What Impact Has the Introduction of a Synoptic Report for Rectal Cancer Had on Reporting Outcomes for Specialist Gastrointestinal and Nongastrointestinal Pathologists?

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• ***Context.*—Synoptic pathology reports increase the completeness of reporting for colorectal cancer. Despite the perceived superiority of specialist reporting, service demands dictate that general pathologists report colorectal cancer specimens in many centers.**

***Objective.*—To determine differences in the completeness of rectal cancer reporting between specialist gastrointestinal and nongastrointestinal pathologists in both the narrative and synoptic formats.**

***Design.*—Pathology reports from rectal cancer resections performed between 1997 and 2008 were reviewed. A standardized, synoptic report was formally introduced in 2001. Reports were assessed for completeness according to 10 mandatory elements from the College of American Pathologists checklist.**

***Results.*—Overall, synoptic reports (n = 315) were more complete than narrative reports (n = 183) for TNM stage, distance to the circumferential radial margin, tumor grade, lymphovascular invasion, extramural venous invasion, perineural invasion, and regional deposits (all $P < .01$). Compared with those by nonspecialist pathologists, narrative reports by gastrointestinal pathologists were more complete for lymphovascular invasion (59.3% versus 35.9%, $P = .02$) and extramural venous invasion (70.4% versus 35.9%, $P = .001$), but there was no difference in completeness once a synoptic report was adopted. Gastrointestinal pathologists tended to report the presence of extramural venous invasion more frequently in both the narrative (18.5% versus 5.1%, $P = .01$) and synoptic formats (25.5% versus 14.6%, $P = .02$).**

***Conclusions.*—Completeness of reporting, irrespective of subspecialist interest, was dramatically increased by the use of a synoptic report. Improvements in completeness were most pronounced among nongastrointestinal pathologists, enabling them to attain a level of report completeness comparable to that of gastrointestinal pathologists. Further studies are required to determine whether there are actual discrepancies in the detection of prognostic features between specialist gastrointestinal and nongastrointestinal pathologists.**

(*Arch Pathol Lab Med.* 2011;135:1471–1475; doi: 10.5858/arpa.2010-0558-OA)

The introduction of a synoptic, or checklist-style, pathology report for colorectal cancer has been shown to improve the completeness of reporting compared with the more traditional narrative format.[1–5] Synoptic reporting has become the accepted practice in most pathology departments and may confer additional benefits in terms of end-user satisfaction, accuracy, and data capture for audit purposes. Adverse prognostic features are being continually identified and have led to the production of pathology reports of increasing complexity. The College of American Pathologists issues a regularly updated checklist,[6] based on a review of the current evidence, and this forms the basis of most synoptic pathology reports produced by pathology departments across Ontario.

It is widely believed that subspecialist reporting results in a more accurate assessment of tissue specimens, because the reporting pathologist has more familiarity with the subtle histologic features of a disease process. In most centers, however, service demands dictate that pathologists share the responsibility for the reporting of rectal cancer specimens, irrespective of their subspecialist interest. Recent studies have demonstrated the independent prognostic significance of several microscopic features, such as venous invasion[7–9] and perineural invasion (PNI),[10,11] which have now been included as mandatory elements on the College of American Pathologists checklist. These features are often difficult to detect on routine

Accepted for publication February 9, 2011.

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The authors have no relevant financial interest in the products or companies described in this article.

Presented as a podium presentation at the Canadian Surgeons' Forum in Quebec City, Quebec, Canada, September 4, 2010.

