	0	0	2	0	2	0
20-29	2	2	7	1	9	1
30-39	5	4	19	4	24	4
40-49	17	13	62	13	79	13
50-59	41	31	119	24	160	26
60-69	33	25	140	29	173	28
≥ 70	31	24	138	28	169	27
Missing*	2	2	4	1	6	1
Ethnic						
Malay	54	41	210	43	264	42
Chinese	46	35	188	38	234	38
Indian	12	9	27	5	39	6
Others	17	13	65	13	82	13
Unknown	0	0	1	0	1	0
Missing*	2	2	0	0	2	0
Education level						
No formal education	23	18	96	20	119	19
Primary	10	8	75	15	85	14
Secondary	33	25	66	13	99	16
Tertiary	6	5	18	4	24	4
Unknown	36	27	143	29	179	29
Missing*	23	18	93	19	116	19

**No data was entered*

Figure 1.1: Age distribution of patients in the NCPR-Colorectal Cancer

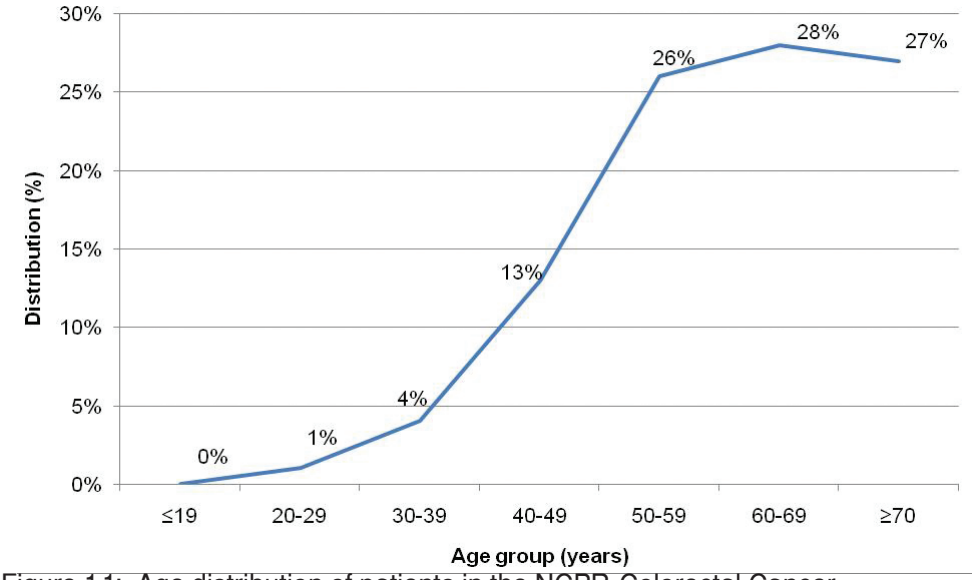


Figure 1.1: Age distribution of patients in the NCPR-Colorectal Cancer

Tables 1.2 (a-d) present the gender and age distributions by ethnicity. Gender distribution was almost comparable in all ethnic groups for 2007 and 2008. For age distribution by ethnicity, more than 50% of patients in the 30-49 years age group were Malays. For the 70 years and above, most were Chinese.

Table 1.2a: Gender distribution by ethnicity (N=622)

	2007 (N=131)						2008 (N=491)					
	Male (n=88)		Female (n=43)		Total (N=131)		Male (n=283)		Female (n=208)		Total (N=491)	
Ethnicity	n	%	n	%	n	%	n	%	n	%	No.	%
Malay	37	42	17	40	54	41	125	44	85	41	210	43
Chinese	33	38	13	30	46	35	106	37	82	39	188	38
Indian	8	9	4	9	12	9	17	6	10	5	27	5
Others	10	11	7	16	17	13	35	12	30	14	65	13
Unknown	0	0	0	0	0	0	0	0	1	0	1	0
Missing	0	0	2	5	2	2	0	0	0	0	0	0

Table 1.2.b: Age distribution (years) by ethnicity (2007)

	2007																	
	≤ 19 (n=0)		20-29 (n=2)		30-39 (n=5)		40-49 (n=17)		50-59 (n=41)		60-69 (n=33)		≥ 70 (n=31)		Missing (n=2)		Total (N=131)	
Ethnicity	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Malay	0	0	1	50	4	80	9	53	19	46	13	39	8	26	0	0	54	41
Chinese	0	0	0	0	0	0	2	12	16	39	12	36	16	52	0	0	46	35
Indian	0	0	0	0	0	0	1	6	5	12	2	6	4	13	0	0	12	9
Others	0	0	1	50	1	20	5	29	1	2	5	15	2	6	2	100	17	13
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Missing	0	0	0	0	0	0	0	0	0	0	1	3	1	3	0	0	2	2

Table 1.2.c: Age distribution (years) by ethnicity (2008)

	2008																	
	≤ 19 (n=2)		20-29 (n=7)		30-39 (n=19)		40-49 (n=62)		50-59 (n=119)		60-69 (n=140)		≥ 70 (n=138)		Missing (n=4)		Total (n=491)	
Ethnicity	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Malay	2	100	2	29	9	47	39	63	59	50	59	42	40	29	0	0	210	43
Chinese	0	0	1	14	3	16	10	16	35	29	59	42	80	58	0	0	188	38
Indian	0	0	0	0	1	5	2	3	8	7	6	4	10	7	0	0	27	5
Others	0	0	4	57	6	32	11	18	17	14	15	11	8	6	4	100	65	13
Unknown	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 1.2 d: Relationship between age group and ethnicity

	2007									2008								
	<50 years		≥ 50 years		Missing		Total		p-value	<50 years		≥ 50 years		Missing		Total		p-value
Ethnic group	No.	%	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	No.	%	
Malay	14	58	40	38	0	0	54	41		52	58	158	40	0	0	210	43	
Chinese	2	8	44	42	0	0	46	35		14	16	174	44	0	0	188	38	
Indian	1	4	11	10	0	0	12	9		3	3	24	6	0	0	27	5	
Others	7	29	8	8	2	100	17	13	<0.001	21	23	40	10	4	100	65	13	<0.001
Unknown	0	0	0	0	0	0	0	0		0	0	1	0	0	0	1	0	
Missing	0	0	2	2	0	0	2	2		0	0	0	0	0	0	0	0	
Total	24	100	105	100	2	100	131	100		90	100	397	100	4	100	491	100	

There were significantly more patients aged 50 years and above than patients below 50 years. This was observed for all ethnic groups (Table 1.2d). As age increased, the number of cases for both genders also increased (Tables 1.3). Figure 1.2 also demonstrates the increasing number of cases in the older age groups.

Table 1.3 a: Age group (years) distribution by gender (2007)

	2007																	
	≤ 19 (n=0)		20-29 (n=2)		30-39 (n=5)		40-49 (n=17)		50-59 (n=41)		60-69 (n=33)		≥ 70 (n=31)		Missing (n=2)		Total (N=131)	
Gender	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Male	0	0	0	0	3	60	12	71	28	68	24	73	20	65	1	50	88	67
Female	0	0	2	100	2	40	5	29	13	32	9	27	11	35	1	50	43	33
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 1.3.b: Age group (years) distribution by gender (2008)

	2008																	
	≤ 19 (n=2)		20-29 (n=7)		30-39 (n=19)		40-49 (n=62)		50-59 (n=119)		60-69 (n=140)		≥ 70 (n=138)		Missing (n=4)		Total (N=491)	
Gender	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Male	1	50	4	57	11	58	36	58	75	63	81	58	72	52	3	75	283	58
Female	1	50	3	43	8	42	26	42	44	37	59	42	66	48	1	25	208	42
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

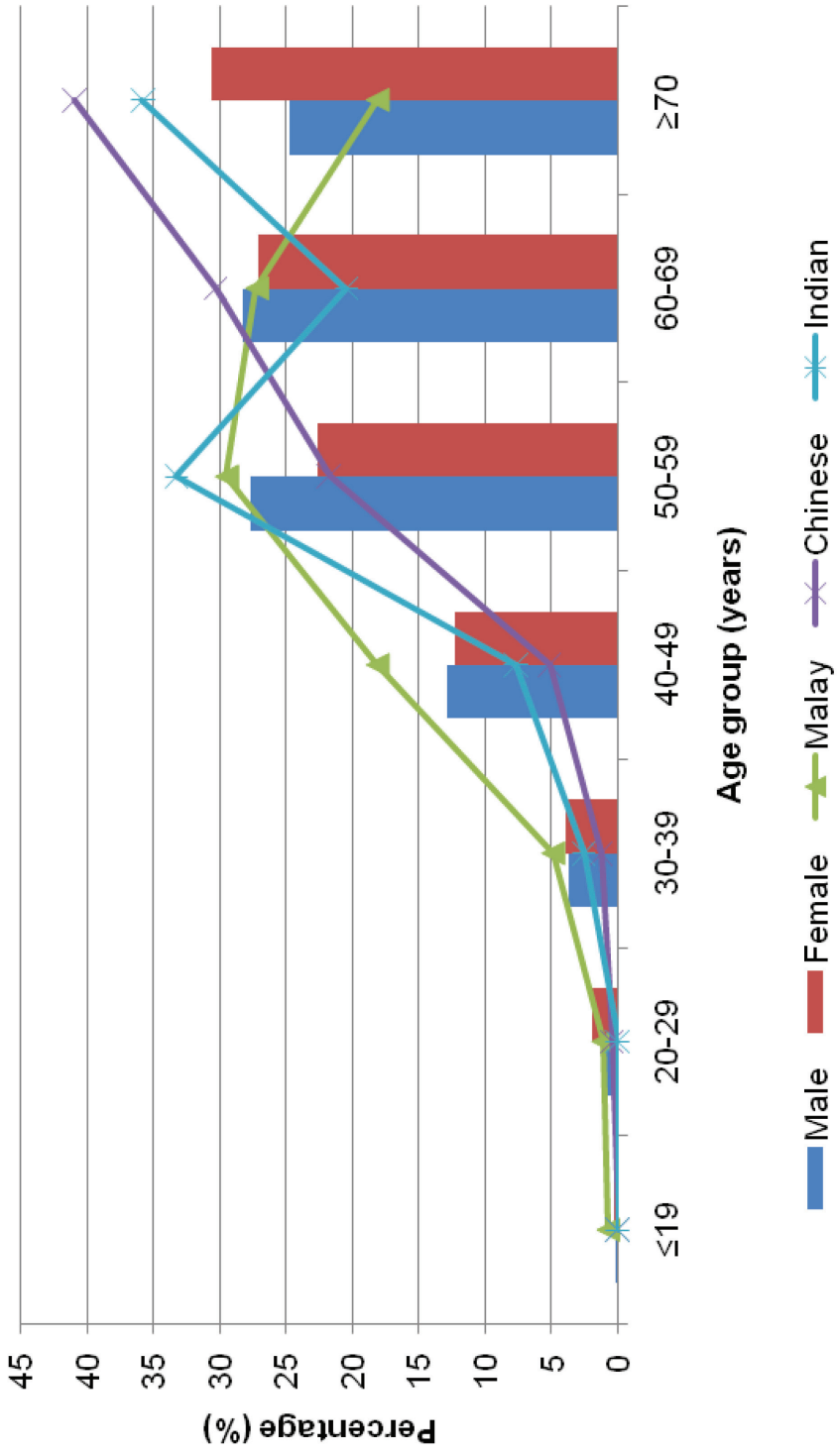


Figure 1.2: Distributions of gender and ethnicity (the three major ethnic groups only) by age group

Family history

In 2007, about 7.6% of all patients reported family history of colorectal cancer. In 2008, it was 6.5%. Family history of other types of cancer was 7.6% in 2007 and 8.9% in 2008. Most cases identified history from 1st degree relatives, who share 50% of the individual's genes.

Table 1.4: Family history of colorectal cancer and other cancers

		2007						2008					
		1st Degree*			2nd Degree+			1st Degree*			2nd Degree+		
Family history		Yes	No	Missing	Yes	No	Missing	Yes	No	Missing	Yes	No	Missing
	Yes	9	1	0	1	5	4	28	4	0	10	22	0
	No	0	103	18	0	80	41	0	405	54	0	384	75
Colorectal cancer	Total	9	104	18	1	85	45	28	409	54	10	406	75
	Yes	10	0	0	1	7	2	39	5	0	8	33	3
	No	0	100	21	0	71	50	0	359	88	0	336	111
Other cancers	Total	10	100	21	1	78	52	39	364	88	8	369	114

**1st degree relatives: share 50 percent of an individual‰s genes. Includes parents, children, and siblings.*

+2nd degree relatives: share one quarter of an individual‰s genes. Includes grandparents, grandchild, uncle, aunt, nephew, niece, half-sibling.

Table 1.4.a: Family history of colorectal cancer and other cancers by race (2007)

	2007													
Family history	**Malay (n=10)**		**Chinese (n=5)**		**Indian (n=1)**		**Other (n=3)**		**Unknown (n=0)**		**Missing (n=1)**		**Total (N=20)**	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Colorectal cancer	4	40	3	60	0	0	2	67	0	0	1	100	10	50
Other cancers	6	60	2	40	1	100	1	33	0	0	0	0	10	50

**Table 1.4.a & b consider patients having 1st degree only, 2nd degree only or 1st and 2nd degree as in Table 1.4.*

Table 1.4.b: Family history of colorectal cancer and other cancers by race (2008)

	2008													
Family history	**Malay (n=36)**		**Chinese (n=33)**		**Indian (n=2)**		**Other (n=4)**		**Unknown (n=1)**		**Missing (n=0)**		**Total (N=76)**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Colorectal cancer	17	47	12	36	0	0	2	50	1	100	0	0	32	42
Other cancers	19	53	21	64	2	100	2	50	0	0	0	0	44	58

Table 1.5.a: Family history of colorectal cancer and other cancers by age groups (2007)

	2007													
	≤ 19 (n=0)		**20-29 (n=2)**		**30-39 (n=0)**		**40-49 (n=4)**		**50-59 (n=8)**		**60-69 (n=1)**		**≥ 70 (n=5)**		**Total (N=20)**	
Family history	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Colorectal cancer	0	0	2	100	0	0	3	75	3	38	1	100	1	20	10	50
Other cancers	0	0	0	0	0	0	1	25	5	63	0	0	4	80	10	50

**This table considers patients having 1st degree only, 2nd degree only or 1st and 2nd degree as in Table 1.4.*

Table 1.5.b: Family history of colorectal cancer and other cancers by age groups (2008)

	2008													
	≤ 19 (n=0)		**20-29 (n=3)**		**30-39 (n=4)**		**40-49 (n=9)**		**50-59 (n=22)**		**60-69 (n=22)**		**≥ 70 (n=10)**		**Total (N=76)**	
Family history	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Colorectal cancer	0	0	2	67	2	50	4	44	10	45	8	36	6	38	32	42
Other cancers	0	0	1	33	2	50	5	56	12	55	14	64	10	63	44	58

**This table considers patients having 1st degree only, 2nd degree only or 1st and 2nd degree as in Table 1.4.*

Table 1.5 c: Relationship between family history and age group (Chi-square test)

	2007									2008								
	<50 (n=6)		≥ 50 (n=13)		Missing		Total (N=19)		p-value	<50 (n=16)		≥ 50 (n=60)		Missing		Total (N=76)		p-value
Family history	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**		**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
Colorectal cancer	5	83	4	31	0	0	9	47	0.012	8	50	24	40	0	0	32	42	0.722
Other cancers	1	17	9	69	0	0	10	53	0.522	8	50	36	60	0	0	44	58	0.400

**This table considers patients having 1st degree only, 2nd degree only or 1st and 2nd degree as in Table 1.4.*

Symptoms

Patients with colorectal cancer have different pathways of presentation for diagnosis (Table 1.6a). Most patients (94%) presented symptomatically. The most commonly presenting symptom was “Diarrhoea, constipation, or other change in bowel habit”, followed by “weight loss” and “abdominal pain”.

