Quality and completeness of histopathology reports of rectal cancer resections

Results of an audit in Brittany

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SUMMARY

Few data are available in France about implementation of guidelines for pathology reports of rectal cancer resections. Aim — The purpose of this study was to audit quality and completeness of histopathology reports of rectal cancer resections in Brittany by comparing results with French guidelines published in 1998.

Methods — All inhabitants in Brittany who were beneficiaries of the general health insurance system and who underwent surgery for rectal cancer between February 1999 and January 2000 were included in the study. Twenty-one pathology laboratories, including 14 private laboratories, participated in this study. All pathology reports were examined by two physician-consultants of the health insurance system trained in the analysis of pathology reports (search for consigned or missing data). Results were compared with guidelines published in 1998.

Results — Of 234 pathology reports, 204 (84%) mentioned the number of examined lymph nodes and 217 (93%) the number of those found positive. The criterion of at least 8 examined lymph nodes was noted in 53.4% of reports. Longitudinal margin involvement was recorded in 92% of reports and circumferential margin involvement in 27% only. Venous and/or lymphatic and neural invasion were recorded in 34% and 18% of reports, respectively. Tumor staging was made by using UICC (pTNM) in 67% of reports.

Conclusion — This study shows that the quality and completeness of histopathology reports of rectal cancer resections could be improved in Brittany. Despite its documented value as an important predictor of local recurrence, circumferential margin involvement is too frequently omitted. Standardisation of the examination procedures and exhaustive reporting would be useful to improve practice quality.

Introduction

With 36000 new cases in 2000, colorectal cancer is the third most prevalent cancer in France [1]. It is the second leading cause of death [16000 deaths in 2000] [1].

According to the Burgundy cancer registry [2], the proportion of rectal cancers among colorectal cancers reaches 42.4% for men and 30.4% for women. The incidence of rectal cancer has not changed greatly over the last twenty years, while the incidence of colon cancer has increased steadily [2].

Because of frequency and gravity of colorectal cancer, the Brittany regional health insurance system (Union Régionale des Caisses d’Assurance Maladie (URCAM) de Bretagne) conducted an audit in 2000 to assess quality of management practices for rectal cancer. The present study concerns the quality of pathology reports. The pathology report is an indispensable element for patient management and treatment since it describes the essential histological factors influencing patient survival [3].

Following the consensus conference in 1998, guidelines were adopted for writing pathology reports for cancer of the colon,
also applicable for cancer of the rectum [4]. A standard report chart was proposed [5] (see appendix 1).

To date, there has been no specific study of the quality of pathology reports in France for rectal cancer. One study published in 1999 by Papin et al. [6] was limited to cancer of the colon. A study of practices in Calvados, an administrative district of France, has provided some information concerning the quality of pathology reports for rectal cancer [7].

The French association for quality of pathology and cytology reports (Association Française d’Assurance Qualité en Anatomie et Cytopathologie, AFAQAP) compared pathology reports for colorectal cancer from 1997 and from 2000 with the 1998 guidelines (unpublished work using a test proposed to members of the AFAQAP).

The purpose of the present prospective study was to assess the quality of pathology reports for rectal cancer in France by comparing routine practices with guidelines published in 1998. The objective was not to evaluate application of the guidelines, but rather to audit practices at the time the guidelines were published.

### Material and methods

#### Study population

The study concerned pathology reports for patients residing in Brittany who underwent surgery for rectal cancer between February 1, 1999 and January 31, 2000 in the four administrative districts of Brittany in establishments affiliated with the general health insurance system.

Patients who did not request total exoneration of payment, beneficiaries of affiliated funds other than the general fund (mainly special funds for agriculture workers, shop keepers, and craftsmen) and patients presenting a recurrent cancer of the rectum after prior treatment were excluded from the study population.

#### Inclusion modalities

When the insurance fund received a request for 100% coverage for a special examination protocol, the physician-consultants of the general health insurance fund selected patients and pathology reports meeting the inclusion criteria. Data were collected from the patient’s hospital file and from the primary care physician as needed. The pathology reports were read by two physician-consultants trained by pathologists for the purposes of the present study. Data recorded were established by consensus between the two physician-consultants during the second semester of 2000.

#### Study variables

Data collected corresponded to items recommended for consignment in pathology reports for rectal cancer in the 1998 consensus guidelines [5].

Complementary information, such as preoperative treatment and TNM staging, including metastasis status, were also noted when included in the pathology report or the hospital file.

