California – Focused Audit of Colorectal Cancer Circumferential Resection Margin (CRM)

When *Positive* may mean *Negative*, and other miscoding patterns noted in data collection of CRM

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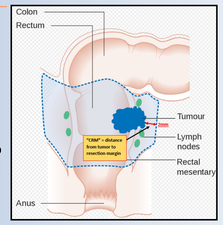
Introduction:

The circumferential resection margin (CRM) is an important prognostic factor for recurrence risk and survival after surgery.

- ◊ According to the American Joint Committee on Cancer (AJCC) 7th Edition Cancer Staging Manual, "The CRM is the surgically dissected non peritonealized surface of the specimen.
- ◊ For Collaborative Stage (CS) Site Specific Factor #6 (SSF6) the CRM is the exact measurement/distance from the greatest extension of the tumor to the circumferential resection margin. Equivalent terms for CRM are radial margin or mesenteric margin.



Background:

The California Cancer Registry (CCR) conducted a recoding audit to review accuracy for twenty (20) colon cancer data items, including required Collaborative Stage (CS), Site Specific Factors (CS SSFs), for data year 2015. Results identified SSF #6-CRM as the data variable with the highest overall discrepancy rate. Overall 47% of 335 cases audited revealed the CRM code was incorrect. Several discrepancy patterns were identified accounting for miscodes. The most frequent miscoding patterns noted were errors in converting centimeters to millimeters leading to decimal point errors in the code, or coding margins other than CRM, and findings of CRM coded as Positive (NOS), yet text clearly stated CRM was Negative. The number of cases coded CRM positive with documentation stating the CRM was negative, were of particular concern. Therefore, the CCR decided to perform a focused audit of CRM code 000 for both colon and rectal cancers for other years to identify error patterns and assess overall accuracy.

Coincidentally, during our CCR colorectal audit, the Surveillance, Epidemiology, and End Results Program (SEER), Quality Improvement Expert Group identified several areas of interest to review and assess CRM data quality. One area identified was CRM codes 001-010 (0.1 mm-1.0 mm). This is a small subgroup of CRM code range 001-980 which records the exact CRM measurement/distance. There is potential for coding errors resulting in misclassification for cases with a CRM measurement greater or equal to 0.1 mm.

The CCR chose to expand our audit to include CRM codes 001-010 to identify cases misclassified positive vs negative secondary to decimal point errors. Any errors identified for CRM code 000 as well as decimal point errors in codes 001-010 should be corrected to ensure quality data for research purposes.

Methodology:

Colon and Rectum/Rectosigmoid sites were audited using a text to code review. Does text support coded information? The following two code groups were reviewed:

CRM Code 000 (2012-2016):

- ◊ COLON: 2,615 were identified coded to 000; 653 of these (25%) were audited.
- ◊ RECTUM / RECTOSIGMOID: 1,404 were identified coded to 000; 351 of these (25%) were audited.

CRM Codes 001-010 (0.1 mm-1.0 mm) (2012-2016):

- ◊ COLON: 1,621 were identified coded to 001-010; 405 of these (25%) were audited.
- ◊ RECTUM / RECTOSIGMOID: 854 were identified coded to 001-010; 213 of these (25%) were audited.

Notes:

- ◊ CS SSF#6 CRM is expressed to nearest tenth in millimeters (mm) in a 3 digit code with an implied decimal point. Example: if CRM is 0.2 mm, code is 002; If CRM is 2.0 mm, code is 020; If CRM is 2.0 centimeters (cm), code is 200.
- ◊ When CRM is described as involved or positive (NOS), or CRM margin distance described within a range of "0-1 mm" without an exact measurement, or described as "less than 1 mm", CS coding note 4 directs to use code 000 indicating the CRM is positive.
- ◊ When CRM is stated as Positive or Negative, and an exact distance is also documented, the exact distance has priority in coding over Positive NOS (code 000) or Negative NOS (code 991).
- ◊ Audit analysis for positive vs negative CRM is based on the following definition:
  - CRM </=1 millimeter is considered positive. A CRM >1 millimeter is considered negative.