Table 1.6 a: Different presentation pathway to colorectal cancer diagnosis
**No data was entered*

	2007 (n=131)		2008 (n=491)		Total (N=622)	
Presentation pathway	**n**	**%**	**n**	**%**	**n**	**%**
Primary screening	3	2	1	0	4	1
Symptomatic	121	92	465	95	586	94
Incidental	3	2	4	1	7	1
Not applicable/ Unknown	0	0	2	0	2	0
Missing*	4	3	19	4	23	4

Table 1.6 b: Presenting symptoms

	2007		2008		Total	
Symptoms	n	%	n	%	n	%
Blood in the stool	45	34	155	32	200	32
Intestinal obstruction	18	14	48	10	66	11
Diarrhoea, constipation, or other change in bowel habits	77	59	285	58	362	58
Anaemia	21	16	61	12	82	13
Abdominal pain	60	46	203	41	263	42
Weight loss	60	46	241	49	301	48
Others	62	47	259	53	321	52

** Patient may have more than one symptom.*

** % = (No. of symptoms / No. of patients)*

Colorectal cancer staging system

A large proportion of the colorectal cancer cases did not have complete staging information. This is probably due to incomplete information on distant metastasis (M), without which we are unable to fully stage the cancer. Where staging was available, more than half were late stage (Stage III & IV) (Table 1.7-1.9).

Table 1.7: Colorectal cancer staging by age group

	2007 (N=131)								2008 (N=491)							
	< 50 (n=24)		≥ 50 (n=105)		Missing (n=2)		Total (N=131)		< 50 (n=90)		≥ 50 (n=397)		Missing (n=4)		Total (N=491)	
TNM Stages	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Stage 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stage I	0	0	2	2	0	0	2	2	0	0	8	2	0	0	8	2
Stage II	0	0	6	6	0	0	6	5	3	3	10	3	0	0	13	3
Stage III	1	4	1	1	1	50	3	2	5	6	9	2	0	0	14	3
Stage IV	0	0	4	4	0	0	4	3	4	4	15	4	0	0	19	4
Not available	1	4	10	10	0	0	11	8	6	7	22	6	0	0	28	6
Missing	1	4	23	22	0	0	24	18	33	37	106	27	3	75	142	29
No stage classification	21	88	59	56	1	50	81	62	39	43	227	57	1	25	267	54

** Patient may have more than one pathology record*

Table 1.8: Colorectal cancer staging by ethnic group

	2007 (N=131)														2008 (N=491)													
	Malay (n=54)		Chinese (n=46)		Indian (n=12)		Other (n=17)		Unknown		Missing* (n=2)		Total		Malay (n=210)		Chinese (n=188)		Indian (n=27)		Other (n=64)		Unknown (n=1)		Missing* (n=1)		Total	
TNM Stages	n	%	n	%	n	%	n	%	n	%	n	%	N	%	n	%	n	%	n	%	n	%	n	%	n	%	N	%
Stage 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stage I	1	2	1	2	0	0	0	0	0	0	0	0	2	2	0	0	8	4	0	0	0	0	0	0	0	0	8	2
Stage II	3	6	2	4	0	0	1	6	0	0	0	0	6	5	1	0	11	6	0	0	1	2	0	0	0	0	13	3
Stage III	1	2	0	0	0	0	2	12	0	0	0	0	3	2	8	4	5	3	0	0	1	2	0	0	0	0	14	3
Stage IV	1	2	2	4	1	8	0	0	0	0	0	0	4	3	6	3	8	4	0	0	4	6	1	100	0	0	19	4
Not available	3	6	4	9	3	25	1	6	0	0	0	0	11	8	12	6	10	5	1	4	5	8	0	0	0	0	28	6
Missing*	10	19	11	24	3	25	0	0	0	0	0	0	24	18	69	33	42	22	8	30	22	34	0	0	1	100	142	29
No stage classification	35	65	26	57	5	42	13	76	0	0	2	100	81	62	114	54	104	55	18	67	31	48	0	0	0	0	267	54

-Patient may have more than one pathology record.

**No data was entered*

Table 1.9: Colorectal cancer staging by familial history (2007 & 2008)

	2007								2008								Total							
	Colorectal cancer				Other cancers				Colorectal cancer				Other cancers				Colorectal cancer				Other cancers			
	1st Degree		2nd Degree		1st Degree		2nd Degree		1st Degree		2nd Degree		1st Degree		2nd Degree		1st Degree		2nd Degree		1st Degree		2nd Degree	
TNM Stages	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Stage 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stage I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stage II	1	11	0	0	2	20	0	0	1	4	0	0	0	0	0	0	2	5	0	0	2	4	0	0
Stage III	0	0	1	100	0	0	0	0	1	4	1	10	0	0	1	13	1	3	2	18	0	0	1	11
Stage IV	0	0	0	0	1	10	0	0	3	11	1	10	2	5	0	0	3	8	1	9	3	6	0	0
Not available	0	0	0	0	1	10	0	0	1	4	0	0	2	5	0	0	1	3	0	0	3	6	0	0
Missing*	2	22	0	0	2	20	0	0	6	21	4	40	7	18	3	38	8	22	4	36	9	18	3	33
No stage classification	6	67	0	0	4	40	1	100	16	57	4	40	28	72	4	50	22	59	4	36	32	65	5	56
Total	9	100	1	100	10	100	1	100	28	100	10	100	39	100	8	100	37	100	11	100	49	100	9	100

-Patient may have more than one pathology record.

**No data was entered*

Site

The rectum was the most frequent site for the primary tumour (32%) followed by sigmoid colon (18%) and the rectosigmoid (16%) (Table 1.10).

Table 1.10: Tumour sites

	2007 (n=131)		2008 (n=491)		Total (N=622)	
Primary cancer site	n	%	n	%	n	%
Caecum	6	5	33	7	39	6
Hepatic flexure	10	8	30	6	40	6
Ascending colon	3	2	25	5	28	5
Transverse colon	5	4	15	3	20	3
Splenic flexure	5	4	18	4	23	4
Descending colon	4	3	18	4	22	4
Sigmoid colon	21	16	92	19	113	18
Rectosigmoid	16	12	82	17	98	16
Rectum	36	27	162	33	198	32
Anorectal	3	2	4	1	7	1
Others	1	1	3	1	4	1
Missing	21	16	9	2	30	5
Total	**131**	**100**	**491**	**100**	**622**	**100**

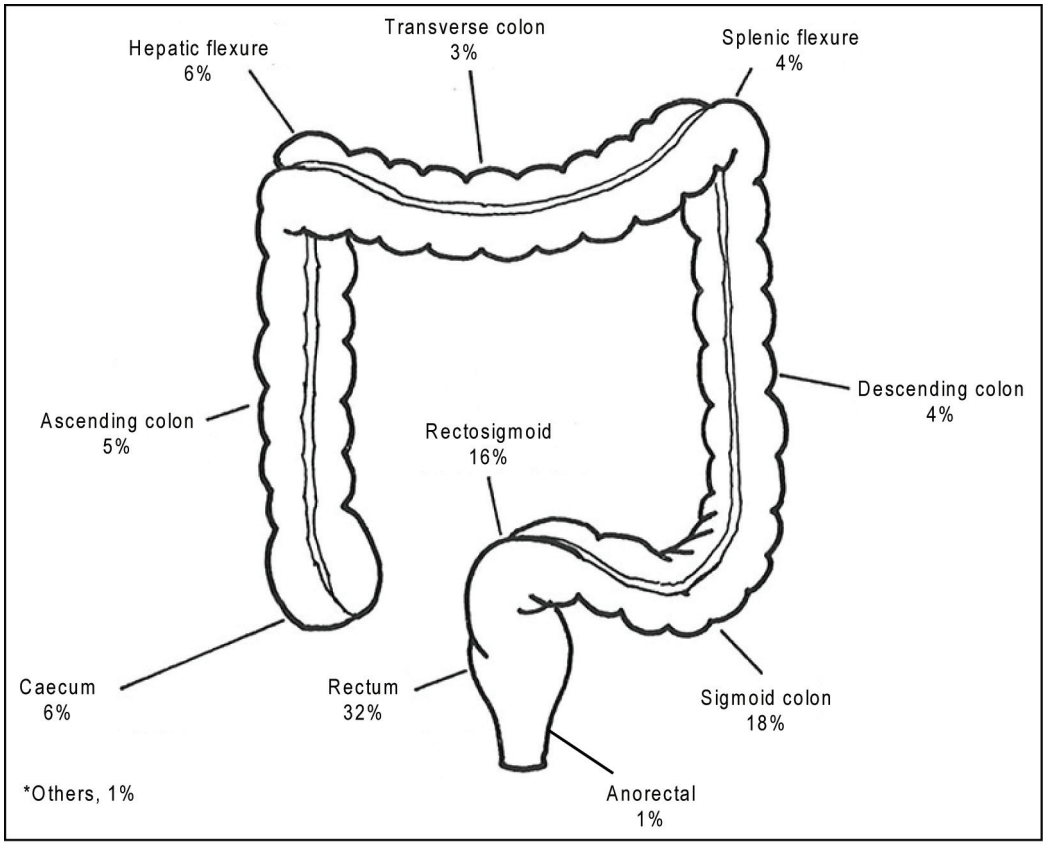


Figure 1.3: Tumour sites

Past medical history

Medical history of diabetes mellitus was most commonly reported, followed by polyps, ulcerative colitis and familial adenomatous polyposis (FAP). There was no reported history of Crohn's Disease and Peutz-Jaghers syndrome (PJS) (Table 1.11).

Colorectal cancer was the most common type reported by patients who had reported past medical history of cancer (Table 1.12).

Table 1.11: Past medical history

	2007(n=61)		2008 (n=223)		Total (N=284)	
Medical History	n	%	n	%	n	%
Diabetes Mellitus	26	43	95	43	121	43
Crohns Disease	0	0	0	0	0	0
Ulcerative colitis	1	2	4	2	5	2
Polyps	19	31	77	35	96	34
FAP	1	2	1	0	2	1
PJS	0	0	0	0	0	0
Missing	14	23	46	21	60	21

** Patient may have more than one past medical history*

-PJS= Peutz-Jaghers syndrome

-FAP= Familial adenomatous polyposis

Table 1.12: Past medical history of other cancers

	2007 (n=11)		2008 (n=22)		Total (N=33)	
Cancer type	n	%	n	%	n	%
Colorectal	7	64	7	32	14	42
Endometrial	0	0	1	5	1	3
Gastric	0	0	0	0	0	0
Small Bowel	0	0	0	0	0	0
Hepatobiliary	0	0	2	9	2	6
Urinary tract	0	0	0	0	0	0
Ovarian	0	0	0	0	0	0
Other	3	27	12	55	15	45
Missing	1	9	0	0	1	3

** Patient has only one past cancer history*

CHAPTER 2: SURGERY AND SURGERY OUTCOMES

From 622 patients, **492** had undergone surgery and out of this, **16** patients had two times surgery:
- Number of surgery cases= 508
- Number of surgery cases in 2007= 103 (with five patients having two surgeries)
- Number of surgery cases in 2008= 405 (with 11 patients having two surgeries)

Table 2.1: Number of surgeries per patient

	2007	2008	Total
No. of surgeries	**No. of patients**	**No. of patients**	**No. of patients**
1	93	383	476
2	5	11	16
Total	98	394	492

Table 2.2: Tumour sites

	2007		2008		Total	
Surgery at colon I	**No.**	**%**	**No.**	**%**	**No.**	**%**
Caecum	5	7	33	12	38	11
Ascending colon	10	14	30	11	40	12
Hepatic flexure	3	4	19	7	22	6
Transverse colon	4	6	25	9	29	8
Splenic flexure	6	9	23	8	29	8
Descending colon	9	13	27	10	36	10
Sigmoid colon	32	46	118	43	150	43
Missing[a]	0	0	2	1	2	1
Total surgery at colon	**69**	**100**	**277**	**100**	**346**	**100**
Surgery at rectum II						
Upper third	9	23	38	25	47	25
Middle third	12	31	29	19	41	21
Lower third	16	41	54	36	70	37
Others	2	5	29	19	31	16
Missing[b]	0	0	2	1	2	1
Total surgery at rectum	**39**	**100**	**152**	**100**	**191**	**100**

[a] Cases had "Yes" on …Surgery at Colon' but did not specify the site

[b] Cases had "Yes" on …Surgery at Rectum' but did not specify the site

I For Surgery at Colon: Two cases did not specify site (Missing[a]), 317 cases had one site, 12 cases had two sites, and one case had three sites.

II For surgery at Rectum: Two cases did not specify site (Missing[b]), 183 cases had one site and three cases had two sites.

In the 2007 data, all of the 103 cases of cancer underwent straight forward curative intent operation except for a few initial damage control procedure i.e. 6 (5.8%) cases had initial loop colostomy and 5 (4.9%) had Hartmann's procedure.

In 2008, out of 405 curative intent operations, only 4 (1%) had a loop colostomy whereas 16 (3.9%) underwent Hartmann's procedure first. Based on the tumour sites, most of the cases had an appropriate resection. There are, however, 74 (18.3%) cases where the surgery type is marked as other than all the standard procedures described due to various reasons.