The UICC classification, 4th edition (1997) was used for TNM staging [8].

#### Analysis methods

The number and percentage of pathology reports presenting the recommended items were recorded.

Chi-square test was used for qualitative variables and ANOVA to compare means. Significance was set at 0.05.

### Results

#### Population

From February 1, 1999 to January 31, 2000, the general health insurance fund for Brittany received requests for total exoneration of payment from 234 patients with cancer of rectum. The files of all patients concerned were included. The study population thus included the pathology reports for 234 patients who underwent surgery for rectal cancer.

All sixteen pathology laboratories in Brittany participated in this study. A few patients had undergone surgery outside Brittany and five pathology reports had been established in other regions (Corrèze, Loire-Atlantique (N = 2), Maine-et-Loire, Paris). In all, among the 21 pathology laboratories involved in this study, 14 were private laboratories, five were attached to public hospitals (including three university hospitals) and two were the pathology laboratories of the Army Instruction Hospital in Brest and the Curie Institute. The majority of the pathology reports, 203 (87%), were established by private laboratories; 17 (7%) by general hospital laboratories, ten (4%) by university hospital laboratories, three by the Army Instruction Hospital laboratory and one by the Curie Institute laboratory.

Male gender predominated: 136 men and 98 women (P = 0.013). Age was 66.5 ± 10.4 years, with no difference between men and women.

### Analysis of the pathology reports (table I)

#### Administrative data

The type of operation (anterior resection, abdominoperineal resection) was noted in 87 of 234 reports (37%).

#### Gross examination

Preparation of the surgical specimen (fresh specimen, fixed and pinned or fixed and not pinned) was noted in 60 reports (26%). The length of the specimen was not mentioned in five reports and the tumor location was not noted in the medical file in one case.

The pathology examination failed to identify any neoplastic zone in four specimens. Results concerning specific tumor features were given for 230 of the examined specimens.

For 220 reports (96%) at least one of the tumor dimensions was noted.

The percent invasion as a function of circumference was noted in 141 reports (61%).

Longitudinal margins were noted in 182 of 230 reports (79%). For 183 reports of anterior resection, the longitudinal margin was not mentioned in 34 (19%). For the 47 abdominoperineal resections, it was not mentioned in 33 reports (70%).

#### Surgical resection

Histological analysis of the longitudinal margins was described in 215 pathology reports (92%) and the circumferential margin of the surgical resection was described in 62 (27%). Fifty-three reports gave measures in millimeters.

#### Extension

The number of lymph nodes dissected was mentioned on 204 reports (87%), the number of positive nodes on 217 reports (93%); certain reports mentioned the number of positive nodes without noting the number of nodes examined. There was no significant difference as a function of preoperative treatment (radiotherapy or chemotherapy) (table II).

The mean number of nodes examined was 11.3 (range 1-26) for patients without preoperative treatment versus 8.0 (range 0-23) after radiotherapy (NS) (figure 1).
The mean number of positive nodes was 1.6 (range 0-19) without preoperative treatment versus 1.7 (range 0-17) after radiotherapy (NS) (figure 2).

Among the 204 reports mentioning the number of nodes dissected, 125 (61.3%) noted that at least eight nodes had been examined and 80 (39.2%) at least 12. These percentages were 70.9 and 48.8 without neoadjuvant treatment and 43.1 and 19.6 after preoperative radiotherapy ($P = 0.05$ for 8 nodes and $P = 0.01$ for 12 nodes).

The notion of vascular embolus was mentioned in 79 reports (34%) and perinervous encasement in 42 (18%).

None of the reports mentioned distant metastases.

Pathology report conclusions
- The UICC classification, alone or in association with another classification, was used in 143 reports (67%).
- Residual tumor was noted in 15 reports (6.5%), in each case corresponding to R1 residue. None of the reports mentioned an R2 residue.

### Discussion

This study concerned the pathology reports of operative specimens from patient-beneficiaries of the French general health insurance system who requested full exoneration of payment for management of a rectal cancer between February 1, 1999 and January 31, 2000.

Patients included in this study were thus those affiliated with the general fund and not fully representative of all patients with rectal cancer. Nevertheless, since this fund represents the majority of the population living in Brittany (76% of the general population [9]), and since all pathology laboratories in the region were involved, the results are considered representative of pathology reports for patients undergoing surgery for rectal cancer in Brittany.

