Bergin Rebecca (Orcid ID: 0000-0003-0448-9125)

**Title:** Concordance between Optimal Care Pathways and colorectal cancer care: identifying opportunities to improve quality and reduce disparities.

**Running title:** Pathway concordance and colorectal cancer care

**Authors:** Rebecca J. Bergin[1,2], Robert J. Thomas[3], Kathryn Whitfield[4], Victoria White[1,5]

**Affiliations:**

[1] Centre for Behavioural Research in Cancer, Cancer Council Victoria, Melbourne, Australia

[2] Department of General Practice/Centre for Cancer Research, University of Melbourne, Melbourne, Australia

[3] Faculty of Medicine, Dentistry and Health Sciences, University of Melbourne, Melbourne, Australia

[4] Department of Health and Human Services Victoria, Victorian Government, Melbourne, Australia

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[5] School of Psychology, Deakin University, Melbourne, Australia

**Corresponding author:** Rebecca Bergin, 615 St Kilda Rd, Cancer Council Victoria, Melbourne, Victoria, Australia, 3004. Phone: +613 9514 6467, email: rebecca.bergin@cancervic.org.au. ORCID: 0000-0003-0448-9125.

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**ABSTRACT**

Rationale, aims and objectives: Care pathway policies for cancer aim to reduce variation and improve the quality of patient care, and there is increasing evidence that adherence to such pathways is associated with improved survival and lower healthcare costs. Australia is implementing Optimal Care Pathways (OCPs) for several cancers, including colorectal cancer, but studies evaluating how well care conforms to OCP recommendations are rare. This study examined concordance between OCP recommendations and colorectal cancer care prior to policy rollout and disparities for vulnerable populations.

Method: Cross-sectional survey (2012-2014) of cancer registry-identified colorectal cancer patients aged ≥40 approached within six-months of diagnosis (n=433), their General Practitioner (GP, n=290) and specialist (n=144) in Victoria, Australia. We measured concordance with 10 OCP recommendations and variation by geography, socio-economic and health insurance status using age and sex-adjusted logistic regression models.

Results: Use of recommended GP investigations varied from 66% for colonoscopy to 13% for digital rectal exam. Recommended waiting times to receive a colonoscopy, see a specialist after referral, and begin adjuvant chemotherapy were exceeded for around a third of patients. Twenty-eight percent of specialists reported a pre-treatment multidisciplinary meeting. Most patients received surgery in a hospital with an intensive care unit (92%) and chemotherapy for high risk disease (84%).

In general, care was similar across sociodemographic groups. However, receipt of GP investigations tended to be higher and waiting times longer for rural, low socio-economic and non-privately insured patients. For example, receiving a colonoscopy within four weeks was significantly less likely for rural (51%) than urban (78%) patients (odds ratio=0.30, 95% confidence interval: 0.11–0.79).

Conclusion: Prior to implementation, a significant proportion of colorectal cancer patients received care that did not meet OCP recommendations. Low concordance and inequities for rural and disadvantaged populations highlight components of the pathway to target during policy implementation.

**Key words:** colorectal neoplasms; care pathways; health care disparities; health policy; time-to-treatment; health care quality, access and evaluation.

## INTRODUCTION

Several countries have adopted cancer care pathway policies.[1-3] There is increasing evidence that adherence to pathways is associated with improved outcomes, including increased survival and lower costs of care.[4,5] In October 2016, the Australian government endorsed Optimal Care Pathways (OCPs) for 16 cancer types.[3] OCPs were developed iteratively, drawing on best-available evidence and clinician and consumer consensus, and aim to ensure consistent, coordinated, high quality cancer care is delivered to all patients.[3] As for clinical care pathways, which are also referred to as integrated care pathways, OCPs describe expected events over a set time for a specific group – patients with cancer.[6] However, OCPs provide recommendations over a longer timeframe

and broader scope than clinical pathways or guidelines which are often treatment-specific, instead describing optimal events and time intervals in cancer prevention, diagnosis, treatment, patient experience and end of life care.