Table 2.3 (i): Curative intent: Operation performed vs. tumour site

	2007																	
	Curative																	
	Right hemicolectomy		**Extended right hemicolectomy**		**Left hemicolectomy**		**Sigmoid colectomy**		**Proctocolectomy**		**Sub total colectomy**		**Transverse colectomy**		**Loop colostomy**		**APR**	
Surgery at colon	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Caecum	3	23	0	0	0	0	0	0	1	100	0	0	0	0	0	0	0	0
Ascending colon	7	54	1	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hepatic flexure	2	15	1	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transverse colon	1	8	2	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Splenic flexure	0	0	0	0	3	30	0	0	0	0	0	0	0	0	2	100	0	0
Descending colon	0	0	0	0	7	70	0	0	0	0	0	0	0	0	0	0	0	0
Sigmoid colon	0	0	0	0	0	0	4	100	0	0	1	100	0	0	0	0	0	0
Total surgery at colon	**13**	**100**	**4**	**100**	**10**	**100**	**4**	**100**	**1**	**100**	**1**	**100**	**0**	**0**	**2**	**100**	**0**	**0**
Surgery at rectum																		
Upper third	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	50	1	14
Middle third	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	25	2	29
Lower third	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	25	4	57
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total surgery at rectum	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**100**	**7**	**100**

	2007													
	Curative													
	Hartmanns procedure		**Local excision**		**Laparotomy only**		**High AR**		**Low AR**		**Ultra Low AR**		**Other, specify**	
Surgery at colon	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Caecum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascending colon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hepatic flexure	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transverse colon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Splenic flexure	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Descending colon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sigmoid colon	3	100	0	0	2	100	3	100	1	100	0	0	7	100
Total surgery at colon	**3**	**100**	**0**	**0**	**2**	**100**	**3**	**100**	**1**	**100**	**0**	**0**	**7**	**100**
Surgery at rectum														
Upper third	1	50	0	0	0	0	3	43	1	17	0	0	0	0
Middle third	1	50	0	0	0	0	3	43	3	50	0	0	0	0
Lower third	0	0	0	0	2	100	1	14	2	33	1	100	1	100
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total surgery at rectum	**2**	**100**	**0**	**0**	**2**	**100**	**7**	**100**	**6**	**100**	**1**	**100**	**1**	**100**

	2008																	
	Curative																	
	Right hemicolectomy		**Extended right hemicolectomy**		**Left hemicolectomy**		**Sigmoid colectomy**		**Proctocolectomy**		**Sub total colectomy**		**Transverse colectomy**		**Loop colostomy**		**APR**	
Surgery at colon	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Caecum	25	43	3	10	0	0	0	0	0	0	2	29	0	0	0	0	0	0
Ascending colon	21	36	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hepatic flexure	8	14	7	24	0	0	0	0	0	0	2	29	0	0	0	0	0	0
Transverse colon	0	0	11	38	3	12	0	0	0	0	0	0	1	33	1	25	0	0
Splenic flexure	2	3	5	17	6	25	0	0	0	0	0	0	1	33	0	0	0	0
Descending colon	2	3	1	4	11	46	0	0	0	0	2	29	0	0	0	0	0	0
Sigmoid colon	0	0	0	0	4	17	18	100	0	0	1	14	1	33	3	75	2	100
Total surgery at colon	**58**	**100**	**29**	**100**	**24**	**100**	**18**	**100**	**0**	**0**	**7**	**100**	**3**	**100**	**4**	**100**	**2**	**100**
Surgery at rectum																		
Upper third	0	0	0	0	0	0	1	100	1	100	0	0	1	100	0	0	1	5
Middle third	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	10
Lower third	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	80
Others	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0	1	5
Total surgery at rectum	**0**	**0**	**1**	**100**	**0**	**0**	**1**	**100**	**1**	**100**	**0**	**0**	**1**	**100**	**0**	**0**	**20**	**100**

	2008													
	Curative													
	Hartmanns procedure		**Local excision**		**Laparotomy only**		**High AR**		**Low AR**		**Ultra Low AR**		**Other, specify**	
Surgery at colon	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Caecum	0	0	0	0	0	0	0	0	1	10	0	0	1	2
Ascending colon	0	0	0	0	0	0	0	0	0	0	0	0	4	9
Hepatic flexure	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transverse colon	0	0	1	100	0	0	0	0	0	0	0	0	3	7
Splenic flexure	1	10	0	0	0	0	0	0	1	10	0	0	3	7
Descending colon	0	0	0	0	1	25	0	0	0	0	0	0	7	15
Sigmoid colon	9	90	0	0	3	75	24	100	8	80	0	0	28	61
Total surgery at colon	**10**	**100**	**1**	**100**	**4**	**100**	**24**	**100**	**10**	**100**	**0**	**0**	**46**	**100**
Surgery at rectum														
Upper third	2	33	0	0	0	0	11	61	5	21	0	0	5	18
Middle third	2	33	0	0	0	0	1	6	10	42	3	25	4	14
Lower third	0	0	0	0	1	100	2	11	8	33	7	58	7	25
Others	2	33	0	0	0	0	4	22	1	4	2	17	12	43
Total surgery at rectum	**6**	**100**	**0**	**0**	**1**	**100**	**18**	**100**	**24**	**100**	**12**	**100**	**28**	**100**

In 2007, 19 (18.4%) cases were already in advanced disease stage and thus had palliative surgery while in 2008, 62 (15.3%) had palliative intent.

Table 2.3 (ii): Palliative intent: Operation performed vs. tumour site

	2007																	
	Palliative																	
	Right hemicolectomy		**Extended right hemicolectomy**		**Left hemicolectomy**		**Sigmoid colectomy**		**Proctocolectomy**		**Sub total colectomy**		**Transverse colectomy**		**Loop colostomy**		**APR**	
Surgery at colon	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Caecum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascending colon	0	0	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hepatic flexure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transverse colon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Splenic flexure	0	0	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Descending colon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sigmoid colon	0	0	0	0	0	0	1	100	0	0	0	0	0	0	1	100	0	0
Total surgery at colon	**0**	**0**	**2**	**100**	**0**	**0**	**1**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**100**	**0**	**0**
Surgery at rectum																		
Upper third	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle third	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100	0	0
Lower third	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total surgery at rectum	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**100**	**0**	**0**

	2007													
	Palliative													
	Hartmanns procedure		**Local excision**		**Laparotomy only**		**High AR**		**Low AR**		**Ultra Low AR**		**Other, specify**	
Surgery at colon	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Caecum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascending colon	0	0	0	0	0	0	0	0	0	0	0	0	1	33
Hepatic flexure	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transverse colon	0	0	0	0	0	0	0	0	0	0	0	0	1	33
Splenic flexure	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Descending colon	1	33	0	0	0	0	0	0	0	0	0	0	0	0
Sigmoid colon	2	67	0	0	0	0	0	0	1	100	0	0	1	33
Total surgery at colon	**3**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**100**	**0**	**0**	**3**	**100**
Surgery at rectum														
Upper third	0	0	0	0	0	0	0	0	1	100	0	0	0	0
Middle third	0	0	0	0	0	0	0	0	0	0	0	0	1	17
Lower third	0	0	0	0	0	0	0	0	0	0	0	0	3	50
Others	0	0	0	0	0	0	0	0	0	0	0	0	2	33
Total surgery at rectum	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**100**	**0**	**0**	**6**	**100**

2008																		
Palliative																		
	Right hemicolectomy		**Extended right hemicolectomy**		**Left hemicolectomy**		**Sigmoid colectomy**		**Proctocolectomy**		**Sub total colectomy**		**Transverse colectomy**		**Loop colostomy**		**APR**	
Surgery at colon	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Caecum	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascending colon	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hepatic flexure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100
Transverse colon	0	0	1	100	0	0	0	0	0	0	0	0	0	0	1	17	0	0
Splenic flexure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	33	0	0
Descending colon	0	0	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0
Sigmoid colon	0	0	0	0	0	0	4	100	0	0	0	0	0	0	1	17	0	0
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	33	0	0
Total surgery at colon	**2**	**100**	**1**	**100**	**1**	**100**	**4**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**100**	**1**	**100**
Surgery at rectum																		
Upper third	0	0	0	0	0	0	1	100	0	0	0	0	0	0	0	0	1	50
Middle third	0	0	0	0	0	0	0	0	0	0	0	0	1	50	1	33	0	0
Lower third	0	0	0	0	0	0	0	0	0	0	0	0	1	50	2	67	1	50
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total surgery at rectum	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**100**	**0**	**0**	**0**	**0**	**2**	**100**	**3**	**100**	**2**	**100**

	2008													
	Palliative													
	Hartmanns procedure		**Local excision**		**Laparotomy only**		**High AR**		**Low AR**		**Ultra Low AR**		**Other, specify**	
Surgery at colon	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Caecum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ascending colon	0	0	0	0	0	0	0	0	0	0	0	0	1	9
Hepatic flexure	0	0	0	0	0	0	0	0	0	0	0	0	1	9
Transverse colon	0	0	0	0	0	0	0	0	0	0	0	0	2	18
Splenic flexure	0	0	0	0	0	0	0	0	0	0	0	0	2	18
Descending colon	0	0	0	0	0	0	0	0	1	33	0	0	0	0
Sigmoid colon	2	100	0	0	0	0	2	100	2	67	0	0	5	45
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total surgery at colon	**2**	**100**	**0**	**0**	**0**	**0**	**2**	**100**	**3**	**100**	**0**	**0**	**11**	**100**
Surgery at rectum														
Upper third	1	100	0	0	0	0	3	100	1	20	0	0	0	0
Middle third	0	0	0	0	2	50	0	0	1	20	1	33	1	20
Lower third	0	0	0	0	0	0	0	0	1	20	2	67	2	40
Others	0	0	0	0	2	50	0	0	2	40	0	0	0	0
Missing	0	0	0	0	0	0	0	0	0	0	0	0	2	40
Total surgery at rectum	**1**	**100**	**0**	**0**	**4**	**100**	**3**	**100**	**5**	**100**	**3**	**100**	**5**	**100**

Table 2.4: Metastasis in patients

	2007		2008		Total	
Distant Metastasis	No.	%[a]	No.	%[b]	No.	%[c]
None	57	55	252	62	309	61
Peritoneal	1	1	5	1	6	1
Bone	2	2	2	0.5	4	1
Lung	9	9	21	5	30	6
Brain	0	0	0	0	0	0
Non-regional lymph nodes	3	3	7	2	10	2
Hepatic	14	14	45	11	59	12
Others	11	11	42	10	53	10
Missing*	18	17	67	17	85	17
Total**	**115**		**441**		**556**	

** Cases did not specify if there was metastasis or not*

***Cases may have more than one metastatic site*

[a] *denominator=103 (number of cases in 2007)*

[b] *denominator=405 (number of cases in 2008)*

[c] *denominator=508 (total number of cases)*

Table 2.5: Preoperative investigations performed

	2007		2008		Total	
Investigation type	No.	%[a]	No.	%[b]	No.	%[c]
Chest Radiograph (CXR)	49	48	104	26	153	30
MRI scans	2	2	4	1	6	1
CT scan	98	95	289	71	387	76
Ultrasound	23	22	58	14	81	16
Colonoscopy	86	83	310	77	396	78
X-ray	8	8	58	14	66	13
CEA (ng/mL)	72	70	193	48	265	52
Total	**338**		**1016**		**1354**	

** Cases may either have one or more investigation type*

[a] *denominator=103 (number of cases in 2007)*

[b] *denominator=405 (number of cases in 2008)*

[c] *denominator=508 (total number of cases)*

The preoperative investigations (Table 2.5) were mainly done either for diagnostic or staging purposes other than for preparation for anaesthesia. More than 75% of the cases had colonoscopy as well as CT-scan. Almost half of them had preoperative CEA done, which is necessary for comparison with post-treatment results during follow-up later.

Table 2.6 (i): Return to theatre

	2007		2008		Total	
Return to theatre	No.	%	No.	%	No.	%
Yes	2	2	28	7	30	6
No	91	88	341	84	432	85
Missing	10	10	36	9	46	9
Total	**103**	**100**	**405**	**100**	**508**	**100**

Table 2.6 (ii): Return to theatre by immediate surgical complications

	2007						2008					
	Yes[a]		No[b]		Missing[c]		Yes[d]		No[e]		Missing[f]	
Immediate surgical complications	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Abdominal /pelvic collection	0	0	0	0	0	0	3	18	4	6	0	0
Deep wound dehiscence	0	0	0	0	0	0	2	12	3	5	0	0
Small bowel obstruction	0	0	0	0	0	0	1	6	0	0	0	0
Anastomotic leak	0	0	0	0	1	100	4	24	10	16	0	0
Ureteric injury	0	0	0	0	0	0	0	0	1	2	0	0
Total	**0**		**0**		**1**		**10**		**18**		**0**	

[a] *Denominator=0 (Number of immediate surgical complications for "Yes" in 2007)*
[b] *Denominator=19 (Number of immediate surgical complications for "No" in 2007)*
[c] *Denominator=1 (Number of immediate surgical complications for "Missing" in 2007)*
[d] *Denominator=17 (Number of immediate surgical complications for "Yes" in 2008)*
[e] *Denominator=63 (Number of immediate surgical complications for "No" in 2008)*
[f] *Denominator=2 (Number of immediate surgical complications for "Missing" in 2008)*

There was no correlation between the disease stage and inpatient death during admission for operation in 2007 and 2008 (Table 2.7). The unexpected return to theatre for surgical complications was 9-10%. Anastomotic leak was the most common cause recorded. There was also no correlation between medical complications developed post-operatively and stage of the cancer (Table 2.9).

However, as expected, medical complications were more likely to develop after an emergency operation since the patient was not well optimised like in an elective operation (14-16% of elective operations had complications compared to the 25-27% for emergency operations – Table 2.10). Naturally, those with medical complications were more likely to have in-patient death (Table 2.11).

In contrast, surgical complications were not related to the urgency of the operations whether elective or emergency (Table 2.12). Nevertheless, it does contribute significantly to in-patient death which is the cause of death for more than half of the patients (Table 2.13).

Table 2.7.a: Final tumour staging vs inpatient death (2007)

	Inpatient death							
	Yes		**No**		**Missing**		**Total**	
Staging	No.	%*	No.	%*	No.	%*	No.	%*
T								
- T0	0	0	0	0	0	0	0	0
- T1	1	13	3	3	0	0	4	4
- T2	0	0	3	3	1	14	4	4
- T3	3	38	31	35	3	43	37	36
- T4	3	38	27	31	2	29	32	31
- TX	0	0	1	1	0	0	1	1
- Tis	0	0	0	0	0	0	0	0
- Missing	1	13	23	26	1	14	25	24
- Total	**8**	**100**	**88**	**100**	**7**	**100**	**103**	**100**
TNM staging								
- Stage 0	0	0	0	0	0	0	0	0
- Stage I	0	0	2	2	0	0	2	2
- Stage II	1	13	20	23	3	44	24	23
- Stage III	1	13	7	8	1	14	9	9
- Stage IV	4	49	11	13	1	14	16	15
- Not Available	2	25	46	52	1	14	49	48
- Missing	0	0	2	2	1	14	3	3
- Total	**8**	**100**	**88**	**100**	**7**	**100**	**103**	**100**

**rounded to nearest integer*

Table 2.7.b : Final tumour staging vs inpatient death (2008)

	Inpatient death							
	Yes		**No**		**Missing**		**Total**	
Staging	No.	%	No.	%	No.	%	No.	%
T								
- T0	0	0	3	1	0	0	3	1
- T1	0	0	4	1	1	3	5	1
- T2	2	8	18	5	5	14	25	6
- T3	7	27	137	40	13	36	157	39
- T4	1	3	62	18	5	14	68	17
- TX	0	0	0	0	0	0	0	0
- Tis	0	0	0	0	0	0	0	0
- Missing	16	62	119	35	12	33	147	36
- Total	**26**	**100**	**343**	**100**	**36**	**100**	**405**	**100**
TNM staging								
- Stage 0	0	0	0	0	0	0	0	0
- Stage I	0	0	4	1	4	12	8	2
- Stage II	1	4	32	9	7	19	40	10
- Stage III	2	8	38	11	3	8	43	11
- Stage IV	2	8	40	12	1	3	43	11
- Not Available	21	80	225	66	21	58	267	65
- Missing	0	0	4	1	0	0	4	1
- Total	**26**	**100**	**343**	**100**	**36**	**100**	**405**	**100**

Table 2.8.a : Final tumour staging vs immediate surgical complication (2007)

	Immediate surgical complication							
	Yes		**No**		**Missing**		**Total**	
Staging	No.	%	No.	%*	No.	%*	No.	%*
T								
- T0	0	0	0	0	0	0	0	0
- T1	1	5	3	4	0	0	4	4
- T2	2	10	1	1	1	14	4	4
- T3	9	45	25	33	3	43	37	36
- T4	4	20	26	34	2	29	32	31
- TX	0	0	1	1	0	0	1	1
- Tis	0	0	0	0	0	0	0	0
- Missing	4	20	20	26	1	14	25	24
- Total	**20**	**100**	**76**	**100**	**7**	**100**	**103**	**100**
TNM staging								
- Stage 0	0	0	0	0	0	0	0	0
- Stage I	1	5	1	1	0	0	2	2
- Stage II	4	20	17	22	3	42	24	22
- Stage III	1	5	7	10	1	14	9	9
- Stage IV	6	30	9	12	1	14	16	16
- Not Available	7	35	41	54	1	14	49	48
- Missing	1	5	1	1	1	14	3	3
- Total	**20**	**100**	**76**	**100**	**7**	**100**	**103**	**100**

