mutations − in 61 codon and one mutation was found in 146 codon of KRAS gene. Frequency of mutation in women was higher than in men (67.4% and 43.2%, respectively). Mostly often KRAS-mutation was found in patients younger than 39 y.o. (66.7%). In patients older than forty it was found that frequency of mutation increased depending on age. Mutations were found in a group of patients where frequency of oncological malignancies was 29.2% but frequency of this sign in group with wild type of gene was 43.7%. Combination of adenocarcinoma with polyps was found in 16.7% in group with mutant gene and only in 6.9% in group with wild type. Frequency of KRAS-mutation in colon cancer was 22.2% and 40.4% in rectal cancer. Metastatic lymphatic spread was found in 46.2% of patients with mutation and only in 29.2% of patients with wild type KRAS-gene.
Conclusion: KRAS-mutation occurs two times often in rectal cancer than in colon that can be the evidence of different pathways of their growth. In patients with mutation combination of adenocarcinoma and polyps occurs often than in patients with wild type of gene. Tumours with mutant status give metastatic spread in lymphatic nodes almost two times often than tumours with wild type.

6066 POSTER

Does the "Two Week Wait" Target Improve the Waiting Times for Specialist Review and Also Waiting Time Between First Seen by Colorectal Cancer Specialist and Diagnosis of Colorectal Cancer?

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Background: Incidence rates of colorectal cancer have risen very slowly for two decades, while mortality rates have fallen by over 25 per cent. 5-year survival rates have risen steadily to nearly 50 per cent. Cancer waiting time targets were introduced to monitor service performance via process improvement. The intention was to improve the outcome (survival) of the disease. The aim of the study was to assess whether the "two week-wait" target can improve survival in patients with colorectal cancer.
Materials and Methods: 613 patients were diagnosed with colorectal cancer between January 2002 and December 2006. Data were retrospectively collected from the cancer database at Queen Elizabeth Hospital, London. Survival was compared in patients that were referred via the two week-wait rule (Group 1) and those not referred via this pathway (Group 2).
Results: Only 27% of patients were referred under the two week-wait rule and of the remainder a significant proportion came from Accident & Emergency and GPs (131 and 144 patients respectively). Waiting time between referral and first seen by colorectal specialist for both groups is seen in Table 1 and waiting time between first seen by specialist and diagnosis of colorectal cancer for both groups is seen in Table 2.

Table 1

	Group One	Group Two
Waiting time between referral and first seen by specialist		
Average	9 days	19 days
Median	8 days	5 days
Range	0−61 days	0–233 days
Number of patients waiting after 14 days	5 (3%)	145 (33%)

Table 2

	Group One	Group Two
Waiting time between specialist review and diagnosis of colorectal cancer		
Average	22 days	22 days
Median	19 days	17 days
Range	−100 to 161 days	−20 to 429 days

Conclusions: Group One patients were seen significantly quicker by a colorectal specialist once the referral was made however in both groups there was no difference in the waiting time for diagnosis of cancer after they were seen by a specialist.

6067 POSTER

Results of the Concurrent or Staged Liver Resection for Primary Colorectal Cancer With Synchronous Hepatic Metastases

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Background: Resection of hepatic metastases is the preferred treatment for selected patients after resection of primary colorectal carcinoma, but timing is controversial. This study was designed to compare outcomes of patients receiving concurrent resection of hepatic metastases and the primary colorectal tumour with those patients receiving staged resection (within 3−6 months).
Material and Methods: We retrospectively analyzed medical records (2008–2010) of 38 consecutive patients with synchronously recognized primary carcinoma and hepatic metastases who underwent concurrent (14 patients, Group 1) or staged (24 patients, Group 2) colonic (18), rectal (20) and hepatic resections performed at our institution.
Results: Concurrent and staged groups were similar in demographics, tumour grade, stage, preoperative comorbidity (cardiac and respiratory), characteristics of hepatic metastases and single vs. multiple lesions. No significant differences were observed between groups (concurrent vs. staged) in type of colon resection ($P = 0.5$) or hepatic resection ($P = 0.1$), overall operative duration (mean, 400 vs. 360 minutes), blood loss (mean, 890 vs. 880 ml), disease-free survival from date of hepatectomy (median, 11 vs. 11 months). Overall duration of hospitalization was significantly shorter for concurrent than for staged resection (mean, 24 vs. 11 days; $P < 0.001$). It is noticed, that in Group 1 of patients there is a bigger risk of development of postoperative complications (53 vs. 34%), 34% from them were specific to a resection of a liver. Disease progressing in this group was observed in 3 cases (8.3%) in terms 3, by 5 and 11 months after operation. In Group 2 of patient resection of a liver were accompanied concerning small frequency of postoperative complications and absence of mortality. Operative mortality rate in Group 1 was 8%.
Conclusions: Staged resection colon and liver is safe and more efficient than concurrent resection for colorectal cancer.