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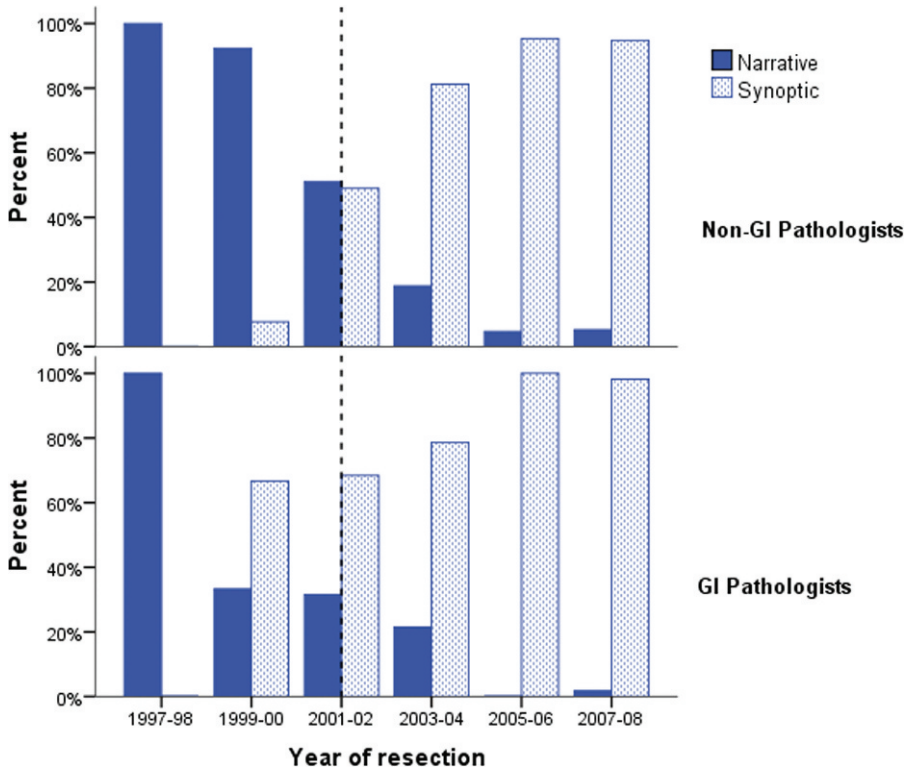

The adoption of synoptic reporting over time by both gastrointestinal (GI) and non-GI pathologists. The dotted line refers to the date when the synoptic report was formally introduced (December 2001).

histologic assessment, and their incidence may be underreported. Despite efforts to maximize the completeness and potential accuracy of reporting by the introduction of a synoptic report, it remains unknown whether the assessment of rectal cancer specimens by a subspecialist pathologist confers any additional benefit.

Therefore, the 2 main objectives of this study were to (1) determine whether there was an overall difference in the completeness of narrative and synoptic reports and (2) determine what effect the subspecialist interest of the pathologist had on the completeness of narrative and synoptic reports.

MATERIALS AND METHODS

A prospectively maintained database was used to identify all patients who underwent resection of a primary rectal adenocarcinoma between January 1997 and December 2008. The corresponding pathology reports were retrieved from the laboratory information system by means of a computer search. Approval for the study was granted by the Research Ethics Board at Mount Sinai Hospital, Toronto, Canada. Exclusion criteria included recurrent tumors, local excisions, and benign lesions. Cases of complete tumor resolution (ypT0) were routinely reported in the narrative format, as pathologists assumed that not all prognostic features would be identifiable. Therefore, ypT0 tumors were also excluded.

The reports were analyzed for completeness according to 10 key prognostic features included in the College of American Pathologists checklist for the reporting of colorectal cancer. These features included tumor size (in greatest dimension), TNM stage, histologic type, histologic grade, circumferential radial margin (CRM) involvement, distance to the CRM, lymphovascular invasion (LVI), extramural venous invasion (EMVI), PNI, and regional tumor deposits. Analysis of the reports was undertaken by a colorectal research fellow, with reporting inconsistencies clarified by a gastrointestinal (GI) pathologist who was blinded to their original formulation. Completion was defined as the reported presence or absence of a particular feature. In addition, the rates of detection of 4 histologic adverse prognostic features—LVI, EMVI, PNI, and regional tumor deposits—were recorded separately.

A general rotation for the receipt of surgical specimens was in operation throughout the duration of the study period, ensuring that all anatomic pathologists were involved in the reporting of rectal cancer. The grossing of specimens was undertaken by pathology assistants and residents in accordance with the pathology protocol at Mount Sinai Hospital. Staff pathologists were responsible for the final authorization of all reports.

