THE UAE NATIONAL GUIDELINES

COLON CANCER

Multidisciplinary Clinical Practice Guidelines

2026 Edition

Emirates Society of Colon & Rectal Surgery (ESCRS)

Emirates Society of Pathology (ESP)

Emirates Oncology Society (EOS)

Radiology Society of the Emirates (RSE)

Emirates Society of Radiation Oncology (ESRO)

Emirates Society of Gastroenterology and Hepatology (ESGE)

Emirates Lifestyle and Longevity Medicine Society

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Preface

The UAE National Guidelines on Colon Cancer have been developed to provide standardized, evidence-based recommendations for the diagnosis, treatment, and follow-up of colon cancer across the United Arab Emirates. These guidelines are intended to support healthcare professionals by promoting consistent, high-quality, and patient-centered care aligned with national healthcare priorities.

The guidelines were formulated through multidisciplinary expert collaboration and rigorous review of current scientific evidence, with adaptation to the local healthcare context and available resources. They reflect international best practices while addressing regional epidemiology and clinical needs within the UAE.

By establishing a unified national framework for colon cancer management, these guidelines aim to reduce variability in clinical practice, enhance care coordination, and improve patient outcomes. Regular updates will ensure continued relevance as evidence and clinical practice evolve.

Editor-in-Chief
June 2026

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EXECUTIVE SUMMARY

Colon cancer is a major public health concern worldwide and has emerged as one of the leading malignancies in the United Arab Emirates (UAE). Changes in lifestyle, rapid urbanization, dietary shifts, and increasing life expectancy have contributed to rising incidence. In the UAE, colon cancer consistently ranks among the top three most diagnosed cancers and remains a leading cause of cancer-related mortality. Notably, the disease affects a significantly younger demographic in the UAE compared with Western populations.

Despite substantial progress in global cancer care, variation in diagnostic pathways, staging practices, treatment selection, and follow-up strategies persists across UAE healthcare institutions. Differences in institutional resources, clinician training, and access to specialized services—including genetic counselling, advanced endoscopy, and multidisciplinary cancer care—contribute to heterogeneous patient outcomes.

To address this, the Emirates Medical Association commissioned this unified national guideline. It consolidates evidence-based recommendations from international authorities (among others ESMO, NCCN, ASCRS, CAP, ESGE, USMSTF) and adapts them to the UAE's demographic, epidemiologic, and health-system realities.

This comprehensive national guideline provides unified, evidence-based recommendations for the diagnosis, staging, treatment, and surveillance of colon cancer across all UAE healthcare settings. It harmonizes surgical, pathological, radiological, medical oncology, and gastroenterology practices within a single framework.

GUIDELINE OBJECTIVES

1. Provide evidence-based, multidisciplinary recommendations for all stages of colon cancer care.
2. Standardize diagnostic evaluation, staging pathways, and reporting frameworks across UAE healthcare institutions.
3. Define best practices for surgical, endoscopic, systemic, and radiologic management.
4. Establish UAE-specific surveillance and survivorship strategies.
5. Integrate recommendations for special populations, including:
    a. Young-onset colorectal cancer (YOCRC)
    b. Inflammatory bowel disease (IBD)
    c. Hereditary colorectal cancer syndromes
    d. Appendiceal neoplasms
6. Support national quality improvement through standardized templates and synoptic reporting.
7. Promote multidisciplinary team (MDT) decision-making throughout the patient care pathway.

SCOPE OF THE GUIDELINE

- Adults (≥18 years) with **suspected or confirmed colon cancer**.
- Includes malignant colon polyps, stage I–IV colon cancer, and appendiceal tumors. This guideline addresses colon carcinoma (adenocarcinoma and epithelial neoplasms), which constitutes most cases. Primary colorectal lymphomas and sarcomas are rare and managed according to dedicated hematology/sarcoma guidelines with MDT referral.
- Does *not* include rectal cancer (addressed in separate UAE guidelines).
- Includes special considerations for:
    - Young-onset colon cancer (<50 years)
    - IBD-associated colorectal cancer
    - Hereditary CRC syndromes (Lynch, FAP, MAP, etc.)