**rounded to nearest integer*

Table 2.8.b : Final tumour staging vs immediate surgical complication (2008)

	Immediate surgical complication							
	Yes		No		Missing		Total	
Staging	No.	%*	No.	%*	No.	%*	No.	%*
T								
- T0	0	0	3	1	0	0	3	1
- T1	1	1	4	1	0	0	5	1
- T2	3	4	17	6	5	15	25	6
- T3	39	48	106	36	12	38	157	39
- T4	11	13	51	18	6	19	68	17
- TX	0	0	0	0	0	0	0	0
- Tis	0	0	0	0	0	0	0	0
- Missing	28	34	110	38	9	28	147	36
- Total	82	100	291	100	32	100	405	100
TNM staging								
- Stage 0	0	0	0	0	0	0	0	0
- Stage I	2	2	3	1	3	9	8	2
- Stage II	8	10	26	9	6	19	40	10
- Stage III	7	8	32	11	4	13	43	11
- Stage IV	12	15	30	10	1	3	43	11
- Not Available	53	65	196	66	18	56	267	65
- Missing	0	0	4	1	0	0	4	1
- Total	82	100	291	100	32	100	405	100

**rounded to nearest integer*

Table 2.9.a: Final tumour staging vs medical complication (2007)

	Medical complication							
	Yes		No		Missing		Total	
Staging	No.	%	No.	%	No.	%	No.	%
T								
- T0	0	0	0	0	0	0	0	0
- T1	2	11	2	3	0	0	4	4
- T2	1	5	2	3	1	13	4	4
- T3	6	32	28	36	3	37	37	36
- T4	8	41	22	29	2	25	32	31
- TX	0	0	1	1	0	0	1	1
- Tis	0	0	0	0	0	0	0	0
- Missing	2	11	21	28	2	25	25	24
- Total	**19**	**100**	**76**	**100**	**8**	**100**	**103**	**100**
TNM staging								
- Stage 0	0	0	0	0	0	0	0	0
- Stage I	0	0	2	3	0	0	2	2
- Stage II	4	21	17	22	3	38	24	23
- Stage III	4	21	4	5	1	12	9	9
- Stage IV	4	21	11	13	1	12	16	16
- Not Available	6	32	41	54	2	25	49	47
- Missing	1	5	1	1	1	13	3	3
- Total	**19**	**100**	**76**	**100**	**8**	**100**	**103**	**100**

Table 2.9.b: Final tumour staging vs medical complication (2008)

	Medical complication							
	Yes		**No**		**Missing**		**Total**	
Staging	No.	%	No.	%	No.	%	No.	%
T								
- T0	0	0	3	1	0	0	3	1
- T1	2	3	3	1	0	0	5	1
- T2	2	3	18	6	5	14	25	6
- T3	19	29	124	41	14	38	157	39
- T4	11	17	51	17	6	16	68	17
- TX	0	0	0	0	0	0	0	0
- Tis	0	0	0	0	0	0	0	0
- Missing	32	48	103	34	12	32	147	36
- Total	**66**	**100**	**302**	**100**	**37**	**100**	**405**	**100**
TNM staging								
- Stage 0	0	0	0	0	0	0	0	0
- Stage I	1	2	4	1	3	8	8	2
- Stage II	4	6	30	10	6	16	40	10
- Stage III	4	6	35	12	4	11	43	11
- Stage IV	5	7	37	12	1	3	43	11
- Not Available	52	79	192	64	23	62	267	65
- Missing	0	0	4	1	0	0	4	1
- Total	**66**	**100**	**302**	**100**	**37**	**100**	**405**	**100**

Table 2.10: Medical complication vs urgency

	2007								2008							
	Elective		**Emergency**		**Missing**		**Total**		**Elective**		**Emergency**		**Missing**		**Total**	
Medical complication	No.	%	No.	%	No.	%	No.	%	No.	%.	No.	%.	No.	%.	No.	%.
Yes	12	16	7	27	0	0	19	18	42	14	24	25	0	0	66	16
No	58	76	17	65	1	100	76	74	228	75	71	74	3	50	302	75
Missing	6	8	2	8	0	0	8	8	33	11	1	1	3	50	37	9
Total	**76**	**100**	**26**	**100**	**1**	**100**	**103**	**100**	**303**	**100**	**96**	**100**	**6**	**100**	**405**	**100**

Table 2.11: Medical complication vs inpatient death

	2007								2008							
	Yes		**No**		**Missing**		**Total**		**Yes**		**No**		**Missing**		**Total**	
Medical Complication	No.	%	No.	%	No.	%	No.	%.	No.	%.	No.	%.	No.	%.	No.	%.
Yes	7	88	12	14	0	0	19	18	16	62	49	14	1	3	66	16
No	1	12	75	85	0	0	76	74	9	34	289	85	4	11	302	75
Missing	0	0	1	1	7	100	8	8	1	4	5	1	31	86	37	9
Total	**8**	**100**	**88**	**100**	**7**	**100**	**103**	**100**	**26**	**100**	**343**	**100**	**36**	**100**	**405**	**100**

Table 2.12: Immediate surgical complication vs urgency

	2007								2008							
	Elective		**Emergency**		**Missing**		**Total**		**Elective**		**Emergency**		**Missing**		**Total**	
Immediate Surgical Complication	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*
Yes	10	13	10	38	0	0	20	19	54	18	28	29	0	0	82	20
No	61	80	14	54	1	100	76	74	220	73	68	71	3	50	291	72
Missing	5	7	2	8	0	0	7	7	29	10	0	0	3	50	32	8
Total	**76**	**100**	**26**	**100**	**1**	**100**	**103**	**100**	**303**	**100**	**96**	**100**	**6**	**100**	**405**	**100**

**rounded to nearest integer*

Table 2.13: Immediate surgical complication vs inpatient death

	2007								2008							
	Dead		**Alive**		**Missing**		**Total**		**Dead**		**Alive**		**Missing**		**Total**	
Immediate Surgical Complication	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*
Yes	5	63	15	17	0	0	20	19	15	58	66	19	1	3	82	20
No	3	38	73	83	0	0	76	74	10	38	276	80	5	14	291	72
Missing	0	0	0	0	7	100	7	7	1	4	1	0	30	83	32	8
Total	**8**	**100**	**88**	**100**	**7**	**100**	**103**	**100**	**26**	**100**	**343**	**100**	**36**	**100**	**405**	**100**

**rounded to nearest integer*

Table 2.14: Medical and surgical complications vs. inpatient death

	2007								2008							
	Inpatient death															
	Yes		**No**		**Missing**		**Total**		**Yes**		**No**		**Missing**		**Total**	
	No	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Medical complications	**7**	**37**	**12**	**63**	**0**	**0**	**19**	**100**	**16**	**24**	**49**	**74**	**1**	**2**	**66**	**100**
Surgical Complications	**5**	**25**	**15**	**75**	**0**	**0**	**20**	**100**	**15**	**18**	**66**	**80**	**1**	**1**	**82**	**100**
Abdominal/ pelvic collection	0	0	0	0	0	0	0	0	1	7	6	9	0	0	7	9
Deep wound dehiscence	0	0	0	0	0	0	0	0	2	13	3	5	0	0	5	6
Small bowel obstruction	0	0	0	0	0	0	0	0	0	0	1	2	0	0	1	1
Anastomotic leak	0	0	1	7	0	0	1	5	5	33	8	12	1	100	14	17
Ureteric injury	0	0	0	0	0	0	0	0	0	0	1	2	0	0	1	1

The waiting time for admission and for surgery showed improvements from 2007 to 2008 in most hospitals especially in Hospital Kuala Lumpur, Hospital Serdang and Hospital Sultanah Bahiyah as reflected by the average interval in Table 2.15 & 2.16. The same also could be seen on the post-operative hospital stay (Table 2.18). Only Hospital Selayang showed an increase in the waiting time and post-operative hospitalisation. It is generally accepted that the waiting time from the date of diagnosis to the date of operation should be within two weeks. Here, none of the waiting time recorded were below 14 days. It is believed that there were similar problems in waiting time for operation for other forms of malignancy. Therefore, it is necessary to provide more OT time for surgeons to clear up malignant cases. The increase of the number of surgeons without a parallel increase in OT time will not help bring down the waiting time. It is proposed that more OTs are provided in the existing hospitals with a proportionate increase in the number of staff to solve this problem.

Table 2.15 (i): Interval from date of diagnosis to the date of surgery

	2007	**2008**
Observation	89	337
Mean ± sd (min, max) (95% confident interval)	47.25±76.19 (0,350) (31.20, 63.30)	26.13±49.89 (0, 388) (20.78, 31.47)
Unique case (-ve interval)	13	67
Missing	1	1
Total	**103**	**405**

Table 2.15 (ii): Interval from date of diagnosis to date of surgery by SDP

		2007			2008		
		No	**Mean ± sd**	**min, max**	**No**	**Mean ± sd**	**min, max**
Observation (+ve interval)	Hosp Kuala Lumpur	20	62.50±89.11	0,267	57	24.25±32.11	0,198
	Hosp Sultanah Bahiyah, Alor Setar	10	26.70±68.40	0,218	73	9.99±21.65	0,132
	Hosp Serdang, Selangor	7	51.00±93.91	0,262	16	8.44±12.51	0,42
	Hosp Selayang, Selangor	12	28.50±30.16	0,102	53	38.94±72.45	0,373
	Hosp Raja Perempuan Zainab II, Kota Bharu	10	44.30±62.65	0,202	32	42.66±77.63	0,337
	HUSM, Kubang Kerian	2	43.50±7.78	38,49	16	24.44±23.77	0,76
	Hosp Sultanah Aminah, Johor Bahru	15	35.33±44.83	0,134	36	29.97±27.34	0,136
	Hosp Umum Sarawak	1	350.00±.	350,350	33	24.58±29.08	0,157
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	12	48.25±87.52	0,297	21	40.43±93.35	0,388
Unique case (-ve interval)	Hosp Kuala Lumpur	5	-	-	14	-	-
	Hosp Sultanah Bahiyah, Alor Setar	0	-	-	2	-	-
	Hosp Serdang, Selangor	0	-	-	1	-	-
	Hosp Selayang, Selangor	0	-	-	21	-	-
	Hosp Raja Perempuan Zainab II, Kota Bharu	0	-	-	1	-	-
	HUSM, Kubang Kerian	1	-	-	1	-	-
	Hosp Sultanah Aminah, Johor Bahru	0	-	-	0	-	-
	Hosp Umum Sarawak	0	-	-	4	-	-
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	7	-	-	23	-	-
Missing	Hosp Kuala Lumpur	0	-	-	0	-	-
	Hosp Sultanah Bahiyah, Alor Setar	0	-	-	0	-	-
	Hosp Serdang, Selangor	0	-	-	0	-	-
	Hosp Selayang, Selangor	0	-	-	0	-	-
	Hosp Raja Perempuan Zainab II, Kota Bharu	0	-	-	0	-	-
	HUSM, Kubang Kerian	0	-	-	0	-	-
	Hosp Sultanah Aminah, Johor Bahru	0	-	-	0	-	-
	Hosp Umum Sarawak	0	-	-	0	-	-
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	1	-	-	1	-	-

Table 2.16 (i): Interval from date of diagnosis to the date of admission

	2007	2008
Observation	61	216
Mean±sd (min, max) (95% CI)	61.97±93.44 (0, 390) (38.04, 88.90)	31.90±57.73 (0,366) (24.16, 39.64)
Unique case (-ve interval)	34	159
Missing	8	30
Total	**103**	**405**

Table 2.16 (ii): Interval from date of diagnosis to the date of admission by SDP

		2007			2008		
		No	**Mean±sd**	**min, max**	**No**	**Mean±sd**	**min, max**
Observation (+ve interval)	Hosp Kuala Lumpur	18	77.56±120.36	0,390	48	19.46±32.63	0,196
	Hosp Sultanah Bahiyah, Alor Setar	3	86.00±116.05	0,218	33	28.36±67.01	0,364
	Hosp Serdang, Selangor	6	58.00±107.50	0,276	7	4.29±7.32	0,15
	Hosp Selayang, Selangor	10	26.70±29.63	0,100	41	45.12±78.41	0,366
	Hosp Raja Perempuan Zainab II, Kota Bharu	5	83.00±68.01	31,200	21	62.10±88.53	0,335
	HUSM, Kubang Kerian	2	38.50±12.02	30,47	12	29.00±23.04	2,74
	Hosp Sultanah Aminah, Johor Bahru	10	16.80±17.86	0,46	13	25.85±19.50	0,53
	Hosp Umum Sarawak	1	349.00±.	349,349	27	27.96±29.61	3,155
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	6	83.67±84.67	11,236	14	28.36±59.36	0,224
Unique case (-ve interval)	Hosp Kuala Lumpur	5	-	-	23	-	-
	Hosp Sultanah Bahiyah, Alor Setar	7	-	-	39	-	-
	Hosp Serdang, Selangor	0	-	-	8	-	-
	Hosp Selayang, Selangor	2	-	-	33	-	-
	Hosp Raja Perempuan Zainab II, Kota Bharu	5	-	-	11	-	-
	HUSM, Kubang Kerian	1	-	-	5	-	-
	Hosp Sultanah Aminah, Johor Bahru	2	-	-	1	-	-
	Hosp Umum Sarawak	0	-	-	10	-	-
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	12	-	-	29	-	-
Missing	Hosp Kuala Lumpur	2	-	-	0	-	-
	Hosp Sultanah Bahiyah, Alor Setar	0	-	-	3	-	-
	Hosp Serdang, Selangor	1	-	-	2	-	-
	Hosp Selayang, Selangor	0	-	-	0	-	-
	Hosp Raja Perempuan Zainab II, Kota Bharu	0	-	-	1	-	-
	HUSM, Kubang Kerian	0	-	-	0	-	-
	Hosp Sultanah Aminah, Johor Bahru	3	-	-	22	-	-
	Hosp Umum Sarawak	0	-	-	0	-	-
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	2	-	-	2	-	-

Table 2.17 (i): Interval from date of admission to the date of surgery

	2007	2008
Observation	88	364
Mean±sd (min, max)	11.69±44.14 (0,301)	4.91±8.09 (0,77)
(95% CI)	(2.34, 21.05)	(4.08, 5.74)
Unique case (-ve interval)	6	10
Missing	9	31
Total	**103**	**405**