A synoptic pathology report was formally introduced in December 2001, although it had been available since mid-1999. The content of the report was based on the College of American Pathologists checklist, current evidence, and the opinion of GI pathologists within the department. It initially took the form of a paper document, which was completed by the reporting pathologist and then transcribed into a synoptic format. An updated electronic version with drop-down menus and the capacity to transfer data to Cancer Care Ontario was subsequently adopted in May 2007.

The data are presented as frequencies and percentages. Statistical analyses were performed using the χ^2 test, the Fisher exact test, or the Cochran-Armitage test where appropriate. A P value of $\leq .05$ was taken to be statistically significant. Analyses were performed using the SPSS statistical software program (SPSS for Windows release 16.0, SPSS Inc, Chicago, Illinois).

RESULTS

Between January 1997 and December 2008, 498 pathology reports of rectal cancer resections were eligible for inclusion: 183 narrative (36.7%) and 315 synoptic (63.3%). A total of 28 pathologists issued pathology reports, 7 of whom had a subspecialist interest in GI pathology. The GI pathologists were responsible for issuing 164 of 498 pathology reports (32.9%) during the study period. The adoption of synoptic reporting over time can be seen in the Figure. There was a significant increase in uptake among both non-GI ($z = 13.8$,

Table 1. Overall Completeness of Pathology Reports in Both the Narrative and Synoptic Formats			
Feature	Narrative, No. (%) (n = 183)	Synoptic, No. (%) (n = 315)	*P* value
Size (greatest diameter)	181 (98.9)	313 (99.4)	.63
TNM stage	44 (24.0)	303 (96.2)	<.001
Histologic tumor type	181 (98.9)	313 (99.4)	>.99
Histologic tumor grade	168 (91.8)	307 (97.5)	.004
Circumferential radial margin status	183 (100)	315 (100)	>.99
Quantification of the distance to the circumferential radial margin[a]	151 (86.3)	294 (97.4)	<.001
Lymphovascular invasion	72 (39.3)	309 (98.1)	<.001
Extramural venous invasion	75 (41.0)	305 (96.8)	<.001
Perineural invasion	25 (13.7)	296 (94.0)	<.001
Regional deposits	24 (13.1)	262 (83.0)	<.001

[a] Eight cases in the narrative group and 13 cases in the synoptic group were excluded from analysis of distance to the circumferential radial margin because of gross involvement of this margin.

$P < .001$) and GI pathologists ($z = 7.25$, $P < .001$) over the duration of the study period. In 1999–2000, synoptic reports were issued by 7.7% of non-GI pathologists and 66.7% of GI pathologists ($P < .001$), but by 2007–2008, the proportion of synoptic reports issued had increased to 94.7% and 98.2%, respectively ($P = .56$).

Synoptic reports were more complete than narrative reports for 7 of the 10 key prognostic features that were analyzed (Table 1). The most dramatic increases in completeness were demonstrated for TNM stage, LVI, EMVI, PNI, and regional deposits (all $P < .001$). There was a less pronounced, but still statistically significant, increase in the proportion in which the CRM was quantified ($P < .001$) and histologic tumor grade ($P = .004$). There was no difference in completeness between synoptic and narrative reports for tumor size in greatest dimension, histologic tumor type, and CRM status.

Following adoption of the synoptic report, there was also an increase in the detection rates of LVI, EMVI, and PNI (all $P < .001$) (Table 2). However, the detection rate of regional deposits remained unchanged.

Narrative reports produced by GI pathologists were more complete than those produced by non-GI pathologists for LVI (59.3% versus 35.9%, $P = .02$) and EMVI (70.4% versus 35.9%, $P = .001$) (Table 3). However, once a synoptic report was adopted, there were no differences in the completeness of reporting of any element between GI and non-GI pathologists.

GI pathologists had a higher reported detection rate of EMVI (18.5% versus 5.1%, $P = .01$) and PNI (14.8% versus 3.2%, $P = .03$) than non-GI pathologists using the narrative format, and were more likely to report the detection of EMVI even after the adoption of a synoptic report (25.5% versus 14.6%, $P = .02$) (Table 4).