Clinical Settings

- All UAE healthcare environments:
    - Government hospitals
    - Private hospitals
    - Cancer centers

Users of the Guideline

- Colorectal surgeons
- Gastroenterologists
- Radiologists & nuclear medicine specialists
- Pathologists
- Medical oncologists
- Primary care physicians
- Allied health professionals (dietitians, stoma nurses, genetics teams)

METHODOLOGY

Guideline Development Process

This guideline was jointly developed by seven national medical societies Under the auspices of the **Emirates Medical Association (EMA):**

- Emirates Society of Colon & Rectal Surgery (ESCRS)
- Emirates Oncology Society (EOS)
- Emirates Society of Gastroenterology and Hepatology (ESGE)
- Emirates Society of Pathology (ESP)
- Emirates Society of Radiology (ESR)
- Emirates Society of Radiation Oncology (ESRO)
- Emirates Lifestyle Medicine and Longevity Society,

Recommendations were generated through systematic evidence review, expert consensus, and contextual adaptation to UAE clinical pathways and available resources.

Evidence Appraisal Framework

Levels of Evidence (LoE)

- **I:** High-quality randomized trials / meta-analyses
- **II:** Randomized trials with limitations / prospective cohort studies

- **III:** Retrospective cohort studies / case–control studies
- **IV:** Case series, observational data
- **V:** Expert opinion, mechanistic rationale, or consensus

Grades of Recommendation (GoR)

- **A:** Strong recommendation based on high-quality evidence (LoE I–II)
- **B:** Moderate strength (LoE II–III)
- **C:** Weak recommendation (LoE III–IV)
- **D:** Consensus/expert opinion only (LoE V)

Multidisciplinary Team (MDT) Coordination

Consistent MDT discussion is essential for colon cancer management in the UAE. Every patient with biopsy-proven colon cancer—at any stage—should be reviewed in an MDT meeting involving surgery, medical oncology, radiology, pathology, and gastroenterology.
MDT decision-making is required for:

- Diagnostic uncertainty
- All Stages treatment planning
- Potentially resectable metastatic disease
- Malignant polyps
- IBD-associated CRC
- Young-onset CRC
- Hereditary cancer syndromes
- Emergency presentations
- Surveillance and complex follow-up issues

Equity, Accessibility, and UAE-Specific Adaptation

Given the UAE's unique healthcare landscape, this guideline integrates:

- Variable access to advanced imaging
- Younger age at diagnosis
- High expatriate population mobility
- Gaps in screening and prevention
- Emerging local data from the UAE Cancer Registry

Health System Goals Supported by These Guidelines

1. Enhance early detection through improved referral and diagnostic pathways.
2. Decrease late-stage presentation and emergency diagnoses.
3. Optimize treatment outcomes through uniform application of evidence-based care.
4. Improve MDT utilization, particularly in complex cases.
5. Promote national registries and standardized synoptic reporting.
6. Establish consistent follow-up to reduce loss to follow-up.
7. Support training and accreditation in advanced endoscopy and colorectal surgery.
   Enable research and quality improvement through standardized data collection

SECTION 1 - INTRODUCTION & BURDEN OF COLON CANCER IN THE UNITED ARAB EMIRATES

1.1 Incidence and Trends [1]

According to recent UAE National Cancer Registry (UAE-NCR) data:

- Colorectal cancer is among the top three most common cancers in the UAE.
- In **2021**, *532 new cases* of colorectal cancer were diagnosed nationally.
- Overall national cancer incidence increased from **4,381 cases in 2019** to **7,098 invasive cancers in 2023**, reflecting improved reporting and population growth as well as true increases in incidence.

1.2. Age of Onset

A distinctive characteristic in the UAE is **early age at diagnosis**:

- A significant proportion of patients are diagnosed before the age of 50, fulfilling the definition of young-onset colorectal cancer (YOCRC).
- In the UAE, over 41% of colon cancer cases occur in individuals younger than 50 years, and more than 22% are diagnosed in patients under 40 years of age.

This epidemiologic pattern underscores the need for:

- Lower screening thresholds
- Early referral from primary care
- Genetic counselling pathways
- Specialized survivorship planning for younger patients

1.3. Stage at Presentation

Most colon cancer cases in the UAE present at **advanced stages**:

- Up to 50% of patients present with Stage III–IV disease.
- Approximately 20–25% present with emergency complications such as obstruction, perforation, or bleeding.
- Low screening uptake (estimated ~90% of adults ≥40 years have never undergone colon cancer screening) remains a major contributor to delayed diagnosis.