Table 2.17 (ii): Interval from date of admission to the date of surgery by SDP

		2007			2008		
		No	**Mean ± sd**	**min, max**	**No**	**Mean ± sd**	**min, max**
Observation (+ve interval)	Hosp Kuala Lumpur	19	19.74±62.36	0,276	69	7.88±13.34	0,77
	Hosp Sultanah Bahiyah, Alor Setar	10	3.20±3.85	0,13	71	4.11±4.39	0,24
	Hosp Serdang, Selangor	5	2.20±2.86	0,7	15	5.80±8.41	0,33
	Hosp Selayang, Selangor	12	6.83±15.28	0,55	73	4.56±5.45	0,30
	Hosp Raja Perempuan Zainab II, Kota Bharu	10	4.30±5.01	1,16	31	3.68±7.85	0,45
	HUSM, Kubang Kerian	3	6.00±3.46	2,8	16	7.00±14.87	1,62
	Hosp Sultanah Aminah, Johor Bahru	12	1.67±0.98	0,4	13	1.54±1.81	0,7
	Hosp Umum Sarawak	1	1.00±.	1,1	36	6.58±25.39	0,154
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	16	22.44±74.35	0,301	40	4.57±3.30	0,11
Unique case (-ve interval)	Hosp Kuala Lumpur	4	-	-	2	-	-
	Hosp Sultanah Bahiyah, Alor Setar	0	-	-	1	-	-
	Hosp Serdang, Selangor	1	-	-	0	-	-
	Hosp Selayang, Selangor	0	-	-	1	-	-
	Hosp Raja Perempuan Zainab II, Kota Bharu	0	-	-	1	-	-
	HUSM, Kubang Kerian	0	-	-	1	-	-
	Hosp Sultanah Aminah, Johor Bahru	0	-	-	1	-	-
	Hosp Umum Sarawak	0	-	-	1	-	-
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	1	-	-	2	-	-
Missing	Hosp Kuala Lumpur	2	-	-	0	-	-
	Hosp Sultanah Bahiyah, Alor Setar	0	-	-	3	-	-
	Hosp Serdang, Selangor	1	-	-	2	-	-
	Hosp Selayang, Selangor	0	-	-	0	-	-
	Hosp Raja Perempuan Zainab II, Kota Bharu	0	-	-	1	-	-
	HUSM, Kubang Kerian	0	-	-	0	-	-
	Hosp Sultanah Aminah, Johor Bahru	3	-	-	22	-	-
	Hosp Umum Sarawak	0	-	-	0	-	-
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	3	-	-	3	-	-

Table 2.18 (i): Interval from date of surgery to the date of discharge

	2007	2008
Observation	85	346
Mean ± sd (min, max) 95% CI	21.47±64.03 (1,382) (7.66, 35.28)	10.23±22.01 (0, 377) (7.90, 12.56)
Unique case (-ve interval)	2	9
Missing	16	50
Total	**103**	**405**

Table 2.18 (ii): Interval from date of surgery to the date of discharge by SDP

		2007			2008		
		No	**Mean ± sd**	**min, max**	**No**	**Mean ± sd**	**min, max**
Observation (+ve interval)	Hosp Kuala Lumpur	20	62.50±89.11	0,267	57	24.25±32.11	0,198
	Hosp Sultanah Bahiyah, Alor Setar	10	26.70±68.40	0,218	73	9.99±21.65	0,132
	Hosp Serdang, Selangor	7	51.00±93.91	0,262	16	8.44±12.51	0,42
	Hosp Selayang, Selangor	12	28.50±30.16	0,102	53	38.94±72.45	0,373
	Hosp Raja Perempuan Zainab II, Kota Bharu	10	44.30±62.65	0,202	32	42.66±77.63	0,337
	HUSM, Kubang Kerian	2	43.50±7.78	38,49	16	24.44±23.77	0,76
	Hosp Sultanah Aminah, Johor Bahru	15	35.33±44.83	0,134	36	29.97±27.34	0,136
	Hosp Umum Sarawak	1	350.00±.	350,350	33	24.58±29.08	0,157
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	12	48.25±87.52	0,297	21	40.43±93.35	0,388
Unique case (-ve interval)	Hosp Kuala Lumpur	5	-	-	14	-	-
	Hosp Sultanah Bahiyah, Alor Setar	0	-	-	2	-	-
	Hosp Serdang, Selangor	0	-	-	1	-	-
	Hosp Selayang, Selangor	0	-	-	21	-	-
	Hosp Raja Perempuan Zainab II, Kota Bharu	0	-	-	1	-	-
	HUSM, Kubang Kerian	1	-	-	1	-	-
	Hosp Sultanah Aminah, Johor Bahru	0	-	-	0	-	-
	Hosp Umum Sarawak	0	-	-	4	-	-
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	7	-	-	23	-	-
Missing	Hosp Kuala Lumpur	0	-	-	0	-	-
	Hosp Sultanah Bahiyah, Alor Setar	0	-	-	0	-	-
	Hosp Serdang, Selangor	0	-	-	0	-	-
	Hosp Selayang, Selangor	0	-	-	0	-	-
	Hosp Raja Perempuan Zainab II, Kota Bharu	0	-	-	0	-	-
	HUSM, Kubang Kerian	0	-	-	0	-	-
	Hosp Sultanah Aminah, Johor Bahru	0	-	-	0	-	-
	Hosp Umum Sarawak	0	-	-	0	-	-
	Hosp Queen Elizabeth, Kota Kinabalu, Sabah	1	-	-	1	-	-

More than 80% of patients underwent some form of surgery which is good but only a small number (less than 40%) had adjuvant treatment especially chemotherapy (Table 2.19). Only 30% (Table 2.20) were recorded as Dukes A or B implying that about 70% required some form of additional therapy. Here the shortage of oncologists is clearly seen. There are very few centres offering oncology treatment in Malaysia, depriving many patients from getting proper treatment. This shortage may come down to a level of crisis if appropriate steps are not taken to overcome it in time.

Table 2.19: Treatment modalities

	2007		2008		Total	
Treatment modalities	No.	%[a]	No.	%[b]	No.	%[c]
Not applicable/No therapy	4	4	10	2	14	3
Surgery	82	80	351	87	433	85
Radiotherapy	16	16	66	16	82	16
Cytotoxic &Immunostimulant therapy	32	31	155	38	187	37
Alternative treatment	0	0	5	1	5	1
Supportive care	5	5	14	3	19	4
Endoscopy	4	4	7	2	11	2
Conservative	0	0	0	0	0	0
Others, specify	4	4	5	1	9	2
Total	**147**		**613**		**760**	

** 30 cases did not specify whether treatment was given or not. 256 cases had one type of treatment modality, 165 cases had two types of treatment modalities, 54 cases had three types of treatment modalities and three cases had four types of treatment modalities*

** [a] Denominator=103 (Number of surgery cases in 2007)*

** [b] Denominator=405 (Number of surgery cases in 2008)*

** [c] Denominator=508 (Total number of surgery cases)*

Table 2.20: Staging of disease

	2007		2008		Total	
Dukes	No.	%[a]	No.	%[b]	No.	%[c]
Dukes A	5	5	18	4	23	5
Dukes B	30	29	95	23	125	25
Dukes C1	24	23	82	20	106	21
Dukes C2	4	4	45	11	49	10
Not staged/Unknown	16	16	63	16	79	16
Missing	36	35	166	41	202	40
Total	**115**	**112**	**469**	**115**	**584**	**117**

** 14 cases were cases with surgery but had no pathology done. Cases may have more than one pathology record.*

[a] Denominator=103 (Number of cases in 2007)

[b] Denominator=405 (Number of cases in 2008)

[c] Denominator=508 (Total number of cases)

Table 2.21: Medical complications

	2007		2008		Total	
Medical complications	No.	%	No.	%	No.	%
Yes[a]	19	18	66	16	85	17
- Medical complications[b]						
- DVT/PE[c]	2	11	0	0	2	2
- Cardiac	2	11	8	12	10	12
- Chest Infection	8	42	8	12	16	19
- Pneumothorax	1	5	4	6	5	6
- Pressure Sores	0	0	0	0	0	0
- Other	10	53	51	77	61	72
Total medical complications	23		71		94	
No	76	74	302	75	378	74
Missing	8	8	37	9	45	9
Total	**103**	**100**	**405**	**100**	**508**	**100**

[a] *One case had "Yes" on Medical Complications but did not specify type of complication*

[b] *Ten cases had two medical complications: (DVT+Chest infection=1, Cardiac+ Pneumothorax=1, Cardiac+Other=3, Chest Infection+Pneumothorax=1, Chest Infection+ Others=4)*

[c] *Deep vein thrombosis/pulmonary embolism*

Table 2.22 (i): Surgical complications

	2007		2008		Total	
Surgical complications	No.	%	No.	%	No.	%
Yes	20	19	82	20	102	20
No	76	74	291	72	367	72
Missing	7	7	32	8	39	8
Total	**103**	**100**	**405**	**100**	**508**	**100**

Table 2.22 (ii): Detailed information on surgical complications

	2007		2008		Total	
Surgical Complications	No.	% [a]	No.	% [b]	No.	% [c]
Abdominal/Pelvic Collection	0	0	7	9	7	7
Enterocutaneous Fistula	1	5	3	4	4	4
Wound Infection	4	20	16	20	20	20
Deep Wound Dehiscence	0	0	5	6	5	5
Prolonged Ileus	1	5	1	1	2	2
Small Bowel Obstruction	0	0	1	1	1	1
Urinary Retention	1	5	5	6	6	6
Superficial Wound Dehiscence	1	5	1	1	2	2
Anastomotic Leak	1	5	14	17	15	15
Septicaemia	3	15	13	16	16	16
Ureteric Injury	0	0	1	1	1	1
Incontinence	1	5	0	0	1	1
Splenectomy	0	0	0	0	0	0
Other	11	55	41	50	52	51
Total	**24**	**120**	**108**	**132**	**132**	**131**

[a] *Denominator=20*

[b] *Denominator=82*

[c] *Denominator=102*

** One case had all "False" on type of surgical complications*

*** 84 cases had one type of surgical complication, 11 cases had two types of surgical complications, five cases had three types of surgical complications, and two cases had six types of surgical complications*

Table 2.23: Inpatient death

	2007		2008		Total	
Inpatient Death	**No.**	**%**	**No.**	**%**	**No.**	**%**
Yes	**8**	**8**	**26**	**6**	**34**	**7**
- Cause of Death						
- Due to Cancer	1	13	9	35	10	29
- Due to post-op Complications	2	25	3	12	5	15
- Other cause,cancer present	2	25	4	15	6	18
- Others,specify	2	25	9	35	11	32
- Missing	1	13	1	4	2	6
No	**88**	**85**	**343**	**85**	**431**	**85**
Missing	**7**	**7**	**36**	**9**	**43**	**8**
Total	**103**	**100**	**405**	**100**	**508**	**100**

CHAPTER 3: PATHOLOGY 2008*

**Interpretation for this chapter is only for 2008; excludes data of 2007 and missing data of 2008.*

3.1 INTRODUCTION

There were a total of 469 patients with confirmed histopathologic diagnoses of colorectal cancer. In 154 (32.8%) patients, diagnoses were based on biopsy only. Nineteen (4.1%) had malignant polypectomy and 296 (63.1%) had resection of the bowel.

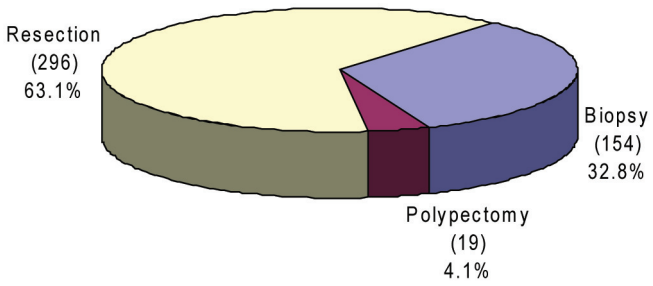


Figure 3.1: Types of specimen from which histopathologic diagnoses were made

3.2 TUMOUR SITE

Tumour sites were specified in 460 patients, with 112 right sided (caecum to splenic flexure) and 348 left sided tumours (Figure 3.2). The detailed location of cancer is shown in Figure 3.3.

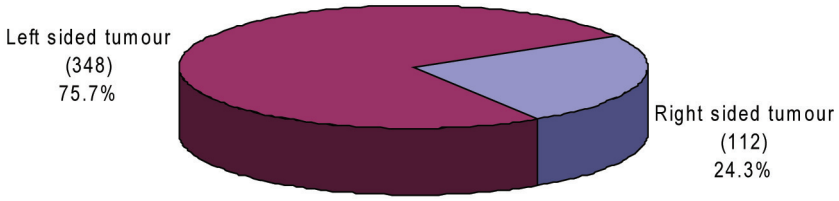


Figure 3.2: Tumour site

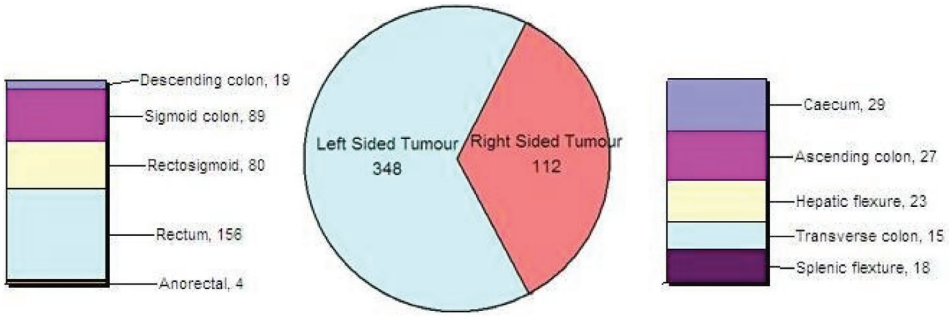


Figure 3.3: Detailed information on location of tumour

3.3 HISTOLOGICAL TUMOUR TYPE

Histological information was available for 466 patients (based either on biopsy, polypectomy or bowel resection). Of these, 446 (95.7%) were usual-type adenocarcinomas. The remaining tumours were mucinous carcinoma (12 patients; 2.6%), signet ring carcinoma (seven patients; 1.5%) and neuroendocrine carcinoma (one patient). Detailed information on histological tumours types are shown in Figure 3.4.

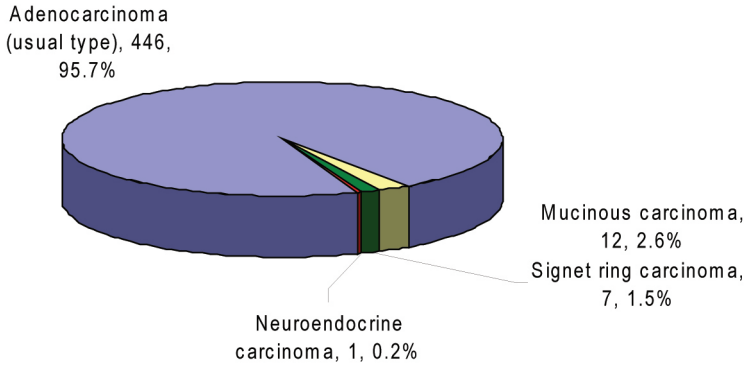


Figure 3.4: Types of tumour histology

3.4 TUMOUR DIFFERENTIATION

Records from 373 patients with usual-type adenocarcinoma included information on tumour differentiation. Majority (301 patients, 80.7%) of these tumours were moderately-differentiated. The histological differentiation is shown in Figure 3.5.

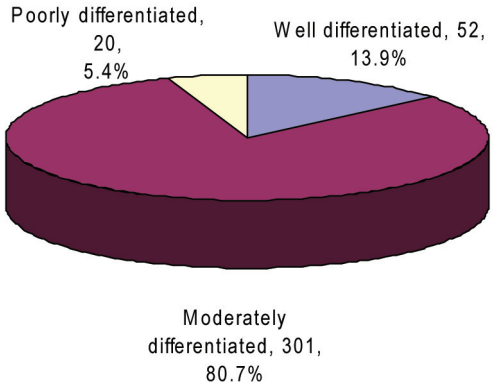


Figure 3.5: Tumour differentiation for adenocarcinoma of usual type.