COMMENT

The production of pathology reports that provide complete and accurate information on key prognostic features is vital to the decision-making process regarding subsequent treatment. The checklist-style format of synoptic reports allows pathologists to report on features in a systematic fashion, thereby reducing the potential for information to be omitted. In rectal cancer, surgical quality improvement initiatives have focused heavily on reducing the involvement of the CRM, as this is a well-recognized independent predictor of local recurrence and disease-free survival.[12,13] More recently, increasing attention has been paid to histologic adverse prognostic features, which may be useful in the risk stratification of patients with stage II tumors who might benefit from the receipt of adjuvant therapy but would otherwise not receive it.[8] It is clear from this study and others that the introduction of a synoptic report increases the completeness of pathology reporting for rectal cancer, although its ability to standardize the reporting outcomes of specialist GI and non-GI pathologists has never previously been demonstrated.

A number of studies in the 1990s demonstrated the benefits of a structured format for pathology reporting.[1–3] This evidence prompted the GI pathologists at Mount Sinai Hospital to develop a synoptic report for colorectal cancer. Gastrointestinal pathologists were quicker to adopt synoptic reporting, although by 2007–2008 almost all reports produced by both GI and non-GI pathologists were in a synoptic format. The uptake rate at the end of the study period compares favorably with that achieved across the rest of Ontario following a Cancer Care Ontario–sponsored initiative to implement synoptic reporting between 2004 and 2007.[14]

The introduction of a synoptic report for rectal cancer improved completeness of reporting for 7 of the 10 prognostic features analyzed in this study. Classification of TNM stage and the reporting of histologic adverse prognostic features showed the greatest improvement in completeness. Smaller, but still statistically significant, improvements in completeness were noted for quantification of distance to the CRM and histologic tumor grade. Interestingly, the assessment of CRM status was 100% complete in both narrative and synoptic reports, which may reflect the fact that pathologists at Mount Sinai Hospital were already aware of the importance of reporting such a powerful prognostic indicator.

Table 2. Detection of Microscopic Features of Tumor Invasion in Both the Narrative and Synoptic Formats			
Feature	Narrative (n = 183)	Synoptic (n = 315)	*P* value
Lymphovascular invasion	11 (6.0)	84 (26.7)	<.001
Extramural venous invasion	13 (7.1)	61 (19.4)	<.001
Perineural invasion	9 (4.9)	48 (15.2)	<.001
Regional deposits	23 (12.6)	47 (14.9)	.47

Table 3. Completeness of Pathology Reports in Both the Narrative and Synoptic Formats, According to the Subspecialist Interest of the Reporting Pathologist, Either Nongastrointestinal (Non-GI) or Gastrointestinal (GI)

Feature	Narrative, No. (%) (n = 183)			Synoptic, No. (%) (n = 315)		
	Non-GI (n = 156)	GI (n = 27)	*P* value	Non-GI (n = 178)	GI (n = 137)	*P* value
Size (greatest diameter)	154 (98.7)	27 (100)	>.99	177 (99.4)	136 (99.3)	>.99
TNM stage	39 (20.6)	6 (16.7)	.68	168 (94.4)	135 (98.5)	.08
Histologic tumor type	154 (98.7)	27 (100)	>.99	177 (100)	136 (100)	>.99
Histologic tumor grade	145 (92.9)	23 (85.2)	.24	173 (97.2)	135 (98.5)	.70
Circumferential radial margin status	156 (100)	27 (100)	>.99	178 (100)	137 (100)	>.99
Quantification of the distance to the circumferential radial margin[a]	133 (87.5)	18 (78.3)	.23	166 (98.2)	128 (96.2)	.31
Lymphovascular invasion	56 (35.9)	16 (59.3)	.02	176 (98.9)	133 (97.1)	.41
Extramural venous invasion	56 (35.9)	19 (70.4)	.001	170 (95.5)	135 (98.5)	.20
Perineural invasion	19 (12.2)	6 (22.2)	.16	166 (93.3)	130 (94.9)	.55
Regional deposits	18 (11.5)	6 (22.2)	.11	146 (82.0)	116 (84.7)	.85

[a] Eight cases (4 non-GI and 4 GI) in the narrative group and 13 cases (9 non-GI and 4 GI) in the synoptic group were excluded from analysis of distance to the circumferential radial margin because of gross involvement of this margin.