Results Colon/Rectum CRM code 000:

Colon CRM Code 000

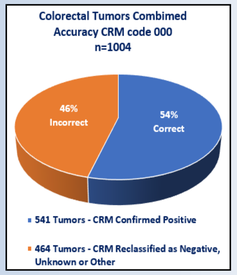
- ◊ 653(25%) of 2,615 Colon tumors with CRM code 000 reviewed.
  - ◊ 52% (338) CRM code 000 Correct. CRM confirmed positive.
  - ◊ **48% (315) Code 000 INCORRECT-CRM Reclassified as Negative/Unk/Other**

Rectum / Rectosigmoid CRM Code 000

- ◊ 351(25%) of 1,404 Rectum/Rectosigmoid tumors w/CRM code 000 reviewed.
  - ◊ 58% (203) Code 000 Correct. CRM confirmed positive.
  - ◊ **42% (149) Code 000 INCORRECT-CRM reclassified as Negative/Unk/Other**

Combined Colon & Rectum CRM code 000

- ◊ 1,004(25%) of 4,019 Colorectal tumors combined w/CRM code 000 reviewed.
  - ◊ 54% (541) Code 000 Correct. CRM confirmed positive.
  - ◊ **46% (464) Code 000 INCORRECT-CRM Reclassified as Negative/Unk/Other**

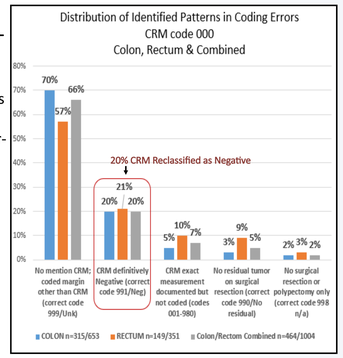


Results Colon/Rectum CRM code 000, cont...

Coding Issues Identified:

- ◊ **20% (95/464) colorectal tumors coded CRM positive, were negative per text review with clear statements the CRM is negative.**
  - Coding CRM to 000 (CRM positive) when documentation describes CRM negative, is believed to result from registrars presuming code 000 indicates a negative value along with not reviewing the CS Manual codes and definitions. The correct code for a negative CRM is 991. The code structure for SSF#6 CRM may also be a contributing factor. Other data item codes with all zeros (0,00,000) most often indicate a negative status or value. See examples of CRM text below:

Actual CRM text description examples	Orig CRM code	Recoded CRM	Error Description
"MARGINS FREE (PROX/DISTAL/CRM)"	000	991	CRM clearly documented as Negative
"Circumferetinal margin is neg"	000	991	
"Radial marg free"	000	991	
"SURG MARGINS UNINVOLVED. CRM UNINVOLVED"	000	991	



- ◊ **66% (305/464) colorectal tumors with no mention of CRM and instead coded proximal/distal/margins NOS in error.**
  - OF INTEREST: It was observed for low TNM stage colon tumors in particular, which were in situ, or only pT1 or pT2 node negative (colon confined), the CRM was often not mentioned, or stated as Not Applicable. Approximately **25% (76/305) of colon tumors recoded to 999/unknown were low TNM stage colon tumors.**

    This raised the question of whether there is a reason CRM may not be reported consistently in early stage colon tumors. We sent a question into "Ask the Pathologist" in CAnswer forum regarding this observation. The pathologist replied in part, "lack of reporting may be due to the mesenteric/CRM margin almost always being very widely negative in colon (as opposed to rectal) cancers. This supports [your] hypothesis that mesenteric/CRM is less commonly designated in low T-stage tumors. It's not that it's N/A exactly, it's just that it is always widely negative in these circumstances".
  - **To read the complete post: See CAnswer Forum post "Ask the Pathologist", Colon; CRM status in Tis, T1 and T2 tumors @http://cancerbulletin.facs.org/forums/forum/ask-the-pathologist/**
- ◊ 14% (64/464) tumors with incorrect use of code 000 when other specific codes should have been applied:
  - Registrars did not code/recognize "radial" margin as equal to CRM. ◊ Used 000 instead of 990 when there was no residual tumor on resection; ◊ Used 000 instead of 998 when no surgical resection or (polypectomy) only.