In 2017, colorectal cancer was prioritised for OCP implementation in Victoria, Australia's second most populous state. While several studies have examined adherence to treatment-based guidelines for colorectal cancer,[7-9] there is limited research from Australia regarding concordance with OCP recommendations,[10] and none have examined care in the diagnostic period or potential variation in OCP concordance before policy implementation. Such research could identify where along the pathway care can be improved, as well as whether concordance varies for vulnerable populations such as rural and low socio-economic patients, to inform who to target during policy implementation. In addition, establishing OCP concordance prior to policy rollout provides a baseline from which to evaluate whether OCPs achieve their aim to improve quality of care and reduce cancer outcome disparities.

Using survey data from Victorian patients, their General Practitioner (GP) and specialist, the current study aimed to examine concordance between care received and recommended components of diagnostic and treatment pathways for colorectal cancer, such as recommended timeframes and diagnostic investigations, prior to OCP policy implementation. We also explored whether care varied by geographic, socio-economic or insurance status. Our research questions were: i) to what extent did care meet OCP recommendations before policy implementation? And, ii) does concordance vary by patient sociodemographic characteristics?

## METHODS

**Design:** Secondary analysis of cross-sectional surveys collected in Victoria, Australia from colorectal cancer patients diagnosed from Nov 2012 to June 2014, their GP and specialist as part of the International Cancer Benchmarking Partnership (ICBP) Module 4 study.[11] Module 4 investigated pathways to cancer diagnosis and treatment. Dates, tests and treatment information from surveys were supplemented with Victorian Cancer Registry (VCR) data on date of diagnosis and stage.

**Ethics:** Module 4 was approved by Cancer Council Victoria's Human Research Ethics Committee (Project number: 1125). All participants provided written informed consent.

**Recruitment and eligibility:** Recruitment and participant eligibility have been described previously.[12] In brief, eligible colorectal cancer patients (C18.0–C18.9, C20.0–C20.9) were aged 40 years or over and within six months of a diagnosis when identified and approached by the VCR. Patients who had previously had colorectal cancer, had a synchronous primary cancer, or metastatic disease to the colon or rectum, were excluded. After checks with the treating clinician, the VCR mailed surveys with cover letter and reply-paid envelope to patients. A reminder letter was sent if there was no response within a month. GPs and specialists were sent surveys with patients' consent.

**Data preparation:** Hierarchical data rules prioritised source of data in defining dates, route of presentation and other variables.[11,12] For example, missing day in a date was imputed to '16', and negative or large positive (>365 day) intervals were coded to zero and 365 days respectively.

**Outcomes:** We examined 10 OCP recommendations using data available from surveys covering the presentation, diagnostic and treatment periods (see Table 2). Three main types of recommendation were examined: 1) time intervals, 2) diagnostic and staging tests, and 3) key recommendations such as multidisciplinary team (MDT) meeting prior to commencing treatment and receiving surgery in a hospital with an intensive care unit (ICU). The data source (patient, GP, specialist or combination) was based on the availability and relevance of information provided by that source. For GP and specialist-reported tests, missing data were considered a 'no' response. For other recommendations, missing data were excluded.

**Predictors:** We explored whether concordance varied for populations by geographic, socio-economic and health insurance status given inferior cancer outcomes for these groups in Australia.[13-15] Rural (regional or remote) or urban (major city) residence was measured using the Australian Statistical Geographic Standard-Remoteness Areas determined using residential postcode.[16] Socio-economic status was measured with the area-based Index of Relative Socio-economic Disadvantage based on residential Statistical Area level 1 tertiles.[17] Australia has a mixed health care system, with universal access to primary care and public hospitals, as well as access to private hospitals through user-pays or private health insurance. In this study, public or private insurance status was determined from patient surveys.

