How can application of the WEO consensus on PCCRC aetiology help reduce rates?

Dr Nick Burr

Clinical Research Fellow, Leeds, UK
Why is PCCRC important

• “Off the radar” for endoscopists and endoscopy services
  – miss rates are small
  – may not ever find out

• Important from a patient perspective!

• Measure of the quality of a colonoscopy service
We recommend that post-colonoscopy colorectal cancer (PCCRC) be the preferred term for cancers appearing after a colonoscopy in which no cancer is diagnosed.
JAG requirement for PCCRCs

<table>
<thead>
<tr>
<th>Measure</th>
<th>Standard</th>
<th>Action required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Colonoscopy Colorectal Cancer</td>
<td>Auditable Outcome</td>
<td>All Post Colonoscopy Colorectal Cancers (PCCRC) should be reported as adverse events and each unit should have a policy for capturing PCCRC data.</td>
</tr>
</tbody>
</table>

It is unclear at present whether services have taken note of this JAG standard, let alone begun addressing it.
Aetiology of PCCRC

- Most evidence of PCCRC comes from big database or large case-control studies
- Good for looking at patient risk factors and broad themes
- Lack the granularity to look at specific reasons for PCCRC and endoscopy factors
- The largest individual cases study used patients from RCTs with multiple exclusion criteria - may miss up to 70% of cases
Reasons for PCCRC (Tollivoro, GIE 2019)

• Case-control study California
  – > 1000 PCCRC

• Factors associated with PCCRC
  – previous polyps
  – incomplete excision
  – failure to examine the segment

• 559 / 1206 (46%) had 1 or more risk factors
Causes of Post-colonoscopy Colorectal Cancers Based on World Endoscopy Organization System of Analysis.

Rebecca Anderson, Nicholas Burr, Roland Valori
Aims

• Route-cause-analysis of PCCRC cases

• Define causative factors

• Categorise PCCRCs using the WEO method
  – determine the strengths and limitations of the WEO methodology

• Determine what proportion of PCCRCs may be preventable

• Make recommendations of how to reduce PCCRC rates
Methods

• Gloucestershire Hospitals:
  – population 628,000
  – four endoscopy sites, one group of colonoscopists
  – 6-7,000 procedures/year
  – national Bowel Cancer Screening Programme (BCSP)
  – colonoscopy training courses since 1999
  – consistently in the top 10% of PCCRC performance

• Inclusion: All adult PCCRCs (2010 to 2017)

• Exclusion: Colonoscopy within 6 months of CRC, appendiceal cancers, neuroendocrine tumors and squamous cell cancers of the anus

• Root-cause analysis based on the WEO algorithm
Gloucestershire Root Cause Analysis

• Data collection according to WEO guidelines:
  – patient characteristics
  – index colonoscopy
  – cancer details
  – management plan
  – endoscopist performance
Adenoma seen in same bowel segment?

No

Caecum intubated & bowel prep good?

No

Lesion resected?

No

A: Possible missed lesion, examination adequate

B: Possible missed lesion, examination inadequate

Yes

Yes

Yes

D: Likely incomplete resection

C: Detected lesion, not resected
Avoidability & attribution

• Unavoidable
  – small tumours (< 5mm growth per year)
  – submucosal lesions
  – patient previously declined follow up. MDT deemed surveillance not appropriate
  – all others “avoidable”

• Attribution
  – PCCRC after a negative colonoscopy (excluding small)
  – colonoscopist did not propose further investigations after inadequate colonoscopy or lesions not treated
  – recommended too long a timeframe for repeat

• Not attributable
  – repeat procedure not booked by the admin team
  – responsibility with the referring clinician
Results

- 61,110 colonoscopies between January 2006 and July 2017
- Unadjusted PCCRC-3yr rate of 4.7% (95% CI: 3.15%-6.25%).
- 129 potential PCCRCs were identified in the study period.

*Exclusion cases

- Detected cancer: 1
- Nodal recurrence: 1
- Anal SCC carcinoma: 6
- Appendiceal carcinoma: 3
- Unclear aetiology: 2
- Total: 13
Number of PCCRCs each 6 months

- 0-6 months: 16
- 6-12 months: 25
- 12-18 months: 12
- 18-24 months: 16
- 24-30 months: 9
- 30-36 months: 11
- 36-42 months: 18
- 42-48 months: 0

Cumulative number of cancers: 120

- 6 to 12 months: 16
- 12 to 18 months: 41
- 18 to 24 months: 53
- 24 to 30 months: 62
- 30 to 36 months: 71
- 36 to 42 months: 82
- 42 to 48 months: 100

Legend:
- Green bars: Number of cancers
- Blue line: Cumulative number of cancers
## Indication for index colonoscopy

<table>
<thead>
<tr>
<th>Indication</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptomatic</td>
<td>43 (40%)</td>
</tr>
<tr>
<td>Surveillance (CRC)</td>
<td>24 (22%)</td>
</tr>
<tr>
<td>Surveillance (polyps)</td>
<td>16 (15%)</td>
</tr>
<tr>
<td>Surveillance (IBD)</td>
<td>9 (8%)</td>
</tr>
<tr>
<td>Hereditary cancer surveillance</td>
<td>4 (4%)</td>
</tr>
<tr>
<td>BCSP</td>
<td>7 (7%)</td>
</tr>
<tr>
<td>Abnormal investigation</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Planned polypectomy</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>107</td>
</tr>
</tbody>
</table>
Site and stage of diagnosis

Anastomosis: 1
Unknown: 3
Size of PCCRC versus delay in diagnosis
Adenoma seen in same bowel segment?

No

Caecum intubated & bowel prep good?

Yes

Lesion resected?