It is conceivable that a narrative report could have been constructed using a structured template, potentially resulting in a comparable level of completeness to that of a synoptic report. However, experience within the pathology department would suggest that the structured template was used with the sole intent of producing a synoptic report, even if this was preceded by a traditional, narrative component.

The detection rates of histologic adverse prognostic features also increased with the use of a synoptic report. It is possible that the adoption of a structured format prompted pathologists to report on the presence or absence of these features, potentially encouraging a more detailed histologic assessment and a subsequent increase in their rate of detection. Although this appears to be the most obvious explanation, increased detection rates of histologic adverse prognostic features may have also been attributed to an increasing awareness among pathologists about their effect on disease recurrence and survival or to changes in tumor biology over time.

Improvements in the completeness of pathology reporting by both GI and non-GI pathologists were witnessed following the adoption of a synoptic report. Narrative reports by GI pathologists were more complete for LVI and EMVI compared with those by nonspecialist pathologists, but once a synoptic report was adopted there were no longer any differences.

Gastrointestinal pathologists reported the presence of EMVI more frequently than non-GI pathologists in both the narrative and synoptic formats. Although interesting, it would be precipitous to draw any firm conclusions from these observations, as the current study was not specifically designed to address differences in detection rates of prognostic features between specialist GI and non-GI pathologists. Nonetheless, these findings have prompted further studies, including a recent cross-sectional survey of pathologists in Ontario that revealed that GI specialists were more likely to report higher detection rates of venous invasion.[15] Similar observations have also been reported by the pathologists involved in the CLASSIC trial, who noted that GI pathologists detected EMVI in 30% of cases, compared with non-GI specialists, for whom the EMVI detection rate was less than 10%.[16] This apparent increase in the reported detection of EMVI by GI pathologists may be related to a more advanced case mix, a lower threshold for the application of diagnostic criteria, or simply a failure of recognition by non-GI pathologists. Interobserver variability between GI and non-GI pathologists in the detection of EMVI and other prognostic histologic features remains to be proven and is currently the subject of further study by the authors.

Despite the increasing prevalence of subspecialist reporting, in many smaller centers there are an insufficient number of pathologists to support subspecialist rotations for the reporting of specimens. Given the ever-increasing complexity of pathology reporting in rectal cancer, not all nonspecialist pathologists will be aware of the prognostic significance of certain features. Therefore, it would appear that the use of a synoptic report, particularly in the electronic format with the option of drop-down menus and discrete data fields, would be of more benefit to nonspecialist pathologists in encouraging the production of a complete pathology report.

In conclusion, the introduction of a synoptic report dramatically improved the completeness of reporting of rectal cancer among both non-GI and GI pathologists. Improvements in completeness were most pronounced among non-GI pathologists, enabling them to attain a level of report completeness comparable to that of GI

Table 4. Detection of Microscopic Features of Tumor Invasion in Both the Narrative and Synoptic Formats, According to the Subspecialist Interest of the Reporting Pathologist, Either Nongastrointestinal (non-GI) or Gastrointestinal (GI)

Feature	Narrative, No. (%) (n = 183)			Synoptic, No. (%) (n = 315)		
	Non-GI (n = 156)	GI (n = 27)	*P* value	Non-GI (n = 178)	GI (n = 137)	*P* value
Lymphovascular invasion	8 (5.1)	3 (11.1)	.21	54 (30.3)	30 (21.9)	.09
Extramural venous invasion	8 (5.1)	5 (18.5)	.01	26 (14.6)	35 (25.5)	.02
Perineural invasion	5 (3.2)	4 (14.8)	.03	25 (14.0)	23 (16.8)	.52
Regional deposit	18 (11.5)	5 (18.5)	.25	26 (14.6)	21 (15.3)	.84

pathologists. Synoptic reporting was also associated with the increased detection of histologic adverse prognostic features. Reports from GI pathologists were more likely to report the presence of EMVI, although further studies of interobserver variation between GI and non-GI pathologists within a defined set of cases will be required before any definite conclusions about the superiority of subspecialist reporting can be drawn.

Mr Messenger was supported by the Wolf and Joseph Lebovic Research Fellowship. Dr McLeod holds the Angelo and Alfredo De Gasperis Families Chair in Colorectal Cancer and IBD Research.

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