Physician-consultants read all of the pathology reports and collected data for analysis. These physicians had received special training from pathologist in this specific field of pathology. This centralized methodology enabled quality data collection providing valid information for analysis.

Certain results must be interpreted with caution. For several variables, for example the presence of perforation, polyp or metastasis, or of vascular or nervous invasion, the consultant pathologist informed the investigators that such elements should be considered as absent if not explicitly consigned in the pathology reports.

Evaluation of the anatomic extension of the tumor (wall, local nodes, distant nodes) is essential for proper patient management, but cannot be accomplished correctly unless the pathologist is fully informed of the surgical situation. The pathology reports examined here demonstrated a lack of communication between the surgeon and the pathologist: pathologist was informed of the type of operation in only 37% of cases and none of the reports mentioned type R2 residue.

The pathology reports cannot be correctly interpreted unless the mode of preparation and the conditions of the examination are known. The reproducibility of the measurements depends on the methods used. The safety margin measured intraoperatively, before section, decreases 30% on the fresh specimen, and 50% on a non-stretched fixed specimen, 10% if fixed and stretched [5]. According to the good practices guidelines recommended by the French National Society of Gastroenterology (SNFGE), measurements should be made on a non-fixed specimen without traction [10]. For the distal section, a safety margin of 2 cm is required.

### Table 1

Data consigned in 234 pathology reports: number of reports with data items.

<table>
<thead>
<tr>
<th>Data Item</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative data (N = 234)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registration number</td>
<td>233</td>
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<tr>
<td>Freezing number for special techniques</td>
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<td>0</td>
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<tr>
<td>Clinical data (N = 234)</td>
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<td></td>
</tr>
<tr>
<td>Type of surgical resection</td>
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<td>37</td>
</tr>
<tr>
<td>Operative specimen (N = 234)</td>
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<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>60</td>
<td>26</td>
</tr>
<tr>
<td>Tumor localization</td>
<td>233</td>
<td>99.5</td>
</tr>
<tr>
<td>Length of resection specimen</td>
<td>229</td>
<td>98</td>
</tr>
<tr>
<td>Gross aspect of tumor (N = 230)</td>
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<tr>
<td>Height</td>
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<td>96</td>
</tr>
<tr>
<td>Width</td>
<td>96</td>
<td>42</td>
</tr>
<tr>
<td>Thickness</td>
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<td>31</td>
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<tr>
<td>At least one dimension</td>
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<td>96</td>
</tr>
<tr>
<td>Circumferential extension</td>
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<td>61</td>
</tr>
<tr>
<td>Margin measurements</td>
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<td>79</td>
</tr>
<tr>
<td>Tumor aspect</td>
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<td>86</td>
</tr>
<tr>
<td>Presence or absence of perforation</td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>Presence or absence of polyps</td>
<td>59</td>
<td>25</td>
</tr>
<tr>
<td>Presence or absence of metastases</td>
<td>62</td>
<td>26</td>
</tr>
<tr>
<td>Tumor histology (N = 230)</td>
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<td>Adenocarcinoma differentiation (N = 225)</td>
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<td>77</td>
</tr>
<tr>
<td>Presence or absence of colloid component mentioned</td>
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<td>23</td>
</tr>
<tr>
<td>Percent with colloid component (N = 51)</td>
<td>39</td>
<td>76</td>
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<tr>
<td>Deep invasion (N = 230)</td>
<td>225</td>
<td>98</td>
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<tr>
<td>Surgical resection</td>
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<td></td>
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<tr>
<td>Longitudinal margins</td>
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<td>92</td>
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<tr>
<td>Circumferential margins</td>
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<td>27</td>
</tr>
<tr>
<td>Extension (N = 234)</td>
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<td></td>
</tr>
<tr>
<td>Number of nodes resected</td>
<td>204</td>
<td>87</td>
</tr>
<tr>
<td>Number of positive nodes</td>
<td>217</td>
<td>93</td>
</tr>
<tr>
<td>Presence or absence of vascular involvement mentioned</td>
<td>79</td>
<td>34</td>
</tr>
<tr>
<td>Presence or absence of perinervous encasement mentioned</td>
<td>42</td>
<td>18</td>
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<tr>
<td>Conclusion</td>
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<td></td>
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<tr>
<td>UICC Classification</td>
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<td>67</td>
</tr>
<tr>
<td>Tumor residue mentioned</td>
<td>15</td>
<td>7</td>
</tr>
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</table>
recommended. In our study, 174 pathology reports (74%) gave the measures but the preparation methods were not detailed.