Yes

A: Possible missed lesion, examination adequate

27/101 (26.7%)

No

B: Possible missed lesion, examination inadequate

59/101 (58.4%)

No

C: Detected lesion, not resected

8/101 (7.9%)

Yes

D: Likely incomplete resection

7/101 (6.9%)
Revised WEO categorisation of PCCRCs

Adenoma seen in same bowel segment?

- Yes
  - Lesion resected?
    - Yes
      - Caecum intubated & bowel prep good?
        - Yes
          - A: Possible missed lesion, examination adequate
            - 27/101 (26.7%) (22.8%)
        - No
          - B: Possible missed lesion, examination inadequate
            - 59/101 (58.4%) (54.5%)
    - No
      - C: Detected lesion, not resected
        - 8/101 (7.9%) (11.9%)

- No
  - Caecum intubated & bowel prep good?
    - Yes
      - D: Likely incomplete resection
        - 7/101 (6.9%) (10.9%)
    - No
Findings in PCCRC

• 98/107 (91.6%) reported as complete procedures

• Reasons for incompletion:
  – poor bowel preparation (2), diverticulosis (2), stricture (2), looping (1), otherwise difficult procedure (1) and patient discomfort (1)
  – 2/9 (22.2%) incomplete cases were referred for repeat colonoscopy and 4/9 (44.4%) for imaging

• Rectal/rectosigmoid cases
  – original reports/photos could not be located in 5/30 (16.7%)
  – of the remaining 25, only six (24%) had undergone retroflexion
## Completion & Retroflexion

<table>
<thead>
<tr>
<th>Proximal and including hepatic flexure</th>
<th>Complete with adequate photo</th>
<th>Retroflexion done</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>24</td>
</tr>
</tbody>
</table>

- **Proximal and including hepatic flexure:**
  - Yes: 11 (31%)
  - No: 24 (69%)
  - Total: 35

- **Rectum or rectosigmoid:**
  - Yes: 6 (24%)
  - No: 19 (76%)
  - Total: 25
Potentially avoidable?

- 95/107 (88.7%) PCCRCs avoidable

- Unavoidable cases (12/107 (11.2%)):
  - five small PCCRCs
  - one sub-mucosal lesion related to anastomotic recurrence
  - four cases of patient decision to not undergo further investigation
  - two cases of MDT decision to not investigate further in unwell patients
Scatterplots of technically attributable PCCRCs

- Scatterplot of PCCRC miss rate versus cecal intubation rate
- Scatterplot of PCCRC miss rate versus polyp detection rate
- Scatterplot of PCCRC miss rate versus colonoscopy number
- Scatterplot of PCCRC miss rate versus PICI
Conclusions of Gloucestershire audit

• PCCRC rates are high in certain types of patients:
  – those with existing colon pathology, such as DD
  – high risk conditions: especially IBD, HNPCC, past CRC and multiple polyps

• Surveillance timeframes were often breached, especially those scheduled for six month repeat for whatever reason
  – be clear to booking team which patients are high risk
Conclusions of Gloucestershire audit

• Bowel preparation was often poor and procedures were not repeated
  – absent or unclear decision making, poor or no documentation of decisions

• Some adenomas were overlooked while endoscopists focussed on large polyps
  – early repeat to check for completeness of excision, but also missed lesions

• Photodocumentation was inadequate for procedures done many years ago so completeness of intubation could not be confirmed in many cases
  – photo document caecum and rectum
What puts patients at risk?

- Quality of the procedure
  - missed/incompletely excised lesions
- Decision making
  - after incomplete procedures/patient choice
- Patient biology
  - IBD/HNPCC/post CRC resection
- Patient characteristics
  - female/DD/high morbidity
- Administrative errors
  - surveillance not scheduled on time
Recommendations for WEO consensus

1. WEO categorisation
   – rectal retroflexion mandatory for ‘completeness’
   – small cancers might be considered unavoidable
   – additional categories – patient choice/clinical decision not to repeat and administrative issues
   – recommend adjusted rates used for benchmarking services
   – broader definition of adenoma/polyp

2. Pragmatic guide for the service
   – abbreviated audit checklist
   – we are creating one and would like the WEO panel to review with possible recommendation for its use
What is being done in Gloucester

• Identify high risk patients and book on special lists with extra time
• Have highest performers do procedures with the best technique
• Repeat for big polyps in <6 months to see what was missed (and base check)
• Standardised process and documentation if preparation inadequate
• Offering low (not that low) PDR extra-tuition with endocuff etc
• Continued clinical governance
  – photodocumentation QI project
  – complete review of IBD surveillance service
  – PCCRC QI Plan
PCCRC quality improvement plan

• Feedback general learning points to all endoscopists
  – decision making and documentation after incomplete procedures
  – importance of withdrawal technique
  – awareness of impact of fatigue on performance

• Feedback case histories to individual endoscopists
  – review performance of those with low PDR

• Establish method of identifying patients (non-IBD) at very high risk
  – flag at risk patients in the booking system
  – be very clear about surveillance interval, and that this should not be breached
  – e.g. early (<6 months) for surveillance post excision of very large polyps
  – clinical validation only for fitness to proceed, decision to repeat should not be reversed
  – book on dedicated lists with extra time +/- special techniques
Aspiration Nationally

• Grant from Bowel Cancer UK to implement a national system for identifying PCCRCs with audit tool
  – Facilitate capture of cases and encourage systematic approach to root-cause analyses

• This will generate a large body of evidence of cause of PCCRCs to aid further quality improvement measures

There is an urgent need for a WEO-endorsed abbreviated PCCRC audit tool
Acknowledgments

• Dr Rebecca Anderson

• Dr Roland Valori
Questions?
Discussion points

• < 5mm growth per year for attributable cancers

• Polyp definition in the algorithm

• Duty of candour

• Stripped-back audit tool