Implications include:

- Higher morbidity and mortality
- More complex surgical procedures
- Increased need for stomas
- More frequent requirement for systemic therapy
- Reduced survival compared with earlier-detected disease

1.4. Mortality and Survival

- **In 2021, 112 deaths** were attributed to colorectal cancer, accounting for **~11.5%** of all cancer deaths in the UAE.
- Colorectal cancer was identified as the **leading cause of cancer mortality** in the 2023 UAE-NCR. Late-stage presentation, emergency diagnoses, and limited early screening explain much of the excess mortality.

1.5. Population Diversity and Healthcare System Considerations

1. Predominantly Expatriate Population

- High mobility complicates longitudinal follow-up.
- Varied health literacy levels affect screening behaviours.
- Genetic diversity broadens the range of tumor biology.

2. Healthcare System Variation

Across the UAE, healthcare settings differ in:

- Access to advanced imaging
- Availability of colorectal subspecialists
- MDT infrastructure
- Access to minimally invasive and robotic surgery
- Genetic and molecular profiling capability
- Endoscopic expertise
- Public versus private sector care models

1.6. Technological and Clinical Innovations

Rapid advances in the UAE's healthcare system necessitate contemporary guidelines that incorporate:

- Minimally invasive and robotic colorectal surgery
- High-resolution colonoscopy and advanced resection techniques (EMR, ESD)
- MRI liver with hepatobiliary contrast
- Modern systemic therapies including targeted therapy and immunotherapy
- Circulating tumor DNA (ctDNA) for risk stratification and surveillance(emerging)
- Artificial intelligence applications in imaging, endoscopy, pathology and AI-Driven biomarkers

The guideline integrates these advances where evidence supports clinical utility.

1.7. Rationale for a UAE-Specific Guideline

International guidelines provide strong evidence foundations but do not fully address UAE-specific challenges:

- Younger patient population
- Lower screening uptake
- Higher rate of emergency presentation
- Variability in follow-up pathways
- Disparities in access to specialized care
- Multicultural patient cohort with diverse genetic backgrounds
- Resource variation between institutions and Emirates

A customized national guideline ensures:

- Standardized staging and diagnostic pathways
- Consistent treatment algorithms
- National alignment in pathology and radiology reporting
- Unified surveillance recommendations
- Improved care continuity for mobile expatriate populations
- Adaptation to local epidemiology and healthcare delivery structures

SECTION 2 — INITIAL DIAGNOSIS AND STAGING OF COLON CANCER

Accurate and timely diagnosis and staging are critical determinants of treatment outcomes in colon cancer. This section outlines standardized national recommendations for colonoscopy, pathological assessment, and radiologic staging. The recommendations integrate international best practices (ESGE, USMSTF, ASCRS, CAP, AJCC, EORTC–ESOI–ESGAR) and are adapted to the UAE's healthcare landscape.

2.1. Diagnostic Colonoscopy [2-7] (LoE I GoR A)

Colonoscopy is the gold standard for diagnosis of suspected colon cancer.

2.1.1 Endoscopist Qualifications: (LoE II, GoR A)

Colonoscopy must be performed by a trained colorectal surgeon or gastroenterologist with demonstrated competency in:

- Adenoma detection
- Resection of complex polyps
- Tattooing techniques
- Recognition of advanced lesions

2.1.2 When Colonoscopy Should Be Deferred or Avoided. (LoE III GoR B)

Omitting colonoscopy is acceptable when the procedure is unsafe or technically unfeasible, including:

- Obstruction preventing scope passage
- Hemodynamic instability
- Suspected/confirmed perforation
- Severe comorbidities precluding sedation/procedure
- Immediately prior to emergency surgery

In such cases, CT colonography or intraoperative colonoscopy (selective) may be alternatives.

2.1.3 Endoscopic Tattooing of Lesions. (LoE II-III, GoR A)

Tattooing facilitates preoperative localization and is mandatory for any lesion referred for surgical resection or requiring advanced intervention.

Tattooing Technique Recommendations:

- Use sterile carbon particle suspension.
- Inject using the saline bleb method:
  - Raise a submucosal cushion
  - Inject ink into the cushion
- Place tattoo 2–5 cm distal to the lesion.
- Avoid injecting into the lesion itself or beneath the tumor.