Gross observations were insufficiently noted: the size of the tumor and its specific dimensions were not noted in all cases. Similarly, the notions of perforation, polyp, and metastasis were not always described.

The precision of microscopic data given in the pathology reports was variable. The histological type of the tumor was stated in all reports, but the degree of differentiation was not always detailed, generally for patients who had been given neo-adjuvant treatment. Likewise, the presence of a colloid component was mentioned on only one quarter of the reports. It is known that the degree of differentiation and the presence of a colloid component are recognized histological factors of prognosis of untreated colorectal cancer. The digestive cancer registry of the Côte-d’Or indicates that colloid carcinoma and undifferentiated carcinoma have a survival of 14% at ten years versus 23% for well-differentiated or intermediary differentiated carcinomas. This further confirms the usefulness of quality reporting mentioning all the items included on the standard chart established by the consensus guidelines. The percentage of reports which gave the circumferential margin (61%) was not better than in the New Zealand audit reported by Keating et al. [11], while in a series of 3319 patients, Wibe et al. found that a smaller safety margin was related to an exponential increase in local recurrence, metastasis and death [12].

Study of lymph nodes is another important contribution of the pathologist. Analysis of cancer registry data [13, 14] show that the prognostic accuracy increases with the number of nodes examined: for colorectal cancer, 5-year survival is poorer when fewer nodes are dissected.

According to the consensus conference, at least 8 nodes should be examined to properly stage a tumor. In our study, 53.4% of the pathology reports met this criterion. This is better however than in the report by Bouhier et al. [7] who found only 43% of pathology reports had at least 8 nodes.

Since 2001, more rigorous protocols have been applied in France. It is estimated that at the present time correct tumor staging requires at least 12 nodes; enabling recognition of 92% of metastatic spread [10]. In 1999, the American consensus [15] recommended 12 to 15 negative nodes for staging a tumor N0. In our study, only 34.2% of the reports satisfied this criterion. The explanation could lie with the surgeon or with the pathologist, but may also be related to preoperative radiotherapy. The number of nodes examined was significantly lower after preoperative radiotherapy. In the study by Baxter et al. [16] on rectal cancer, the results were slightly lower than in our study: on average 7 nodes examined in case of radiotherapy versus 10 without preoperative treatment (11.3 and 8 in our series). In the event of preoperative radiotherapy, 20% in the Baxter et al. study had at least 12 examined nodes, 19.6% in our study. Baxter et al. concluded that staging must be prudent after preoperative radiotherapy. In another series published in 2004 by Pheby et al. [17], it was demonstrated that 10 to 15 nodes have to be examined to correctly stage a rectal tumor.

Several studies have confirmed the role of venous invasion and perineural encasement as predictive factors of hepatic metastasis and survival [18]. In our study, the pathology report mentioned these factors in only 34% and 18% of the reports.

The absence or presence of tumor residue reflects surgical clearance. In our study, analysis of the distal margins was defective in 8% of the pathology reports and the status of the circumferential margin in 73%.

The absence or presence of tumor residue reflects surgical clearance (complete R0 or incomplete R1 or R2 resection). In our
Table III – Presence of different parameters in three studies (%).

<table>
<thead>
<tr>
<th></th>
<th>Papin 1995</th>
<th>AFAQAP 1997</th>
<th>AFAQAP 2000</th>
<th>This study 1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of operation</td>
<td>96.6</td>
<td>100</td>
<td>100</td>
<td>37</td>
</tr>
<tr>
<td>Height</td>
<td>95</td>
<td>96</td>
<td>98</td>
<td>96</td>
</tr>
<tr>
<td>Width</td>
<td>35</td>
<td>61</td>
<td>70</td>
<td>96</td>
</tr>
<tr>
<td>Thickness</td>
<td>20</td>
<td>16</td>
<td>37</td>
<td>41</td>
</tr>
<tr>
<td>Circumferential extension</td>
<td>48</td>
<td>50</td>
<td>70</td>
<td>61</td>
</tr>
<tr>
<td>Longitudinal margin</td>
<td>42</td>
<td>86</td>
<td>86</td>
<td>79</td>
</tr>
<tr>
<td>Histological differentiation</td>
<td>99</td>
<td>99</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>Colloid component</td>
<td>42</td>
<td>52</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Status of circumferential margin</td>
<td>13</td>
<td>52</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Number of nodes resected</td>
<td>88</td>
<td>99</td>
<td>100</td>
<td>87</td>
</tr>
<tr>
<td>Number of positive nodes</td>
<td>99</td>
<td>100</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td>Vascular involvement</td>
<td>25</td>
<td>49</td>
<td>63</td>
<td>34</td>
</tr>
<tr>
<td>Perinervous encasement</td>
<td>22</td>
<td>39</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

reports, only 6% of the conclusions mentioned the status of residual disease. Bouhier et al reported a figure of 21.6% [7].