**Statistical analysis**: Analyses were weighted by residential location to account for the over-recruitment of non-metropolitan patients in the original Module 4 study.[12] Descriptive statistics are provided for participant characteristics. The proportion meeting (concordant) OCP recommendations were calculated with 95% confidence intervals (CI). Where sample size allowed (n≥50), logistic regression was used to examine associations between each of the three population groups and OCP concordance, adjusting for age (continuous) and sex. For statistically significant results ($p<0.05$), sensitivity analyses were conducted to examine whether insurance status influenced the relationship between population group and recommendations being met. As analyses were exploratory, no adjustments were made for multiple testing.[18] Analyses were conducted in Stata 14.2.

## RESULTS

### Recruitment

Surveys were returned from 433 patients (41% response), 290 GPs (74% response) and 144 specialists (38% response). Patients completed surveys a median of five months (IQR: 4–6 months) post-diagnosis**.**

### Participant characteristics

After weighting, a quarter lived in rural areas, around 40% had no private health insurance, and a third lived in the most disadvantaged areas (Table 1). Most participants had local stage disease defined as stage I and II cancers (62%) and had their cancer detected via a symptomatic diagnostic route (77%).

**Concordance between care received and OCP recommendations**

Concordance across recommendations ranged from 13% (95% CI: 9–16%) for GP-reported digital rectal exam to 94% (95% CI: 79–98%) for non-surgical or stage IV patients receiving chemotherapy (Table 2).

Time interval recommendations (numbers 2, 3, 8 and 10) were met for around two-thirds of patients, except the recommendation to begin neoadjuvant radiotherapy or chemotherapy within three weeks of diagnosis, which was met for only six of 16 patients (39%, 95% CI: 16–70).

Although sample sizes were small, less than a third of patients had an MDT meeting prior to beginning treatment, and over two-thirds of rectal cancer patients with stage II/III disease did not receive radiotherapy as recommended. However, over 90% of patients received surgery in a hospital containing an ICU and over 80% with high-risk colon cancer had chemotherapy (Table 2).

**Concordance by population group**

In logistic regression analyses adjusted for age and sex, statistically significant differences were found for GP-reported immunochemical faecal occult blood test (iFOBT) which was more common for rural than urban and the most disadvantaged compared to least disadvantaged patients (Table 3). Rural patients were also more likely to receive a blood test than urban, and blood tests from specialists were significantly less common for public than private patients.

Significant variation was also found for timeframes: receiving a colonoscopy within four weeks of referral was significantly less likely for rural than urban patients. Patients in the most disadvantaged areas were also less likely to begin adjuvant chemotherapy within eight weeks of surgery compared to those in the least disadvantaged areas. Findings remained statistically significant in sensitivity analyses including insurance status (data not shown).

Data trends support the findings above, with odds of having GP tests generally higher for the most disadvantaged, rural and public patients, but odds of meeting waiting time recommendations and specialist tests lower for these three groups. Other results were mixed with no clear pattern of concordance by sociodemographic characteristics.

**DISCUSSION**

Prior to OCP implementation, concordance with some recommendations was high. For example, over 90% of colorectal cancer patients received surgery in hospitals with an ICU, and 84% with high risk disease received chemotherapy. There was also limited population variation for these recommendations, suggesting Australia's universal health system provides adequate and equitable access to these components of care. However, low concordance was found for several recommendations, for example, only 13% of GPs performed a DRE. This may be due to the small number of rectal cancer cases in our sample (17%) for whom use of DRE would be most relevant. However, low concordance was also identified for other recommendations relevant to all patients, such as only a third of patients were presented at an MDT meeting prior to treatment, and a third to two-thirds did not receive care within OCP timeframes.

Our study also identified variation for at-risk populations, with receipt of GP tests generally higher, but waiting times longer, for rural, the most socio-economically disadvantaged and public patients. Significant differences were found indicating longer waiting time to colonoscopy for rural populations and adjuvant chemotherapy for low socio-economic groups. These findings identify key components of the pathway for improvement and populations at risk of sub-optimal care.