Results CRM codes 001-010 (0.1mm-1.0mm):

Colon CRM Codes 001-010: (0.1 mm-1.0 mm)

- ◊ 405 (25%) of 1,621 colon tumors reviewed.
  - ◊ **73% (294) coded in range 001-010 were INCORRECTLY coded. Correction = CRM reclassification as NEGATIVE**
  - ◊ 27% (111) coded 001-010 were Correct and/or Positive CRM classification remained valid after correction.
    - ◊ Above includes 8%/33 tumors corrected from code 001 to 000. CRM was described as <1mm w/o an exact measurement. Correcting the code does not alter the positive classification, so these cases were included in the counts for "CRM code & Positive classification confirmed ". **

Rectum / Rectosigmoid CRM Codes 001-010: (0.1 mm-1.0 mm)

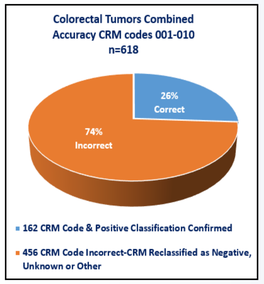
- ◊ 213 (25%) of 854 rectum/rectosigmoid tumors reviewed
  - ◊ **76% (162) coded in range 001-010 were INCORRECTLY coded. Correction = CRM reclassification as NEGATIVE**
  - ◊ 24% (51) coded 001-010 were Correct and/or Positive CRM classification remained valid after correction.
    - ◊ Above includes 9%/17 tumors corrected from code 001 to 000. CRM described as <1mm w/o an exact measurement. Correcting the code does not alter the positive classification, so these cases were included in the counts for "CRM code & Positive Classification confirmed". **

Combined Colon & Rectum CRM code 001-010 (0.1 mm-1.0 mm)

- ◊ 618 (25%) of 2,475 Colorectal tumors combined reviewed
  - ◊ **74% (456) coded in range 001-010 were INCORRECTLY coded. Correction = CRM reclassification as NEGATIVE**
  - ◊ 26% (162) coded in range 001-010 were correct and/or positive CRM classification unchanged after code correction.

** CRM text to code examples-Recoded to 000

Actual CRM Text description examples	Orig CRM Code	Recoded CRM	Error Description
"CRM less 1mm"	001	000	CRM Pos+ w/o exact measurement. Per CS Note 4 use code 000/CRM Pos+NOS. *While original code is incorrect per coding guidelines, correction to 000 does not alter CRM margin classification as positive*
"Cimcumferential margin positive between 0-1mm"	001	000	
Rectal CRM pos within 0-1mm	001	000	
"tumor presents 0-1mm from CRM	001	000	
"Adenocarcinoma, ext to radial margin"	001	000	
"Radial Margin clear <1mm	009	000	



Results CRM codes 001-010, cont...

Coding Issues Identified:

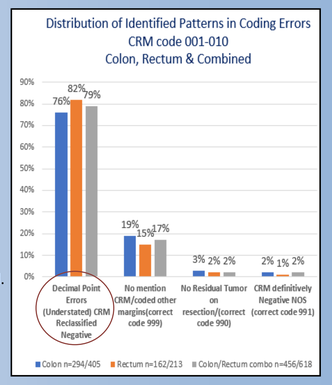
- ◊ **79% (358/456) combined colorectal tumors with errors were the result of implied decimal point errors (76% colon/82% rectum).**
  - **Of interest in all cases with decimal point errors, the margin distance was UNDERSTATED.**
    - ◊ Example: If the margin was documented as 3.0 **cm** (code 300) it was coded as 3.0 **mm** (code 030).

      If documented as 3.0 mm (code 030), it was coded as 0.3 mm (code 003).
  - **Correction of the CRM code/margin results in reclassification of the CRM as NEGATIVE when margin is >1.0 mm. See Text to code example at right:**

Actual CRM Text description examples	Orig CRM Code	Recoded CRM	Error Description
"All margins neg, Radial margin 1.0cm"	010	100	Implied decimal point errors resulting in margin misclassification as positive. Correction of CRM code/margin results in reclassification of CRM as negative
"Marg clr (Rad 2.0mm)"	002	020	
"Margins neg, CRM (-) by 1.0cm"	010	100	
"Marg neg, 3mm CRM margin"	003	030	
"Radial is 0.1cm from adenocarcinoma"	001	010	
"Margins; neg. CRM is 4mm"	004	040	
"CIRC MARG 0.5CM"	005	050	
" 0.8cm radial margin"	008	080	