3.5 TUMOUR STAGE

Two-hundred twenty-four patients had data on the pathologic (p) TNM staging of the colorectal tumours (i.e. resection was done without prior neoadjuvant therapy). Majority (190 patients; 84.8%) of them were diagnosed with the malignancy when tumour had already extended beyond muscularis propria (pT3 and pT4). The details are as shown in Figure 3.6. Of 224 resection specimens, 118 (52.7%) showed evidence of regional lymph node metastases (Figure 3.7). Distant metastases were reported in 33 out of 259 patients, with the most frequently recorded site being the liver (eight out of 15 recorded sites). The other sites of distant metastases include the lymph node (1), the retroperitoneum/peritoneum (2) and the lung (1).

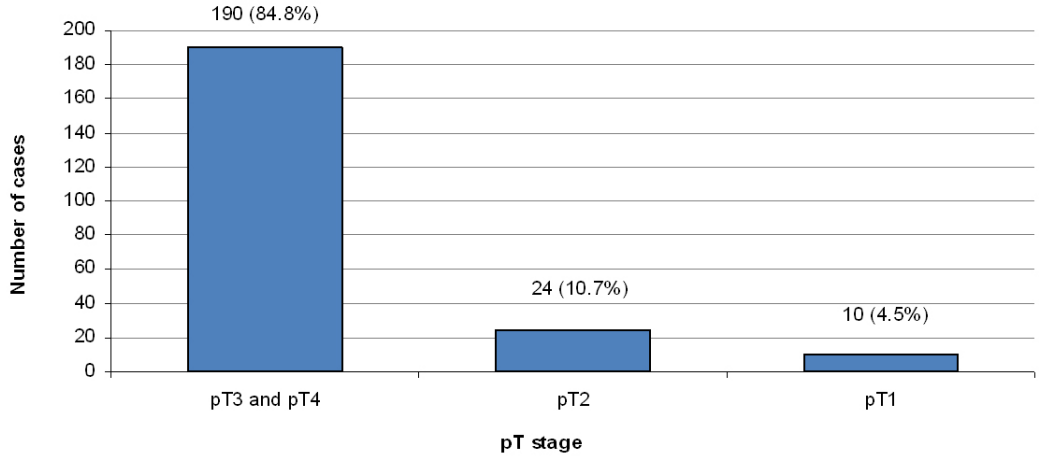


Figure 3.6: (p)T stage for resected tumours

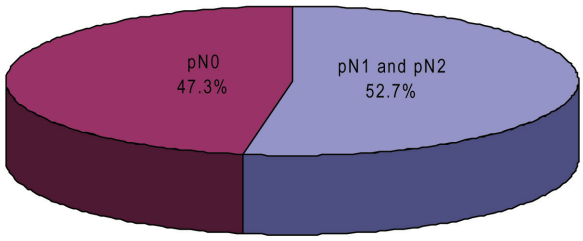


Figure 3.7: Regional lymph node metastasis

There was no significant association between histologic tumour differentiation and pathologic tumour stage (pT), as majority of both well-differentiated tumours (68.5%) and moderately differentiated tumours (86.4%) were diagnosed at higher stages (pT3 or pT4). This is shown in Figure 3.8.

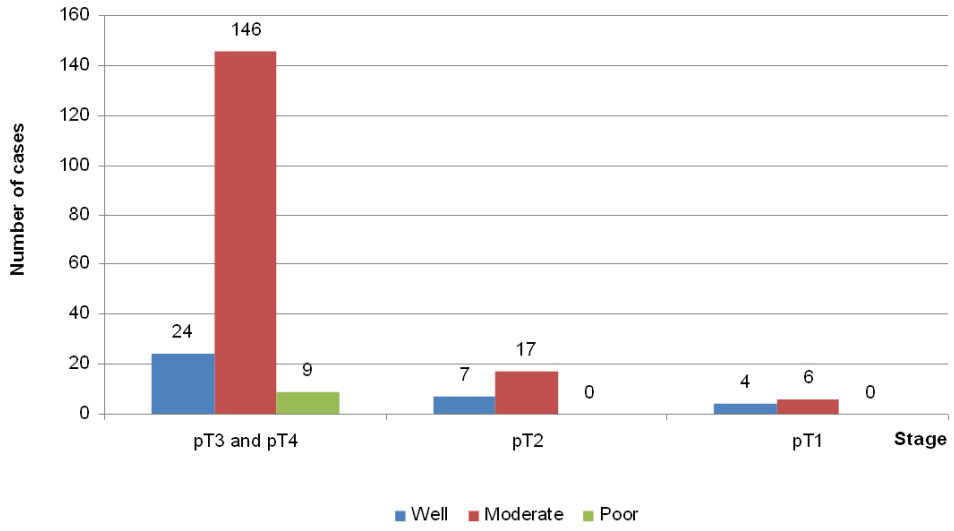


Figure 3.8: Histologic tumour differentiation versus pT stage.

3.6 REGIONAL LYMPH NODE SAMPLING

Data regarding number of lymph nodes sampled were obtained from 278 resected specimens. Of these, a minimum of 12 lymph nodes were sampled in only 123 (44.2%) cases while 155 cases had 0-11 lymph nodes sampled.

In cases that had more than 12 lymph nodes sampled, pN2 stage (four or more positive nodes) was observed in 39 of 70 (55.7%) specimens with positive lymph nodes. In contrast, pN2 stage was only noted in 27 of the 82 cases (32.9%) with less than 12 lymph nodes retrieved.

3.7 TUMOUR INVOLVEMENT OF MARGINS IN RESECTED SPECIMENS

Surgical margin involvement was assessed in proximal and distal ends of resected specimens or proximal and distal doughnuts if available, as well as circumferential/nonperitonealised margins. Of 296 resected specimens, 12 (4.1%) showed proximal or/and distal margin involvement by tumour. Of 150 specimens that had information on circumferential/nonperitonealised margins, 48 cases (32.0%) showed evidence of margin involvement. Of 87 rectal cancers with available information on circumferential margin, 27 (31.0%) showed tumour involvement. In the colon, 21 of 63 cancers (33.3%) showed nonperitonealised margin involvement. Assessment of margin involvement, for resected ends and circumferential/nonperitonealised margin are shown in Figures 3.9 and 3.10, respectively.

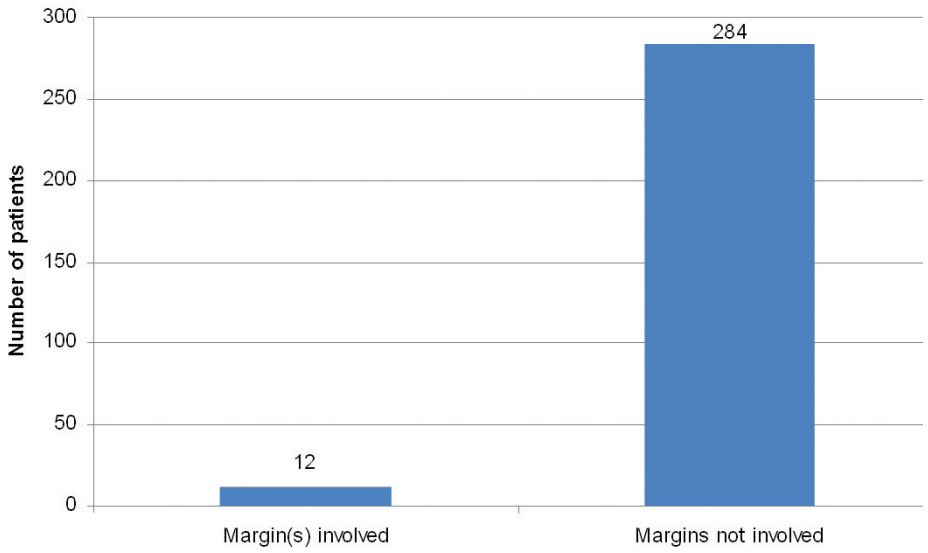


Figure 3.9: Assessment of resection (cut end) margins involvement of colonic and rectal cancers

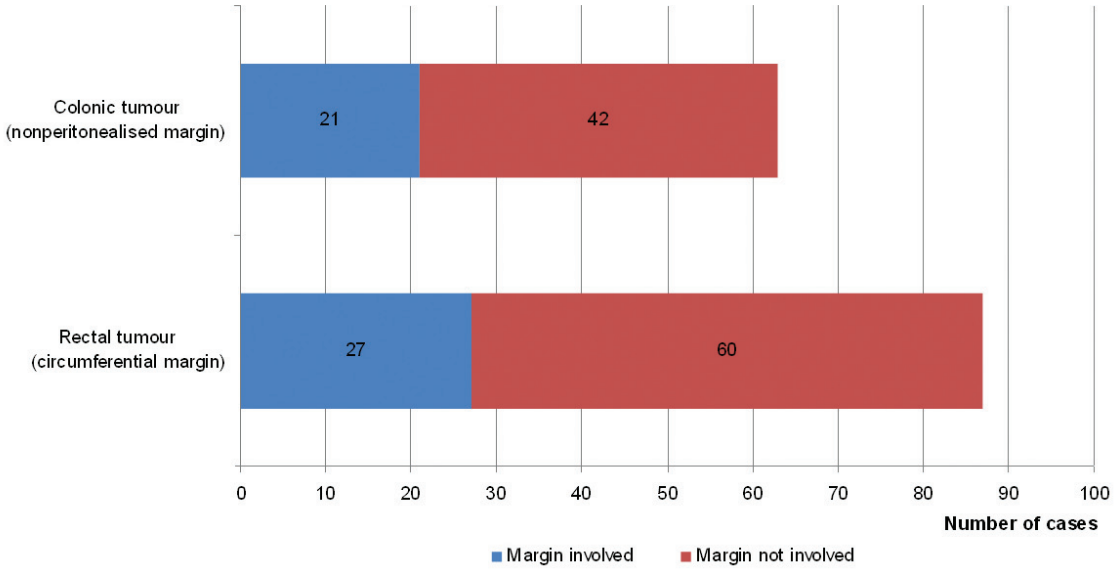


Figure 3.10: Assessment of circumferential/nonperitonealised margin

3.8 TUMOUR SIZE

Data on tumour size was obtained from 229 resected specimens. Of these, the widest dimension of 125 tumours (54.6%) were 50mm or less and 104 (45.4%) tumors were larger than 50mm. Data on pT and pN were available for 218 cases i.e. 100 cases of tumours greater than 50mm and 118 cases of tumours 50mm or less.

For tumours that were larger than 50mm, 54 of them (54.0%) showed evidence of lymph node metastases while 66 of 118 (59.0%) tumours of 50mm or less had positive regional nodes. For tumours that were larger than 50mm, 94% has extended beyond muscularis propria (pT3 and pT4) while 82.9% of tumours less than 50mm showed similar depth of invasion.

Thus it may be concluded that there was no significant association between tumour size, lymph node metastases and depth of tumour invasion.

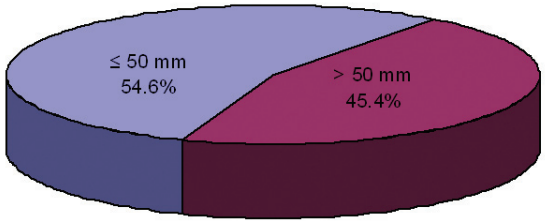


Figure 3.11: Tumour size

3.9 LYMPHOVASCULAR INVASION

Information on intramural lymphovascular invasion was available for 246 resected specimens and was positive in 72 (29.3%). Of these 72 patients, 60 (83.3%) had evidence of regional lymph node metastases, signifying an association between presence of lymphovascular invasion and regional lymph node metastasis.

Extramural venous invasion, which is a feature that predicts liver metastasis, was observed in 57 of 247 (23.1%) patients. However, histologically confirmed liver metastasis was recorded in only two of these cases.

3.10 OTHER HISTOLOGICAL FEATURES

3.10.1 INTRATUMOURAL LYMPHOCYTIC INFILTRATE (TUMOUR-INFILTRATING LYMPHOCYTES)

Significant intratumoural lymphocytic infiltrate was seen in 28 out of 231 specimens (12.1%).

3.10.2 PERITUMOURAL LYMPHOID AGGREGATES

Marked peritumoural lymphoid aggregates were seen in 28 out of 228 cases (12.3%).

3.11 PATHOLOGIC RESPONSE TO NEOADJUVANT THERAPY

Minimal information was available with regards to pathologic response of tumour to neoadjuvant therapy. Only two cases were recorded, which showed minimal presence of residual tumours.

3.12 ASSOCIATED ABNORMALITIES

3.12.1 POLYPS

Information on polyps was available in 256 resected specimens. Polyps were seen in 59 cases (23.0%). Five of these cases had more than 100 polyps, suggesting Familial Adenomatous Polyposis (FAP). There were 27 cases with less than 100 polyps each. The remaining 27 cases did not specify the number of polyps.
In 45 patients, the types of polyps were specified. The most frequently recorded polyp type was tubular adenoma (26 cases, 57.8%). The various polyp types are shown in Figure 3.12.

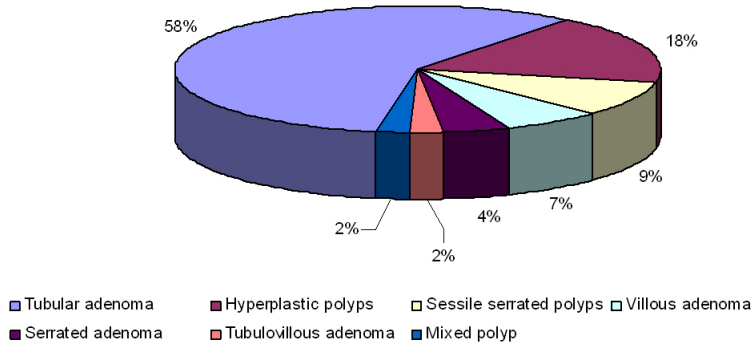


Figure 3.12: Various types of polyp

3.12.2 OTHER ABNORMALITIES

Other abnormalities were noted in non-cancerous parts of the bowel specimen. This included one case each of Crohn's disease and colitis (unspecified) and three cases of diverticular disease.

3.13 SYNCHRONOUS TUMOURS

Information on the presence of synchronous tumours was available in 242 patients. There were five patients with synchronous tumours.

CHAPTER 4: CHEMOTHERAPY

A total of 241 colorectal cancer patients underwent chemotherapy; 74 in 2007 and 167 in 2008. For both years, the majority of patients received treatment with curative intent in the adjuvant (postoperative) setting (Table 4.1). Fewer patients received treatment in the neoadjuvant (preoperative) setting.

Table 4.2 shows the chemotherapy protocol/regimen administered, with the MAYO Clinic regimen (bolus 5-fluorouracil/folinic acid) being the most common. This is followed by the de Grammont (infusional 5-fluorouracil/folinic acid) and FOLFOX (infusional 5-fluorouracil/folinic acid plus oxaliplatin) regimens. The two least commonly used regimens in both years were Capecitabine (oral chemotherapy) and FOLFIRI (infusional 5-fluorouracil/folinic acid plus irinotecan).

In 2007, 66% of patients who underwent chemotherapy completed treatment or stopped due to patient's choice (Table 4.3). In the same year, 36% of patients had complete response to treatment (Table 4.4). In 2008, 50% of patients stopped chemotherapy due to treatment completion or patient's choice (Table 4.3), with 38% having complete response to treatment (Table 4.4).