Our finding that GPs report greater use of tests, including significantly more blood and iFOBT tests, for rural and low socio-economic patients may have several meanings. For example, higher use of tests could reflect greater GP involvement in diagnostic workup for rural patients. More comprehensive investigation of symptomatic patients prior to colonoscopy referral is also in line with recent Australian clinical practice guidelines.[19] Blood tests and iFOBTs are relatively easy to order and complete with minimal waiting times compared to colonoscopy. iFOBT also offers fewer patient-related barriers than colonoscopy which requires time off work, discomfort, and possible travel and out-of-pocket costs; barriers with a greater impact on disadvantaged and rural patients. In addition, GPs may use iFOBT to facilitate priority access to colonoscopy services in areas with long waiting times, such as regional and low socio-economic communities. Thus, GPs may prefer initial low-impact, accessible investigations over colonoscopy referral for these patient populations. However, in the UK, the use of more tests prior to diagnosis has been associated with delayed time to referral.[20] Further research is needed to explore whether such prescribing behaviour impacts clinical cancer outcomes in vulnerable populations in Australia.

We also found rural patients were more likely to wait longer than four weeks for colonoscopy. This is consistent with Victorian research that shows rural GPs report less direct access to colonoscopy than urban GPs,[21] and that rural patients with colorectal cancer have longer diagnostic intervals than urban patients.[12] Access issues may lead rural GPs to delay referral for definitive diagnostic tests[22] and could be another reason rural GPs were more likely to order alterative tests. These findings suggest that monitoring and addressing colonoscopy waiting times for rural populations as part of the OCP implementation should be a priority.

Variation in time to adjuvant chemotherapy also warrants attention. Recent linked-data analyses from Victoria found that 72% of stage III colon cancer patients diagnosed between 2011-2015 received adjuvant chemotherapy within eight weeks of surgery.[23] This is consistent with our finding that 72% of patients with any stage or tumour type were treated within the eight-week timeframe. While these results compare favourably with other jurisdictions, such as in Ontario, Canada where 57.9% of colon cancer patients waited longer than eight weeks to commence adjuvant chemotherapy,[24] at least a third of patients had sub-optimal pathways with survival implications.[25] In addition, we found trends indicating longer waiting times for rural and public patients and significant differences for low socioeconomic patients. Similar variation in time to adjuvant chemotherapy for these populations have been reported locally and internationally.[23,26,27] Overall, the sociodemographic variability in meeting OCP timeframes suggests the need to design programs targeting time to care for these vulnerable groups.

Comparison between concordance results in our study compared to other research is complicated by different study designs, data sources and timeframes. A 2000–2001 survey of Australian surgeons found 76% of colon cancer patients with Dukes C disease were offered adjuvant chemotherapy, lower than our estimate of 88%.[8] Rates of GP and specialist investigations in a Spanish study of symptomatic colorectal cancer patients diagnosed in 2006–2009 were similar for some investigations, such as iFOBT, but variable for others, such as specialist rate of CT scan 44% compared to our finding of 77%.[28] Although low concordance identified for some recommendations is concerning, this may have improved in the time since our study was completed. For example, although the sample was small, only 28% of specialists in our study reported that an MDT meeting occurred prior to treatment commencement. This figure from 2013-14 is lower than that reported in a 2015 medical record audit of Victorians undergoing surgery for rectal cancer which found half of MDT meetings occurred before treatment.[23] Discrepancies may reflect improvements in prospective MDTs since our survey or differences in sampling where we include colon and private patients who may have earlier stage disease or less access to an MDT meeting. Such work demonstrates that local monitoring of concordance over time will be required to determine progress in achieving care consistent with OCP recommendations.

The ability to monitor care using optimal recommendations is a strength of pathway policies.[29] However, measuring and developing indicators for such policies can be challenging given variability in patient pathways. As such, pathway policies are broadly worded to be widely applicable. In determining measures from OCP documents for the current study, some difficulties were experienced in relation to this wording. For example, the recommendation that

"patients with cancer-specific symptoms be referred for colonoscopy within four weeks" could be interpreted several ways: i) as time from first presentation with symptoms to GP referral; ii) time from first presentation to colonoscopy completion; or iii), as we have defined it, time from GP referral to colonoscopy completion. Also, not all recommendations are relevant to all patients. For example, GP tests may not be relevant to patients diagnosed via screening or emergency routes.