Do NOT Tattoo: Cecum and Low or mid rectum (<10 cm from anal verge)
(Aligned with UAE 2022 national guideline & International Delphi consensus)

2.1.4 Minimum Quality Benchmarks and Quality Indicators

- Cecal intubation rate: ≥95%
- Withdrawal time: ≥6 minutes
- Adequate bowel preparation documentation
- Adenoma detection rate (ADR) monitored by institution

2.2. Histopathological Evaluation

Pathology is central to diagnosis, risk stratification, staging, and treatment planning. All UAE pathology departments are required to use **CAP-compliant synoptic reports** for colon cancer. *A full CAP-style synoptic template appears in Section 7.*

Key Requirements

1. **Clear communication between surgeon and pathologist:**
    a. Procedure performed
    b. Orientation and anatomical site
    c. Prior neoadjuvant therapy
    d. Perforation or invasion concerns
    e. Previous biopsy results
2. **Mandatory testing:**
    a. MMR/MSI for *all* newly diagnosed colorectal cancers
    b. Report peritumoral budding, lymph vascular invasion, perineural invasion
    c. Minimum **12 lymph nodes** examined (when feasible)
3. **Synoptic reports must include:**
    a. Histologic subtype
    b. Grade
    c. Tumor size
    d. Margin status
    e. LVI, PNI
    f. Tumor budding
    g. Tumor deposits
    h. pTNM stage (AJCC 8th edition)

2.3. Radiologic Imaging and Staging [8–19]. **(LoE II, GoR A)**

Radiologic staging determines disease extent and guides MDT decision-making.
All patients with newly diagnosed colon cancer require contrast-enhanced CT of the chest, abdomen, and pelvis as first-line staging.
Recommendations are based on EORTC–ESOI–ESGAR consensus and adapted to UAE resources.

2.3.1 CT Chest, Abdomen, and Pelvis (Primary Staging)

- IV contrast: mandatory
    - Dose: 1.0–2.0 mL/kg
    - Iodine concentration: 200–400 mg/mL
- Oral contrast not routinely recommended (no proven benefit).

- Acquisition: monophasic venous phase imaging.

Chest CT Reconstructions

- Axial soft tissue: 3 mm
- Lung window: 1 mm
- Bone reconstruction: optional

Abdomen & Pelvis

- Axial soft tissue: 3 mm
- Bone recon: optional

2.3.2 Liver MRI With Hepatobiliary Contrast

MRI liver is recommended for:

- Patients being considered for liver metastasectomy
- Small or indeterminate liver lesions on CT
- Contraindication to iodine contrast
- Detailed preoperative mapping

Technique Requirements

- Hepatobiliary contrast (e.g., Gd-EOB-DTPA)
- T1/T2 weighted sequences
- DWI
- Multiphase contrast-enhanced imaging

Advantages:

- Superior detection of lesions <1 cm
- Improved characterization of cysts, haemangiomas
- Precise mapping for ablation/resection planning

2.3.3 PET/CT (18F-FDG)

Routine PET/CT is **NOT recommended** for staging colon cancer. **(LoE II, GoR B)**

Indications (Selective Use):

- Equivocal findings on CT/MRI
- Elevated CEA with negative CT scan
- Contraindication to iodinated contrast (eGFR <40 mL/min/1.73 m^2)
- Radiotherapy planning for metastatic lesions

2.4. Additional Staging Elements

2.4.1 CT Colonography **(LoE II, GoR A)**

A complete colonoscopy is essential to identify synchronous polyps or cancers.
If obstructing tumor prevents full visualization:

- CT colonography, OR
- Completion colonoscopy within 3–6 months postoperatively

2.4.2 CEA Measurement

- Obtain baseline serum CEA at diagnosis.

CEA is prognostic and useful for postoperative surveillance.

2.5 Staging Classification **(LoE III, GoR A)**

Staging must follow **AJCC 8th Edition TNM** criteria, documented in:

- Radiology report
- Pathology synoptic report
- MDT summary

A dedicated staging template is provided in Section 7.