Table 4.5 shows the Eastern Cooperative Oncology Group Performance Status Scale (ECOG PS) for patients after chemotherapy completion. In both years, the majority of patients were in Grades 0 and 1 i.e. categories of good performance status.

Table 4.1: Type of treatment

	Treatment intent															
	2007								2008							
	Curative		Palliative		Missing		Total		Curative		Palliative		Missing		Total	
Chemotherapy intent	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Neo Adjuvant	3	8	13	62	2	13	18	24	8	8	5	21	5	12	18	11
Adjuvant	31	82	7	33	7	47	45	61	86	86	14	58	30	70	130	78
Concurrent	4	11	0	0	3	20	7	9	6	6	4	17	8	19	18	11
Unknown	0	0	1	5	2	13	3	4	0	0	1	4	0	0	1	1
Missing	0	0	0	0	1	7	1	1	0	0	0	0	0	0	0	0
Total	38	100	21	100	15	100	74	100	100	100	24	100	43	100	167	100

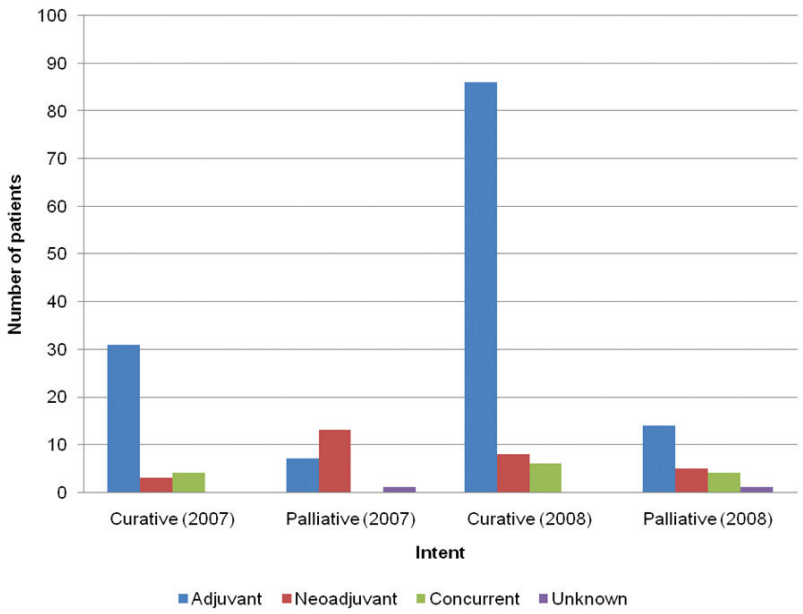


Figure 4.1: Type of treatment

Table 4.2: Name of chemotherapy regimen

	Treatment intent															
	2007								2008							
	Curative		Palliative		Missing		Total		Curative		Palliative		Missing		Total	
Name of regimen	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
MAYO Clinic	12	32	8	38	9	60	29	39	35	35	11	46	22	51	68	41
de Grammont	12	32	4	19	0	0	16	22	26	26	2	8	7	16	35	21
FOLFIRI	1	3	2	10	2	13	5	7	4	4	1	4	1	2	6	4
FOLFOX	7	18	4	19	2	13	13	18	25	25	8	33	3	7	36	22
Capecitabine	4	11	1	5	0	0	5	7	5	5	2	8	4	9	11	7
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Missing	2	5	2	10	2	13	6	8	5	5	0	0	6	14	11	7
Total	**38**	**100**	**21**	**100**	**15**	**100**	**74**	**100**	**100**	**100**	**24**	**100**	**43**	**100**	**167**	**100**

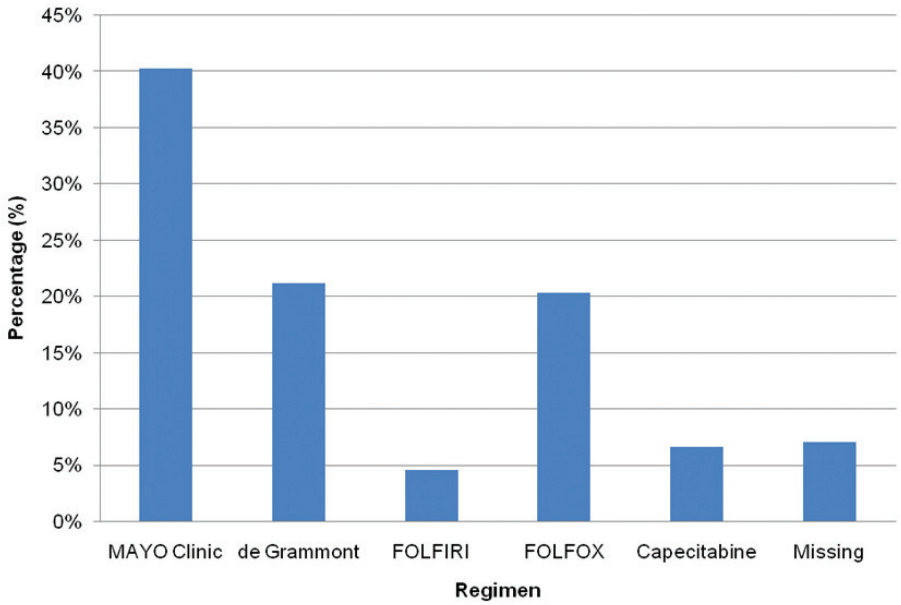


Figure 4.2: Name of chemotherapy regimen (2007 and 2008 combined)

Table 4.3: Reason for stopping chemotherapy

	2007		2008		Total	
Reason for stopping chemotherapy	No.	%	No.	%	No.	%
Completed treatment+patient's choice	49	66	84	50	133	55
Progressive disease	3	4	2	1	5	2
Poor performance status	1	1	3	2	4	2
Stable disease	1	1	0	0	1	0
Toxicities, specify	1	1	1	1	2	1
Terminal/Death	2	3	3	2	5	2
Others, specify	6	8	8	5	14	6
Unknown	1	1	17	10	18	7
Total	**64**		**118**		**182**	

** Cases may have one or more than one type of reason for stopping or not have any one type of reason for stopping*

- 66 cases had no type of reason for stopping, 169 cases had one type of reason for stopping, five cases had two types of reason for stopping, one case had three types of reason for stopping

Table 4.4: Response to therapy

	Treatment intent															
	2007								2008							
	Curative		Palliative		Missing		Total		Curative		Palliative		Missing		Total	
Response to therapy	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Complete	12	32	9	43	6	40	27	36	49	49	5	21	9	21	63	38
Partial	2	5	3	14	1	7	6	8	0	0	1	4	1	2	2	1
Stable disease	3	8	0	0	1	7	4	5	3	3	2	8	5	12	10	6
Progressive disease	3	8	1	5	0	0	4	5	4	4	1	4	0	0	5	3
Unknown	18	47	8	38	7	47	33	45	44	44	15	63	28	65	87	52
Total	**38**	**100**	**21**	**100**	**15**	**100**	**74**	**100**	**100**	**100**	**24**	**100**	**43**	**100**	**167**	**100**

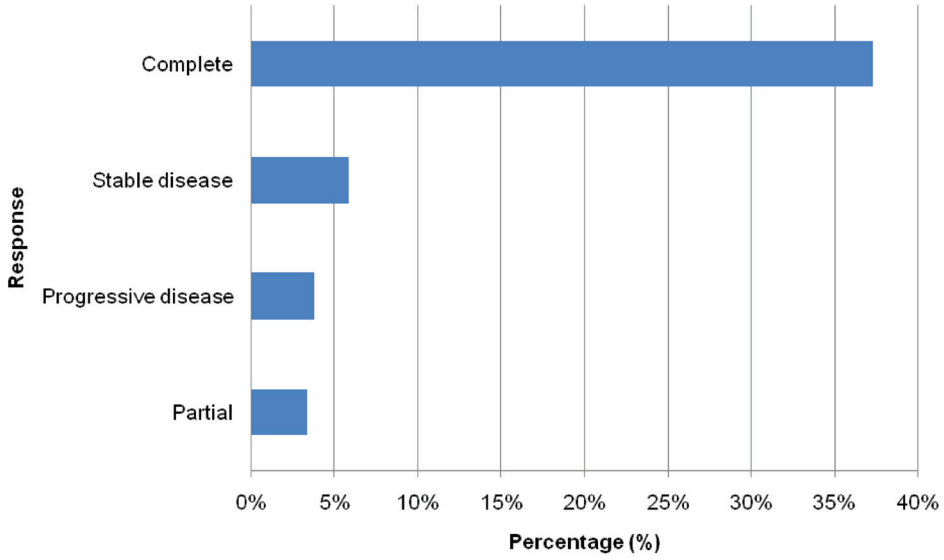


Figure 4.3: Response to therapy

Table 4.5: Eastern Cooperative Oncology Group Performance Status Scale (ECOG PS)

	2007		2008		Total	
ECOG PS	No.	%	No.	%	No.	%
Asymptomatic (Grade 0)	18	24	61	37	79	33
Symptomatic, fully ambulatory (Grade 1)	5	7	6	4	11	5
Symptomatic, in bed <50% of the day (Grade 2)	1	1	1	1	2	1
Symptomatic, in bed >50% of the day, but not bedridden (Grade 3)	0	0	2	1	2	1
Bedridden (Grade 4)	0	0	0	0	0	0
Dead (Grade 5)	2	3	1	1	3	1
Unknown	48	65	96	57	144	59
Total	**74**	**100**	**167**	**100**	**241**	**100**

CHAPTER 5: RADIOTHERAPY

Table 5.1 shows the patients who received radiotherapy for colorectal cancer in 2007 and 2008. Only 78 patients received the therapy with the majority having received radiotherapy concomitantly with chemotherapy in 2007 and 2008. A significant proportion received radiotherapy independently as palliative treatment or monotherapy in both years. The majority of patients completed the prescribed radiotherapy (Table 5.2).

Table 5.3 shows the patients who received both radiotherapy and chemotherapy. Radiotherapy was given concomitantly with chemotherapy in the curative and palliative settings for 71% of patients in 2007 and 66% of patients in 2008. Sequential treatment of radiotherapy followed by chemotherapy was far less common in both years.

Table 5.1: When was radiotherapy given?

	2007		**2008**		**Total**	
When was radiotherapy given?	No.	%	No.	%	No.	%
Concomitant with chemotherapy	17	59	25	51	42	54
Sequential to the chemotherapy	1	3	5	10	6	8
Independently as Palliative or Mono therapy	4	14	8	16	12	15
Unknown	6	21	4	8	10	13
Missing	1	3	7	14	8	10
Total	**29**	**100**	**49**	**100**	**78**	**100**

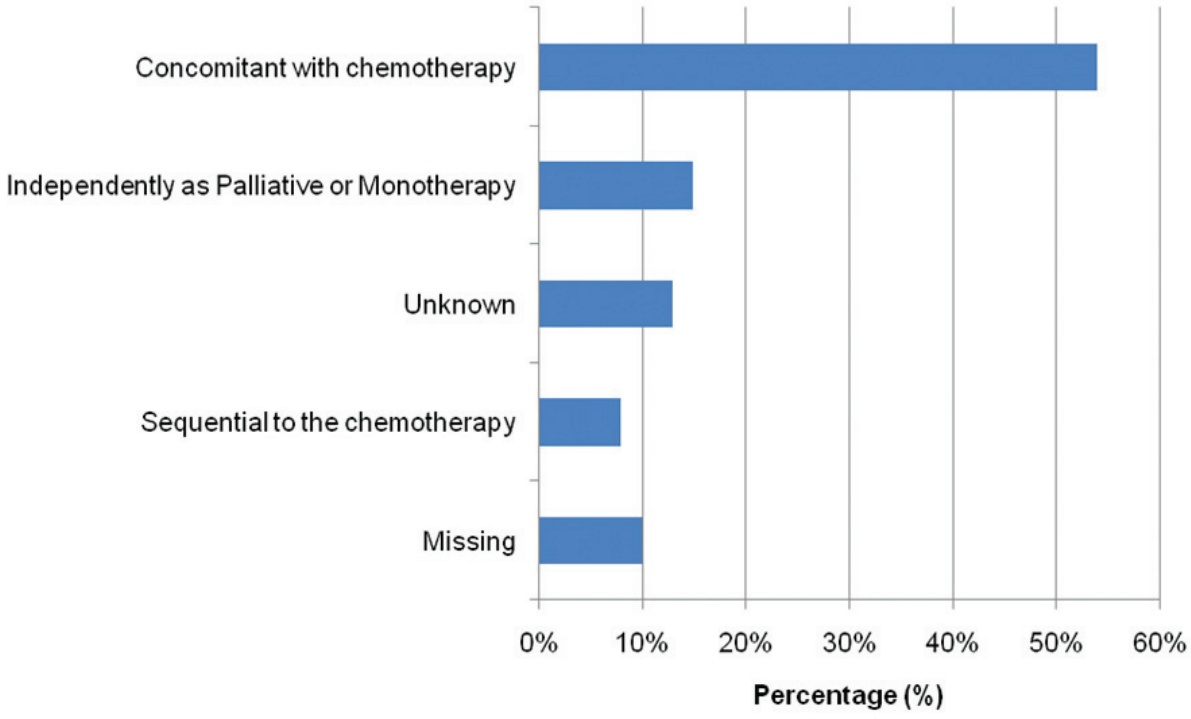


Figure 5.1: When was radiotherapy given?

Table 5.2: Reason for stopping radiotherapy

	2007		2008		Total	
Reason for stopping radiotherapy	No.	%	No.	%	No.	%
Completed treatment	24	83	38	78	62	79
Patient's choice	1	3	3	6	4	5
Progressive disease	1	3	0	0	1	1
Poor performance status	0	0	0	0	0	0
Stable disease	0	0	0	0	0	0
Toxicities	0	0	0	0	0	0
Terminal/Dead	1	3	0	0	1	1
Others,specify	2	8	0	0	2	3
Not available /Unknown/Ongoing	0	0	7	14	7	10
No type of reason *	0	0	1	2	1	1
Total	29	100	49	100	78	100

** One case had no type of reason for stopping radiotherapy*

Table 5.3: When radiotherapy given vs. chemotherapy therapy intent

	Treatment Intent															
	2007								2008							
	Curative		Palliative		Missing		Total		Curative		Palliative		Missing		Total	
When was radiotherapy given	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Concomitant with chemotherapy	6	67	2	50	7	88	15	71	8	57	5	100	6	60	19	66
Sequential to the chemotherapy	0	0	1	25	0	0	1	5	2	14	0	0	2	20	4	14
Unknown	3	33	1	25	1	13	5	24	3	21	0	0	1	10	4	14
Missing	0	0	0	0	0	0	0	0	1	7	0	0	1	10	2	7
Total	9	100	4	100	8	100	21	100	14	100	5	100	10	100	29	100

** from 78 cases of radiotherapy, only 50 had chemotherapy*

CHAPTER 6: FOLLOW-UP: AT 6 MONTHS AND 12 MONTHS

The aims of follow-up are to diagnose, in the earliest possible stage, any metastasis or tumours that develop later.
Based on our collected data (Figure 6.1), 84 patients were alive at follow-up after six months while 27 patients were alive at 12 months follow-up. Twelve patients were reported dead during six months follow-up and two during 12 months follow-up while the other 12 were considered lost to follow-up as they had never returned for routine check up or defaulted treatments offered.