Kinder et al. also identified challenges in mapping patient journeys with OCPs as written, with the complexity of patient diagnostic routes difficult to reconcile with the current broad-level recommendations.[10] To address this, the authors suggest the need for more timeframe recommendations according to diagnostic route. However, care pathway guidelines are inherently limited in their scope and ability to represent the complex reality of patient care and need to be flexible rather than absolute.[30] Introducing more detailed measures into an already complex document may be prohibitive to implementing and achieving pathway aims. Indeed, the American Society of Clinical Oncology has acknowledged these as ongoing issues as the number and complexity of clinical pathway documents increase.[31]

An option to make OCPs measurable could be to identify and track the core elements of optimal pathways for specific tumour types, particularly those elements linked with improved clinical outcomes such as survival, patient experience and quality of care. Evaluating these core elements will require the ability to measure these aspects of care, identify what constitutes success, and explore variation for vulnerable populations. We examined 10

recommendations from the colorectal cancer OCP, but there were many items that might be explored. Availability of data or difficulty in measurement will limit what recommendations can be assessed and new ways of gathering information may be required. For example, while linked hospital, primary care and cancer registry data provide detailed information about care received, recommendations regarding patient co-ordination, communication and support require other data collection methods, such as patient experience surveys.

Identifying the optimal level of concordance, or what Harrison et al. call identifying what is and is not unwarranted variation, is also challenging.[32] Although concordance targets would ideally be evidence-based, the complexity of pathways can make this difficult. For example, recent research from the UK found no significant association or an inverse association between concordance with cancer waiting time targets and one-year net survival, likely explained by confounding by indication as patients with more serious disease are referred and treated more quickly.[33] Nonetheless, monitoring health system performance and setting targets are recognised internationally as ways to improve health care.[34] Targets should be SMART: specific, measurable, accurate, realistic and time bound.[35] They should be informed by research evidence where possible as well as stakeholder advice, including clinical, patient and carer perspectives. Considering a range of views is important as care pathways typically reflect the perspectives of those most involved in developing them, namely clinical practitioner voices.[30] Targets also need to consider baseline rates of concordance in order to promote improvement, and as OCPs are monitored and revised, new targets should be endorsed to ensure continuous improvement.

Strengths of our study include population-based recruitment and use of data from multiple sources. This allowed the assessment of pathways from primary into secondary care, and across public and private healthcare systems. Limitations include the relatively small sample size for several OCP recommendations, exploratory nature of this analysis, and multiple testing, highlighting the need for larger studies to confirm our findings. The variables available through surveys were also not designed for OCP assessment. Hence, some recommendations could not be examined, such as patient experiences of care or screening for mismatch repair deficiency in resected tumours. Regarding GP and specialist test data, although tests may not have been ordered by the respondent, this could have been conducted by another healthcare professional. Thus, test results here may under-estimate actual care received. There were also some discrepancies between OCP recommendations and available survey data. For example, time to begin neoadjuvant treatment was calculated from date of diagnosis rather than date of confirmed management plan.

Other limitations of self-report data are well-recognised, including potential recall bias, incomplete disclosure and self-selection.[36] Nevertheless, alternative methods for measuring patient pathways, such as the use of administrative data or hospital records, also have limitations. For example, a recent study that attempted to map OCP pathways using hospital medical records found a high proportion of missing data, particularly in the pre-treatment period, with some data inaccessible due to patient care being undertaken across both public and private health systems.[10] In contrast, surveys provide valuable insight into pre-diagnostic patient pathways and cross-sector care. Novel approaches to link administrative, hospital and GP datasets while incorporating self-

report information will be required to adequately assess OCP recommendations. In addition, such linkage studies could assess the validity of survey and administrative data.