2.6. MDT Review for Final Staging. **(LoE II/III, GoR A)**

Every newly diagnosed case must undergo MDT discussion after completion of imaging, pathology, and colonoscopy

MDT determines:

- Final stage
- Resectability
- Whether neoadjuvant therapy is indicated
- Surgical approach
- Systemic therapy sequencing
- Whether case requires referral to an expert centre

SECTION 3 — TAILORED APPROACHES FOR THE TREATMENT OF COLON CANCER

Colon cancer treatment requires coordinated multidisciplinary care to determine optimal sequencing of surgery, systemic therapy, and endoscopic interventions. **(LoE II/III, GoR A)**

Core principles

- Surgery is the primary curative modality for stages I–III.
- Optimal oncologic outcomes depend on complete mesocolic excision, appropriate lymphadenectomy, and margin clearance.
- Endoscopic resection plays an increasingly important role in selected early cancers (T1).
- Systemic therapy is essential for stage III and IV disease, and selectively for high-risk stage II disease.
- All cases must be reviewed, and management plan must be approved by a MDT board.
- Neoadjuvant systemic chemotherapy or immunotherapy may be considered in selected cases of locally advanced non obstructive disease after MDT discussion.

3.1. GENERAL SURGICAL PRINCIPLES AND RECOMMENDATIONS

3.1.1 Principles of Oncologic Resection: (LoE II/III, GoR A)

Surgical resection must follow standardized oncologic principles to optimize cure:

1. Adequate proximal and distal margins, typically at least 5 cm on each side.
2. Complete Mesocolic Excision (CME) with preservation of fascial planes.
3. Central vascular ligation (CVL) or high lymphnode dissection at the origin of supplying vessels, resulting in a D2 lymphadenectomy.
4. En-bloc multivisceral resection when adjacent organ invasion is suspected.
5. Do not perform in vivo sentinel node biopsy as a substitute for mesocolic lymph node harvest.
6. Perform adnexal excision for:
    a. Macroscopic involvement, OR
    b. High-risk genetic backgrounds (e.g., BRCA, Lynch syndrome) after shared decision-making.
7. Specimen extraction: Prefer Pfannenstiel incision when feasible (lower hernia rate).

3.1.2 Surgeon Qualifications and Competency

Requirements

- Board certification in General Surgery
- Preferably fellowship training in Colorectal Surgery.
- Minimum (10) colon resections as the primary surgeon per year to maintain competency.
- Ongoing CME/CPD in Colorectal Surgery.

3.1.3 Choice of Surgical Approach

- Minimally invasive Surgery (MIS-laparoscopic or robotic) is highly recommended when performed by appropriately trained surgeons (**LoE I, GoR A)**
- Open surgery **is** indicated when:
  - Surgeon lacks MIS expertise
  - Large bulky masses
  - Emergency presentations were MIS expertise in not available or feasible

3.1.4 Intraoperative Staging

At the beginning of surgery, perform:

- Full intra-abdominal inspection
- Assessment for peritoneal metastases
- Liver surface evaluation
- Ovarian assessment

3.1.5 Unexpected Peritoneal Metastases

If peritoneal metastases are discovered:

1. Document the Peritoneal Cancer Index (PCI) and obtain biopsy for histopathological examination
2. Abort elective resection unless a clear palliative indication exists.
3. Refer to a specialized peritoneal malignancy/oncology center.
   (LoE II, GoR A)

3.1.6 Mandatory referral to a specialized centre for:

- T4b tumours requiring multivisceral resection
- Fistulizing tumours (entero-vesical, entero-cutaneous, entero-enteric)
- Large or complex masses with suspected invasion
- Synchronous metastases (consider curative MDT approach)
- Obstruction/perforation requiring complex reconstruction

3.1.7 Perioperative Care (Enhanced Recovery After Surgery (ERAS)) [20 – 29] (**LoR I, GoR A)**

All patients should follow an ERAS-compliant perioperative program:

- Early ambulation
- Early oral intake
- Avoid nasogastric tubes
- Minimize drains
- Goal-directed fluid therapy
- Multimodal analgesia (epidural for laparotomy)
- PONV prophylaxis
- Preoperative nutritional optimization in malnourished patients

3.2 MANAGEMENT OF MALIGNANT COLON POLYPS (pT1)

Management depends on histologic high-risk features.
Oncologic Surgical colectomy is recommended for pT1 cancers with ≥1 high-risk feature.[30 – 54] **(LoE II/III, GoR A)**

- Positive or <1 mm margins
- Lymphovascular invasion (LVI)
- High-grade tumor budding (Bd2–3)
- Poor differentiation
- Deep submucosal invasion
    - ≥1000 µm
    - Kikuchi SM2–3
    - Haggitt level 4
- Piecemeal resection
- Uncertain R0 status

Surveillance may be considered when:

- One high-risk feature (excluding R1) AND
- Moderate or high surgical risk
  R1/Rx scar: Consider endoscopic scar excision in expert centers—only if all risk features are evaluable.