Table 6.1: Follow-up month

	2007		2008		Total	
Follow-up month	**No.**	%	**No.**	%	**No.**	%
Month 3	34	27	103	26	137	26
Month 6	23	18	86	22	109	21
Month 9	17	13	36	9	53	10
Month 12	19	15	13	3	32	6
Month 24	0	0	0	0	0	0
Month 36	0	0	0	0	0	0
Others	27	21	132	33	159	30
Missing	7	6	29	7	36	7
Total	127	100	399	100	526	100

Table 6.2: Status of patients at follow-up

	Follow-up month											
	2007						2008					
	Month 6		Month 12		Total		Month 6		Month 12		Total	
Patient status	No.	%	No.	%	**No.**	**%**	No.	%	No.	%	No.	%
Alive	19	83	15	79	**34**	**81**	65	76	12	92	77	78
Dead	2	9	1	5	**3**	**7**	10	12	1	8	11	11
Lost to follow-up	2	9	3	16	**5**	**12**	7	8	0	0	7	7
Others, specify	0	0	0	0	**0**	**0**	4	5	0	0	4	4
Missing	0	0	0	0	**0**	**0**	0	0	0	0	0	0
Total	23	100	19	100	**42**	**100**	86	100	13	100	99	100

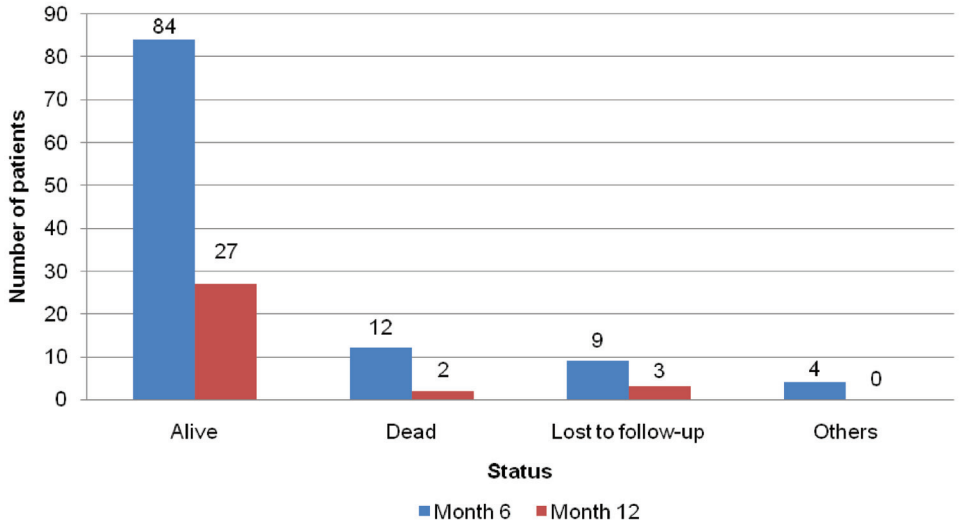


Figure 6.1: Status of patients at follow-up (2007 and 2008 combined)

Follow-up of more than 6 months:

Table 6.3: Status of Alive Patients

	2007		2008		Total	
Alive: With evidence of	No.	%	No.	%	No.	%
Without recurrence	34	53	82	58	116	56
With evidence of:	10	16	11	8	21	10
-Recurrence*	6	9	3	2	9	4
-Metastases*	6	9	8	6	14	7
-Metachronous*	0	0	0	0	0	0
Transfer to a new centre	1	2	8	6	9	4
Others	17	27	41	29	58	28
Missing	2	3	0	0	2	1
Total	**64**	**100**	**142**	**100**	**206**	**100**

- Patients who are Alive after six months follow-up

** May occur more than once*

The long-term prognosis after surgery depends on whether the cancer has spread to other organs (metastasis) or recurrence occurred between the follow-up visits. Referring to Table 6.3, 116 patients (56.3%) were alive without recurrence while the other 21 (10.2%) were alive with evidence of recurrence or metastasis. Nine (4.3%) were transferred to other new centres and 58 (28.2%) were reported as alive with their status as “others”. This status usually includes outpatient visits, clinical evaluation, haematological, radiological, and colonoscopic evaluation and also admissions to ward due to any other medical reasons.

Most of the reported cause of death for colorectal cancer after six months follow-up was due to the cancer itself. As in Table 6.4, 50% of the deaths after six months follow-up were due to cancer. Four percent died due to post-op complications and septicaemia respectively while the deaths of 13% were due to other causes although the cancer was still present. However, for 8% of cases, the contribution of cancer to death was unknown.

Table 6.4: Primary cause of death

	2007		2008		Total	
Death: Cause of death	No.	%	No.	%	No.	%
Due to cancer	5	71	7	41	12	50
Due to post-op complications	1	14	0	0	1	4
Recurrence	0	0	0	0	0	0
Metastases	0	0	0	0	0	0
Septicaemia	0	0	1	6	1	4
Other cause, cancer present	0	0	3	18	3	13
Other cause, cancer not present	0	0	0	0	0	0
Contribution of cancer to death unknown	0	0	2	12	2	8
Others, specify	1	14	3	18	4	17
Unknown	0	0	1	6	1	4
Missing	0	0	0	0	0	0
Total	**7**	**100**	**17**	**100**	**24**	**100**

** After six months follow-up*

APPENDIX

APPENDIX 1: METHOD

1.0 REGISTRY DESIGN

This is a multi-centre, observational cohort study designed to evaluate the health outcomes of patients with colorectal cancer undergoing treatment at participating clinical centres.

All confirmed cases of colorectal cancer from the participating sites (source data providers, SDP) that meet the inclusion criteria, will be eligible for enrolment into the registry. The colorectal cancer cases are identified by the gastroenterologists, colorectal surgeons, pathologists and oncologists working in these centers.

The patient registry is designed to observe secular changes in clinical practice as well as to observe long term mortality outcome for colorectal cancer in real world clinical practice. Hence, the registry should operate at least 10 years to meet many of its objectives that require long term patient follow-up to realise.

2.0 REGISTRY STUDY POPULATION AND PATIENT RECRUITMENT

2.1 Selection of subjects

As a patient registry, the eligibility criterion is deliberately broad (any patients undergoing treatment for colorectal cancer at any clinical centres) to reflect real world practice and to ensure the sample is representative of the population at large with colorectal cancer. Patients are informed of the centre's participation in the registry through public notices.

2.2 Inclusion criteria

All histologically verified primary colorectal cancer cases from participating sites (irrespective of the staging, histopathology, duration of the disease) reported during the study period.

2.3 Exclusion criteria

Any patient who received his or her treatment at participating study sites not within the study period. Anal cancers and metastatic lesions to the colorectum are excluded.

3.0 DATA MANAGEMENT

3.1 Data collection

All data on demographics, clinical history, family history, pathology and treatment details (including surgical, oncology and palliation treatment) will be extracted from patients' medical records by designated staff under supervision by site coordinator/investigators.

There are no prescribed study visits. Patient shall attend the clinical site as and when required per the standard of care at the site. Required data shall be collected as they become available. Each participating hospital will notify all new patients to the registry until the termination of the registry. Patients shall be followed-up for up to 36 months.

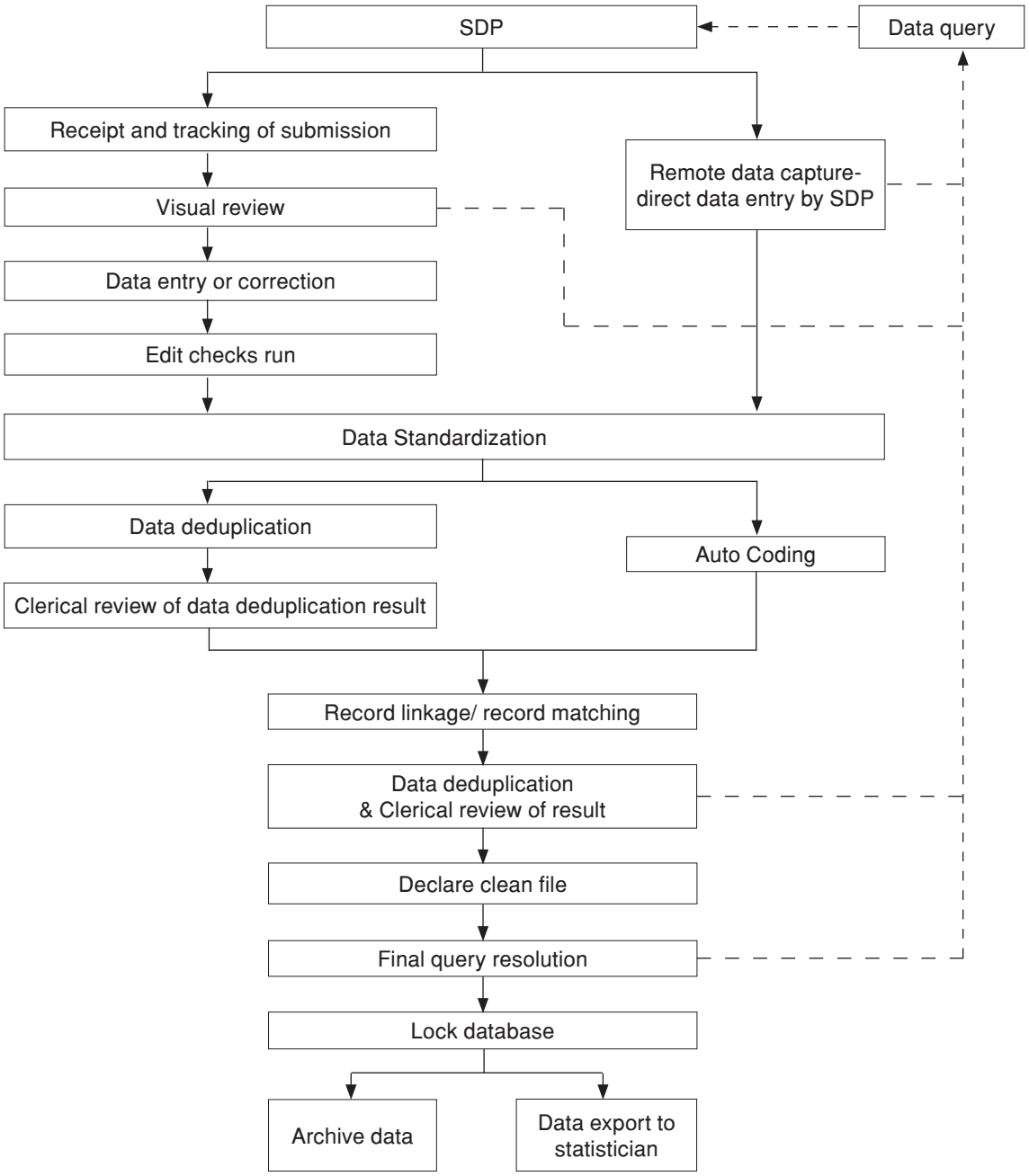
Data is collected and stored through a customised web-based electronic case report form (eCRF) that is readily available to source data providers. The eCRFs are implemented using third party (Datamed Clinical Computing Services Sdn Bhd) software application that is fully validated and conforms to regulatory requirements for electronic data capture, where applicable.

Where eCRF could not be implemented for technical or resource reason, or as a backup measure, the registry uses paper CRF to record and transfer data collected.

3.2 Database monitoring and data management

Database monitoring and data management will be carried out by the research assistants under the supervision of the principal investigators and the Clinical Research Centre, Hospital Kuala Lumpur in compliance with patient data protection.

All data captured whether electronically via eCRF or manually via paper CRF is stored in a third party database. Remote data capture via eCRF and central database management functions is underpinned by an ICT infrastructure, at the heart of which is the highly secured data centre (Datamed Clinical Computing Services Sdn Bhd) which hosts the registry database.



DATA FLOW PROCESS

APPENDIX 2: PARTICIPATING CLINICAL SITES (SOURCE DATA PROVIDERS)

1. Hospital Sultanah Bahiyah, Alor Star, Kedah
   - Dato' Dr Muhammad Radzi Abu Hassan
   - Dr Wan Khamizar Wan Khazim
   - Datin Dr Nik Raihan Nik Mustapha
   - Dr Kiew Kuang Kiat
   - Dr N. Ravindran
   - Mr Muhamat Shamil Hj Yusuf (MA)
   - S/N Noorhaslina Binti Ahmad
   - S/N Sabariah Binti Ibrahim

2. Hospital Kuala Lumpur
   - Dr Hajjah Rosaida Hj Mohd Said
   - Dr Ganesananthan Shanmuganathan
   - Dr Hjh Zabedah bt Haji Othman
   - Dr Natasha bt Mohd Hashim
   - Dr Lau Fen Nee
   - Dr Razmin Ghazali
   - Dr Razali Ibrahim
   - Dr Kok Sim Hui
   - Nurse Norleza Hassan
   - Nurse Zanihah bt Muhammad
   - Mr Mohd Isa bin Hamidon (PPK)

3. Hospital Serdang, Selangor
   - Assoc. Prof. Dr Wendy Lim Wan Dee
   - Dr Rushdan Aziz
   - Prof Dr Yunus Gul bin Alif Gul
   - Dr Thamilannal Subramaniam
   - Dr Rosna binti Yunus
   - Dr Sangar a/l Perumal

4. Hospital Queen Elizabeth, Kota Kinabalu, Sabah
   - Dr Jayaram Menon
   - Dr Chin Su Kiun
   - Dr Shankaran a/l Thevarajah
   - Dr Lim Chun Sen
   - Dr Othman Abdullah
   - S/N Tan Siew Phung
   - S/N Ruzina binti Benedict Juis
   - S/N Karenita K. Shandu
   - Dr Vasanthi Selvaraju (Hosp. Pakar Likas)
   - Dr D. Jayendran (Hosp. Pakar Likas)

5. Hospital Raja Perempuan Zainab II, Kota Bharu, Kelantan
   - Dr Rosemi bin Salleh
   - Dr Ahmad Shanwani bin Mohamed Sidek
   - Dr Azhan bin Yusoff
   - Dr Mukarramah binti Che Ayub
   - Mr Haji Fauzi bin Mamat (MA)
   - Mr Kamarudin bin Mohamad (Lab Technologist)

6. Hospital Sultanah Aminah, Johor Bahru
   - Dr Andrew Gunn Kean Beng
   - Dr Rahmat bin Othman
   - Dr Noraida bt Khalid
   - Dr Zakaria Jusoh
   - Dr Abraham Mathew George
   - Dr Mohd Roslan bin Haron
   - S/N Norhana

7. Hospital Selayang, Selangor
   - Dr Fitjerald Henry
   - Dr Muhammad Ridwan bin Mirza Asfian
   - Dr Sharmila Sachithanandan
   - Dr Noor Laili Mokhtar
   - Dr Richard Lim Boon Leong
   - Ms Zamzurina Binti Zulkifli

8. Hospital Universiti Sains Malaysia (HUSM)
   - Dr Lee Yeong Yeh
   - Dr Syed Hassan bin Syed Abd Aziz
   - Dr Maya Mazwin binti Yahya
   - Dr Zaidi bin Zakaria
   - Dr Nazri Mustaffa
   - Prof Dr Nor Hayati Othman
   - Dr Hoh Boon Peng
   - Ms Yam Yan Yan
   - Dr VMK Bhavaraju
   - Sr Arizah Ibrahim

9. Hospital Umum Sarawak, Kuching
   - Dr Wong Chee Ming
   - Dr Jacqueline Wong Oy Leng
   - Dr C.R. Beena Devi
   - Muhammad Faizal Abdullah
   - S/N Diana Hui
   - Sr Tan Hoon Yian