In summary, care pathway policies aim to reduce variation and improve the quality of clinical care. We found variable concordance between OCP recommendations and colorectal cancer care prior to policy implementation. Low concordance and inequities for some populations suggest key areas for improvement. Work is needed to clarify OCP measures, including the level of concordance considered optimal, and to develop strategies to improve care while accounting for the complexity of cancer pathways.

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**CONFLICT OF INTEREST**

The authors declare no conflicts of interest, financial or otherwise, in relation to the work.

**TABLES**

**Table 1:** Demographic and clinical characteristics of colorectal cancer patients of the ICBP Module 4 study weighted to Victorian population (weighted sample n=432.5)

| | | n | % |
|---|---|---|---|
| **Age** | | | |
| Mean (SD) | 67 (11.5) | | |
| Median (IQR) | 67 (58 - 76) | | |
| Range | 42 – 89 | | |
| **Gender** | Male | 243 | 56.3 |
| | Female | 189 | 43.7 |
| **Marital status** | Married/partner | 328 | 75.8 |
| | No partner | 99 | 22.8 |
| | Missing | 6 | 1.4 |
| **Language at home** | English | 397 | 91.8 |
| | Non-English | 24 | 5.6 |
| | Missing | 11 | 2.6 |
| **Remoteness (ASGS-RA)** | Urban | 319 | 73.7 |
| | Rural | 114 | 26.3 |
| **Socio-economic status (IRSD tertiles)** | Least disadvantaged | 156 | 36.0 |
| | Mid-disadvantaged | 143 | 33.0 |
| | Most disadvantaged | 134 | 31.0 |
| **Insurance** | Private | 265 | 61.4 |
| | Public | 167 | 38.6 |
| **Perceived Health** | Very good/good | 350 | 80.9 |
| | Fair, poor/very poor | 76 | 17.5 |
| | Missing | 7 | 1.7 |
| **Comorbidity** | None | 267 | 61.7 |
| | ≥1 | 161 | 37.3 |
| | Missing | 4 | 1.0 |
| **Diagnostic route** | Symptomatic route | 332 | 76.9 |
| | Screen-detected | 100 | 23.1 |
| **Tumour site** | Colon | 359 | 83.0 |
| | Rectum | 74 | 17.0 |
| **Stage** | Local | 268 | 61.9 |
| | Regional | 122 | 28.2 |
| | Advanced | 38 | 8.9 |
| | Unable to stage | 5 | 1.1 |
| **Treatment** | Surgery | 431 | 99.6 |
| | RT | 20 | 4.7 |
| | Chemotherapy | 180 | 41.6 |

Abbreviations: ASGS-RA, Australian Statistical Geographic Standard – Remoteness Areas; IQR, interquartile range; IRSD, Index of Relative Socio-economic Disadvantage; RT, Radiotherapy; SD, standard deviation.

**Table 2:** Concordance between 10 Optimal Care Pathway recommendations and care for Victorians with colorectal cancer prior to policy implementation.