Comparing our results with those of Papin [6] published in 1999 on pathology reports written in 1995, and with those of a study from eight French administrative districts during an audit of pathology practices proposed by the AFAQAP (pathology reports written in 1997 and 2000) enables an assessment of how the pathologists apply recommendations.

The comparison is difficult however due to the different recruitments for these studies: the pathology report audit of 1999 concerned a random sample of reports recorded by eight registries; the AFAQAP test was based on voluntary participation; our study included all patient files recorded by the general health insurance fund over a one-year period. The two studies mentioned above also concerned colorectal cancers and not only rectal cancer (table III).

Certain indications were insufficiently reported in the three studies, for example the circumferential margin to evaluate the risk of locoregional and distant recurrence.

The differences observed between the Papin study, the AFAQAP study and our study could be related to chronology: guidelines were published in 1998 and so it could be expected that the quality of the 2000 reports would be better than those written in 1997 or 1999 (year of our study).

Pathologists play an important role in establishing the histological diagnosis and in determining the prognosis, but most importantly in transmitting adequate information to determine the adjuvant therapeutic strategy after surgery and to orient follow-up practices. Improved prognosis for this devastating disease will require in part a reduction in the differences in management practices.

Many pathologists now apply the guidelines and use a consensus terminology. Use of a standardized report, consigning all the necessary items, should become systematic practice. Sensations taken to improve the quality of pathology reports should be further supported by pluridisciplinary consultations which could be instituted in upcoming years.

REFERENCES


Appendix 1.— Recommended standard pathology report

**Administrative data**

<table>
<thead>
<tr>
<th>NAME Registration N°</th>
<th>First name Freezing N°</th>
<th>Laboratory</th>
</tr>
</thead>
</table>

**Type of operation:** right __ transverse __ left __ colectomy, sigmoidectomy __ anterior resection __ abdomino-perineal resection __ total colectomy __ not known __

**Gross aspect:** fresh specimen __ fixed with traction __ fixed without traction __

- Tumor localization: Cecum __ right colon __ transverse colon __ left __
- Sigmoid __ Rectum __ Multifocal __ not known __
- Length of resection: .... cm
- Tumor size: height...... cm width ....... cm thickness...... cm
  (measured at point of maximal extension)
- % invasion / circumference: 1/4 __ 1/2 __ 3/4 __ 4/4 __
- Margins: Longitudinal:Proximal: ......cm Distal: ......cm
  or between the tumor pole and the closest resection margin: ......cm
- for right colon resections: Distance / ileocecal junction: ............cm
- for rectal tumors: Distance/pectinate line: ......................cm
- Aspect: Budding __ ulcerating __ Infiltrating __ Plane __ (several responses possible)
- Perforation: absent __ present __
- Polyp(s): absent __ present __
- Metastasis(es): absent __ present __
- Other ..........................................................

**Histologic examination**

- Type: Adenocarcinoma __ well-differentiated __ intermediate __ undifferentiated Colloid mucosal component: ......%
- Other __

**Deep invasion**

- Intra-mucosal (not exceeding the muscularis mucosae) (Tis) __
- Limited to the submucosa (T1) __
- Limited to the muscularis (T2) __
- Subserous invasion (T3) __
- Serous invasion (mesothelial lining) or neighboring organs (T4) __

**Surgical resection:** Longitudinal margin: Negative __ Positive __ not known __
  Circumferential margin ......... mm

**Extension**

- Number of nodes examined: ................. number of nodes invaded: .................
- Vascular involvement: Absent __ Present __ perinervous encasement: absent __ present __
- Autres ..........................................................

**Conclusion**

- pTNM stage: Tis __ T1 __ T2 __ T3 __ T4 __
  Nx __ N0 __ N1 __ N2 __
  Mx __ M1 __
  For rectal cancer: tumor residue __ R0 __ R1 __ R2 __
  Signature of physician