6068 POSTER

Detection of Recurrences During Follow-up After Liver Surgery for Colorectal Metastases − Both Carcino-Embryonic Antigen (CEA) and Imaging Are Important

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Background: The follow-up of patients treated for colorectal liver metastases (CRLM) is not standardized. The accuracy of Carcino-Embryonic Antigen (CEA) rise for finding recurrences after treatment for CRLM is compared here with the accuracy of routine imaging of liver and chest.
Materials and Methods: All patients in follow-up after intentionally curative treatment for CRLM from 1990–2010 were analyzed. The way in which recurrences became apparent (i.e., CEA rise, routine imaging, or both) was registered. Significant CEA rise was defined as a 25% rise compared with the previous value. The specificity and sensitivity of rises in CEA prior to finding of recurrent disease were calculated using ROC curves. An economic evaluation of the costs per resectable tumour recurrence was performed.
Results: Recurrences were detected in 46% of the procedures through CEA rise concomitant with positive imaging, in 23% through CEA rise without positive findings on routine imaging, and in 31% through positive imaging without rise in CEA (table 1).

Table 1. Trigger leading to the diagnosis of recurrent disease.

Trigger	Recurrent disease, n = 254		
	Incurable	Curable	Total (%)
Positive routine imaging without concomitant CEA rise	52 (30.2)	28 (34.2)	80 (31)
CEA rise and positive routine imaging	78 (45.4)	38 (46.3)	116 (46)
CEA rise without positive routine imaging	42 (24.4)	16 (19.5)	58 (23)
Total	172 (100)	82 (100)	254 (100)

The numbers between brackets represent the column percentages.

For patients with elevated CEA levels before liver surgery, 78% of recurrences were found through CEA rise. In patients with normal CEA levels before liver surgery, 29% of recurrences were found through CEA rise. The resectability rates of recurrences did not differ between the different triggers (CEA rise or positive imaging).
ROC curves for a 25% rise in serum CEA for all recurrences, patients with normal CEA levels, and patients with increased CEA levels before liver surgery had an area under the curve (AUC) of 0.77, 0.66, and 0.78, respectively. Costs per (curable) recurrence are low.
Conclusions: In the follow-up of patients after liver surgery for CRLM a 25% rise in CEA serum level can detect recurrences accurately, but routine imaging is indispensable, especially in patients with normal CEA

levels before liver surgery. In patients with CRLM we advocate both CEA monitoring and imaging in the follow-up after liver surgery.

6069 POSTER

A Combined Volume and Quality Threshold to Reliably Assess Hospital Performance

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Background: Recent studies have shown that a high procedural volume is associated with a better quality of care, resulting in volume thresholds set for hospitals. However, hospital-specific outcomes that may be better or worse than average, are ignored in these thresholds. We aimed to develop a combined volume and (risk-adjusted) outcome threshold that identifies hospitals that deliver adequate care.
Methods: We illustrate our methods on the Dutch Surgical Colorectal Audit database of 2009. Outcome was measured by postoperative mortality and morbidity. The minimal volume needed to detect a difference between the population average outcome and twice this average, regardless of hospital-specific outcomes, was calculated. Than, for each hospital, an Observed/Expected (O/E) outcome was calculated. Expected outcome was based on hospitals' case-mix. When the 95% confidence interval around the hospitals' O/E outcome was below 2 and not above 1, the hospital met the combined volume and quality threshold.
Results: We included 6416 patients, treated in 81 hospitals. Average mortality was 4%, average morbidity was 24%. A minimum volume of 247 patients was needed for mortality, and 45 for morbidity. No hospitals met this volume threshold for mortality; 68 (81%) hospitals had sufficient volume for morbidity. For mortality, 73 (90%) hospitals had an O/E outcome less than 2, but only 16 (20%) also had a sufficient volume to prove their results to be reliable. For morbidity, all hospitals had an O/E outcome less than 2, while 61 (75%) hospitals also had sufficient volume to meet the combined volume and quality threshold.
Conclusion: Using the combined volume and outcome threshold we can identify those hospitals that deliver adequate care, and increase transparency and trust in quality of care.