| OCP recommendation | Module 4 data | Data source | N | % OCP met (95% CI) | Medn (IQR) |
|---|---|---|---|---|---|
| **Presentation** | | | | | |
| 1. GP investigations: Physical exam, DRE, bloods, family history | 1a. Blood test | GP | 297 | 47% (41, 54) | |
| | 1b. Colonoscopy | GP | 297 | 66% (60, 72) | |
| | 1c. Physical exam | GP | 295 | 62% (56, 68) | |
| | 1d. DRE | GP | 297 | 13% (9, 17) | |
| | 1e. iFOBT | GP | 297 | 20% (16, 25) | |
| 2. Patients should be referred for colonoscopy within 4 weeks if symptoms are suggestive of colorectal cancer | Date GP ordered colonoscopy to date conducted for cases with cancer-specific symptoms and/or iFOBT | GP | 93 | 72% (61, 81) | 18 days (10, 30) |
| **Diagnosis, staging and treatment planning** | | | | | |
| 3. Patients should be seen by a surgeon within 2 weeks of GP referral. | Date GP referral to date specialist appointment | GP | 210 | 65% (58, 72) | 7 days (1, 23) |
| 4. MDT planning prior to treatment start | Date MDT meeting to date first treatment | Sp | 38 | 28% (15, 47) | |
| 5. Investigations/workup: Bloods, colonoscopy (curative disease), CT chest/abdo and pelvis, MRI (rectal only) | 5a. Blood test | Sp | 143 | 68% (59, 76) | |
| | 5b. Colonoscopy | Sp | 143 | 66% (57, 74) | |
| | 5c. CT | Sp | 143 | 77% (68, 83) | |
| | 5d. MRI (rectal) | Sp | 27 | 31% (15, 54) | |
| **Treatment** | | | | | |
| 6. Hospital for surgery has ICU | Hospital has ICU (2012-14) | Pt | 418 | 92% (88, 94) | |
| 7. High-risk rectal may benefit from neoadjuvant (chemo-) RT, or post-operative RT | Rectal stage II/III, receiving any RT | Pt/Sp | 32 | 28% (14, 48) | |
| 8. Neoadjuvant RT or chemotherapy to begin within 3 weeks of the management plan | Date of diagnosis to date neoadjuvant RT or chemotherapy | Pt/Sp | 16 | 39% (16, 70) | 25 days (20, 46) |
| 9. High risk patients may benefit from adjuvant chemotherapy; metastatic or non-resectable locally advanced disease may benefit from chemotherapy | 9a. Colon stage III surgical patients receiving any chemotherapy | Pt/Sp | 99 | 88% (79, 93) | |
| | 9b. Rectal stage II/III surgical patients receiving any chemotherapy | Pt/Sp | 36 | 63% (44, 79) | |
| | 9c. Stage IV or no surgery, receiving any chemotherapy | Pt/Sp | 40 | 94% (79, 98) | |
| | 9d. 9a – 9c populations combined | Pt/Sp | 175 | 84% (77, 89) | |
| 10. Adjuvant chemotherapy should commence within 8 weeks of surgery | Date of surgery to date of chemotherapy | Pt/Sp | 155 | 72% (64, 79) | 41 days (32, 59) |

Abbreviations: DRE, digital rectal exam; iFOBT, immunochemical faecal occult blood test; GP, General

practitioner; ICU, intensive care unit; IQR, interquartile range; Medn, median; OCP, optimal care pathway; Pt, patient; RT, radiotherapy; Sp, specialist.

**Table 3:** Optimal Care Pathway recommendation concordance and variation by remoteness, socio-economic disadvantage and insurance status adjusted for age and sex, where recommendation n≥50 cases.