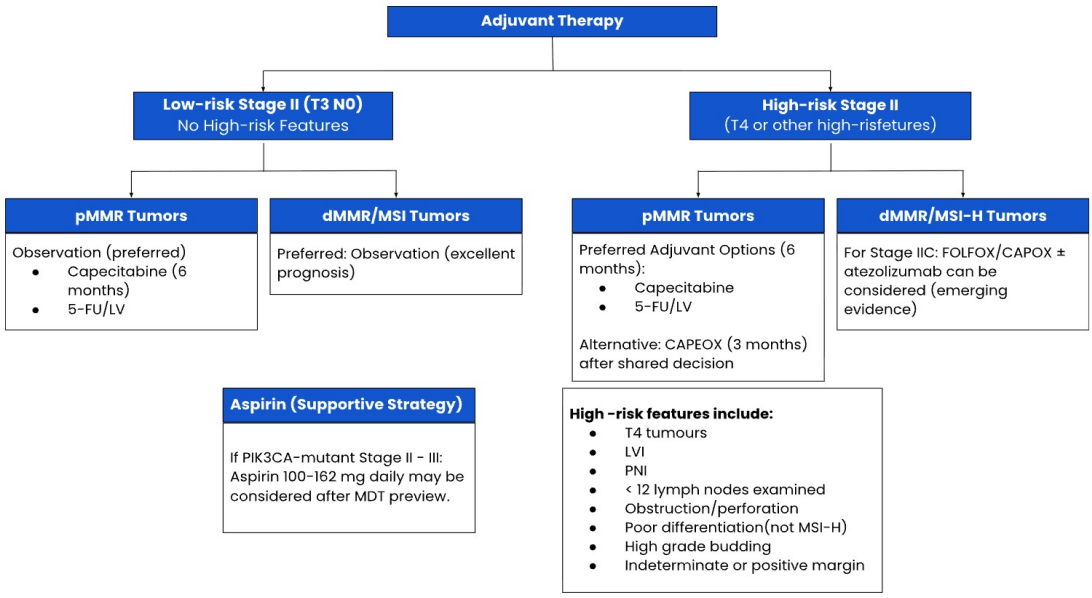
3.3 MANAGEMENT OF STAGE I–II COLON CANCER

3.3.1 Stage I

- Treatment: **Surgical resection alone**, adhering to oncologic principles.
  No adjuvant therapy indicated. **(LoE I, GoR A)**

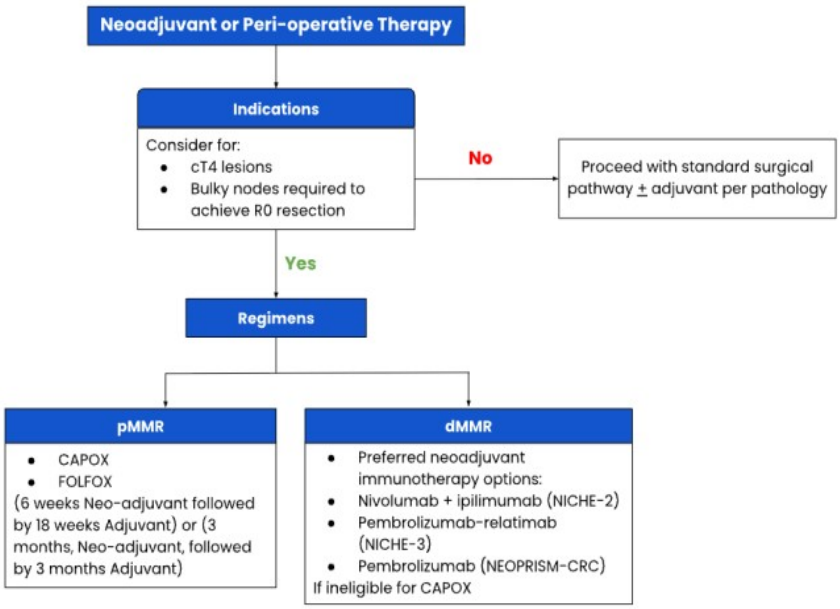
3.4.2 Stage II

- Treatment: **Surgical resection,** adhering to oncologic principles **+/- Adjuvant Systemic Therapy**: [55-67]