  - **In 26% (93/358) combined colorectal tumors with decimal point errors, CRM margin was actually 1.0 centimeters , and coded as 1.0 millimeters.**

    In some instances registrars converted centimeters to millimeters incorrectly and/or appeared to be unclear where the implied decimal point is within the 3 digit code. CS SSF#6 CRM is coded to the nearest tenth in millimeters. Examples: if CRM is 0.2 mm, code is 002; If CRM is 2.0 mm, code is 020; If CRM is 2.0 **cm** the code is 200.
- ◊ In 18% (80/456) colorectal tumors combined the CRM was not specifically mentioned, and other surgical margins were documented/coded. Only specific statements about the CRM are to be coded in this data item, therefore if CRM is not mentioned CS coding guidelines direct to code to 999/unknown.
- ◊ In 3% (11/456) colorectal tumors combined no residual tumor was identified on resection following either an excisional biopsy or post neoadjuvant therapy. Specific code 990 was not applied and incorrect codes 001 or 991 were assigned.
- ◊ In 2% (7/456) colorectal tumors combined the CRM was documented as negative NOS and code 991 was not applied; instead a surgical margin other than CRM was coded.



Conclusions:

- ◊ **For the 1,004 colon and rectal tumors with CRM coded as 000 (Positive CRM NOS), 46% overall were incorrect, and in fact the CRM was not positive.** In cases with errors, registrars used code 000 incorrectly when CRM was not mentioned and other margins were described as negative (66%), or when the CRM was described as negative (20%), in both instances apparently presuming code 000 indicated a negative status.
- ◊ **For the 618 colon and rectal tumors with CRM coded in the range 001-010 (0.1 mm-1.0 mm) which is generally considered within the "positive range", 74% overall were incorrect. In cases with errors 79% were reclassified as CRM negative** because the CRM measurement was *understated* (the CRM was actually greater than what was coded), secondary to centimeter to millimeter conversion errors and/or decimal point errors.
- ◊ **Patterns identified in coding discrepancies for CS SSF#6 CRM for colorectal cancers could continue in the new 2018 Site Specific Data Item for CRM, therefore it is important to address coding issues with additional education and monitoring of 2018 data.**
- ◊ Focused audits that look at a large number of cases are useful to confirm data quality and/or identify coding issues which may affect a significant percentage of data. Issues identified can be addressed with global corrections if appropriate or may identify the need for review and recoding of all cases in the database, or within a specified range. It's important to review and monitor data outside of traditional visual editing practices, to ensure data quality which may be used in outcomes studies.

Recommendations:

- ◊ A CCR Educational "Q-Tips" with audit findings and coding clarifications for CS SSF#6/CRM, contrasted with the new 2018 SSDI codes and definitions for CRM was developed. The CCR Colon coding "Q-Tips" was distributed statewide in December of 2018.
- ◊ Develop a QC tool for Visual Editors to quickly assess CRM coding as they continue to review 2017 data, and segue into 2018 with the new CRM SSDI to catch and correct CRM coding errors.
  - Recently, it was communicated to the SSDI work group (2 CCR staff are SSDI work group members) that a CRM may in fact not be applicable for in situ tumors. This will need to be clarified further. Potential updated coding guidelines for the new SSDI CRM data item are under review and discussion by the SSDI workgroup. Appropriate updates or clarifications for coding CRM will be incorporated into CCR education material.
- ◊ **Based on our audit findings, the CCR is considering review and recoding of CRM codes 000 and 001-010 for all colon and rectal cases in the database diagnosed between 2010-2017 to ensure data quality. While errors in other CRM codes were observed, codes 000 and 001-010 have the most potential to be used in outcomes studies to assess recurrence risks after surgery.**
- ◊ SEER is also in the process of a data quality assessment of CRM in colon and rectal tumors. The CCR will await SEER's conclusions and recommendations for assessment of the CRM data item and will proceed further as appropriate.

**The CalCARES Program partners with the California Department of Public Health (CDPH) to manage the operations of the state mandated California Cancer Registry program*

I would like to thank the following contributors: Cheryl Moody, BA,CTR and Mary Brant, BA, CTR