6070 POSTER

Non Elective Colon Cancer Resections in the Dutch Surgical Colorectal Audit, a Scoring System to Identify High Risk Patients

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Background: Although outcome after non-elective colon cancer resections is worse than after elective resections, there may be elective patients with a high risk of postoperative mortality, and non-elective patients with a lower risk. The aim of this study was to develop a prediction score for postoperative mortality after elective and non-elective resections, which enables to identify and compare high- and low-risk elective and non-elective patients in clinical practice.
Patients and Methods: In the Dutch Surgical Colorectal Audit (DSCA) detailed clinical data on case-mix, treatment and outcome variables were registered of patients operated for a colon carcinoma in the Netherlands. All factors predicting mortality were identified for elective and non-elective patients separately, by means of multivariate logistic regression. Every 100% rise in odds ratio was translated into one point in the scoring system. Patients were divided into risk-categories based on their score.
Results: A total of 3547 elective, and 968 non-elective patients operated for a colon carcinoma in 2009 were included. Postoperative mortality ranged from 1% in the low-risk elective patients to 27% in the high-risk non-elective patients. Low-risk non-elective patients had a similar mortality rate as medium-risk elective patients (4% and 3% respectively, $p = 0.24$). Of all non-elective patients, 26% were diagnosed 1 week or longer before surgery. When all of these patients could have been treated electively, mortality might be reduced.
Conclusion: Using a simple scoring system, physicians can identify high-risk patients during their preoperative visit. Only a select group of non-elective patients were classified as high-risk patients with a postoperative mortality risk of 27%. Maximum effort should be made to treat these patients in an elective setting.

6071 POSTER

Quality of Life of Older Rectal Cancer Patients is Not Impaired by a Permanent Stoma

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Background: The association between age at treatment and health-related quality of life (HRQL) of older rectal cancer patients is poorly understood. The aim of this study was to investigate whether HRQL of older rectal cancer patients ($\geqslant$70 years) treated for a tumour in the lower two-third of the rectum differs from younger patients (<70 years). Furthermore the influence of a permanent stoma was taken into account.
Materials and Methods: Patients with rectal cancer from 4 hospitals diagnosed in 1998–2007 were identified from the Eindhoven Cancer Registry. All patients were treated with either abdominoperineal or low anterior resections. Survivors completed the Short-Form-36 (SF-36) health survey and the EORTC Quality of Life Questionnaire-Colorectal 38 (QLQ-CR38). HRQL scores were compared after dividing the patients in four groups, stratified by stoma status and age at time of operation (<70 and $\geqslant$70). The SF-36 and the QLQ-CR38 sexuality subscale scores of the survivors were compared with a normal age- and sex-matched Dutch population.
Results: 143 patients were included. Median follow-up was 3.4 years. Older patients had significantly worse physical function ($p = 0.0003$) compared to younger patients on the SF-36 subscales. On the QLQ-CR38 domains, older patients ($p = 0.005$) and patients without a stoma ($p = 0.009$) had worse sexual functioning compared to younger patients and patients with a stoma, respectively. There was a significant age effect ($p = 0.01$) for male sexual dysfunction, where older males had more sexual dysfunction compared to younger males. Older patients with a stoma had worse physical function ($p < 0.01$), but slightly better mental health ($p < 0.05$) compared to the Dutch normative population. Older patients without a stoma had better emotional role function ($p < 0.01$) compared to the normative population. However younger patients had a worse sexual functioning and enjoyment compared to the normative population (both $p < 0.0001$).
Conclusions: This study shows that older patients with a stoma have comparable HRQL to older patients without a stoma or the normative population. Patients who are sexually active after treatment could benefit from receiving psychosocial and clinical support in the management of potential sexual dysfunction following treatment.

6072 POSTER

Postoperative Morbidity After Hypertherm Intraperitoneal Chemotherapy Related to Perfusion Temperature

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Background: Hypertherm intraperitoneal chemoperfusion (HIPEC) is a treatment given to patients with peritoneal carcinomatosis of different primary origin. Hyperthermia is supposed to enhance the tumoricide effects of chemotherapy. In this study, the clinical effects of temperature during a HIPEC were investigated.
Material and Methods: All patients treated in one tertiary with oxaliplatin based HIPEC (460 mg/m^2) were included. In addition to intraperitoneal oxaliplatin, 5-fluorouracil was administered intravenously. The temperature of the perfusion was adjusted to the clinical condition of the patient. During the 30 minute perfusion, temperature was continuously recorded at 3 sites. The maximal temperature and the area under the temperature curve (AUC) were recorded. Data on age, sex, anaesthesia time, BMI, blood counts and biochemistry, number of anastomosis, postoperative complications, time in the intensive care (IC) department, total hospitalisation time and time to removal of the stomach tube were extracted from patient files. The latter was considered a measure of postoperative ileus. A stepwise multiple linear regression analysis was performed to predict time in the IC department and time to removal of stomach tube.
Results: Between July 2005 and February 2011, 138 patients with peritoneal carcinomatosis of different origin were eligible for inclusion. Data on time to removal of stomach tube of 131 patients were available. The mean age was 57 years (range 17−82) and the sex ratio was 60 males to 78 females. Mean operation time was 579 minutes. Adequate temperature data of 102 patients were available. Maximal temperature was not related to the time to removal of stomach tube, occurrence of anastomotic leaks