| | **Remoteness** | | | **Socio-economic disadvantage** | | | | | **Health insurance** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Urban (ref.)** | **Rural** | | **Least (ref.)** | **Mid-disadvantaged** | | **Most disadvantaged** | | **Private (ref.)** | **Public** | |
| **OCP** | N (% met) | N (% met) | OR (95% CI) | N (% met) | N (% met) | OR (95% CI) | N (% met) | OR (95% CI) | N (% met) | N (% met) | OR (95% CI) |
| **Presentation** | | | | | | | | | | | |
| 1a | 227 (44.1) | 70 (57.8) | **1.70 (1.05, 2.73)** | 105 (41.2) | 104 (51.4) | 1.54 (0.83, 2.87) | 88 (49.9) | 1.34 (0.71, 2.55) | 189 (47.5) | 108 (47.1) | 1.01 (0.60, 1.70) |
| 1b | 227 (67.7) | 70 (61.7) | 0.75 (0.46, 1.23) | 105 (63.1) | 104 (61.6) | 0.94 (0.50, 1.77) | 88 (75.7) | 1.86 (0.95, 3.64) | 189 (62.1) | 108 (73.6) | 1.75 (0.99, 3.09) |
| 1c | 226 (61.3) | 70 (64.6) | 1.15 (0.71, 1.87) | 104 (58.2) | 104 (63.9) | 1.27 (0.68, 2.38) | 87 (64.4) | 1.27 (0.66, 2.46) | 188 (61.9) | 107 (62.3) | 1.02 (0.6, 1.73) |
| 1d | 227 (10.6) | 70 (18.8) | 1.94 (0.99, 3.81) | 105 (11.8) | 104 (8.3) | 0.68 (0.25, 1.81) | 88 (18.4) | 1.65 (0.68, 4.01) | 189 (11.8) | 108 (13.7) | 1.20 (0.56, 2.55) |
| 1e | 227 (17.4) | 70 (28.9) | **1.93 (1.10, 3.37)** | 105 (10.1) | 104 (20.6) | 2.31 (0.97, 5.48) | 88 (31.6) | **4.03 (1.69, 9.59)** | 189 (16.5) | 108 (26.4) | 1.82 (0.98, 3.36) |
| 2 | 75 (77.4) | 18 (51.5) | **0.30 (0.11, 0.79)** | 29 (73.8) | 29 (83.5) | 2.00 (0.50, 8.1) | 35 (62.0) | 0.65 (0.19, 2.25) | 55 (79.2) | 38 (62.4) | 0.43 (0.15, 1.19) |
| **Diagnosis, staging and treatment planning** | | | | | | | | | | | |
| 3 | 157 (92.7) | 53 (88.8) | 0.71 (0.40, 1.28) | 66 (72.6) | 81 (61.9) | 0.60 (0.27, 1.32) | 63 (60.7) | 0.57 (0.25, 1.29) | 131 (65.2) | 79 (64.5) | 0.98 (0.52, 1.83) |
| 5a | 104 (70.3) | 39 (62.9) | 0.71 (0.35, 1.43) | 54 (75.9) | 50 (65.5) | 0.63 (0.23, 1.70) | 40 (61.3) | 0.53 (0.2, 1.41) | 103 (73.4) | 40 (54.9) | **0.45 (0.20, 1.00)** |
| 5b | 104 (66.2) | 39 (65.7) | 0.96 (0.46, 1.98) | 54 (72.7) | 50 (61.5) | 0.58 (0.22, 1.52) | 40 (62.7) | 0.61 (0.22, 1.67) | 103 (70.4) | 40 (54.9) | 0.49 (0.21, 1.14) |
| 5c | 104 (77.0) | 39 (75.7) | 0.90 (0.41, 1.99) | 54 (77.5) | 50 (78.5) | 1.18 (0.39, 3.57) | 40 (73.2) | 0.91 (0.33, 2.54) | 103 (78.6) | 40 (71.7) | 0.72 (0.30, 1.73) |
| **Treatment** | | | | | | | | | | | |
| 6 | 310 (92.7) | 108 (88.8) | 0.60 (0.30, 1.19) | 153 (90.4) | 139 (92.8) | 1.33 (0.54, 3.31) | 126 (92.1) | 1.15 (0.49, 2.68) | 256 (90.7) | 162 (93.3) | 1.36 (0.64, 2.90) |
| 9a | 72 (86.3) | 28 (92.0) | 2.32 (0.65, 8.28) | 33 (85.3) | 43 (89.6) | 2.00 (0.33, 12.18) | 24 (88.2) | 1.53 (0.24, 9.8) | 58 (87.4) | 42 (88.5) | 0.56 (0.17, 1.90) |
| 9d | 124 (82.9) | 51 (87.1) | 1.67 (0.69, 4.00) | 64 (85.9) | 66 (85.6) | 1.39 (0.41, 4.63) | 46 (79.7) | 0.78 (0.24, 2.55) | 102 (83.2) | 74 (85.5) | 0.98 (0.37, 2.54) |
| 10 | 110 (75.6) | 45 (62.2) | 0.53 (0.26, 1.07) | 60 (82.6) | 57 (74.6) | 0.61 (0.22, 1.69) | 38 (50.3) | **0.21 (0.08, 0.58)** | 93 (76.9) | 62 (63.9) | 0.53 (0.25, 1.14) |

Statistically significant (p<.05) odds ratio in bold. Abbreviations: CI, confidence interval; OCP, optimal care pathway recommendation; OR, odds ratio; ref., reference group.