3.5 MANAGEMENT OF STAGE III (NON-METASTATIC) COLON CANCER

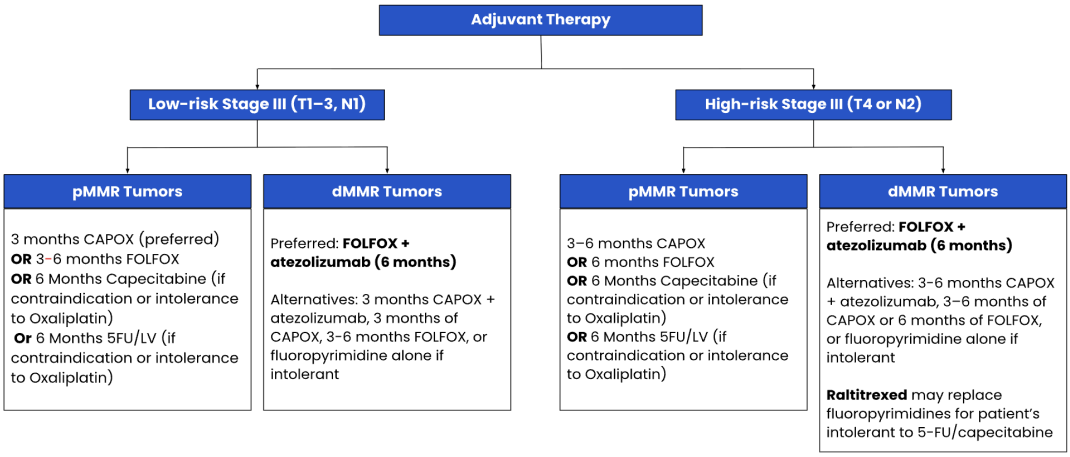
3.5.1 Neoadjuvant or Peri-operative Therapy[68-71] (GoRB,LoEII)



3.5.2 Neoadjuvant Chemo Radiotherapy for: [72 - 81] (LoE III, GoR B)

- May be considered for T4b tumors abutting/fixed to adjacent organs where upfront R0 is doubtful.

3.5.2 Adjuvant Systemic Therapy [82-114] (LoE I,GoR A)



3.5.3 Adjuvant Radiotherapy [94 – 97] (LoE III, GoR C)

Indications high risk features such as but not limited to:

- Positive/Close Margins R1 and re-resection not feasible
- Gross Residual Disease After Colon Resection (R2 - resection) and re-resection not feasible
- High risk features not suitable candidate for any systemic therapy

SECTION 4 — MANAGEMENT OF STAGE IV (METASTATIC) COLON CANCER

Stage IV colon cancer encompasses a heterogeneous group of patients with widely varying prognosis. Modern therapeutic advances—including metastasectomy, ablation, stereotactic radiotherapy, and biomarker-driven systemic therapy—have made long-term survival and even cure achievable for selected patients.

Management must be individualized and guided by a multidisciplinary tumor board with colorectal surgery, hepatobiliary surgery, medical oncology, thoracic surgery, radiology, nuclear medicine, pathology, and gastroenterology.

4.1 MDT ASSESSMENT AND GENERAL PRINCIPLES

The MDT determines:

- Resectability of metastases
- Sequence of surgery and systemic therapy
- Whether curative-intent treatment is possible
- Best systemic regimen based on molecular profile
- Suitability for ablation/SBRT
- When to refer to a specialized center

4.1.2 Resectability Definitions

Resectability assessments apply to liver, lung, and limited peritoneal disease:

Resectable

- All lesions removable with negative margins
- Adequate future liver remnant (FLR)
- No uncontrolled extrahepatic disease

Borderline resectable

- Technical but not oncologically safe upfront
- Conversion therapy required to downsize disease

Unresectable

- Insufficient FLR (Future Liver Remnant)
- Multifocal or bilobar disease not amenable to staged resection
- Widespread extrahepatic spread

4.1.3 Mandatory Testing for ALL Stage IV Patients

1. MMR/MSI (IHC or PCR)
2. RAS (KRAS/NRAS)
3. BRAF V600E
4. HER2 IHC ± ISH
5. NGS panel recommended when available

4.2 COLORECTAL LIVER METASTASES (CRLM)

The liver is the most common metastatic site. Liver-directed therapy offers the highest chance of cure in oligometastatic disease.

4.2.1 Initial Imaging Evaluation

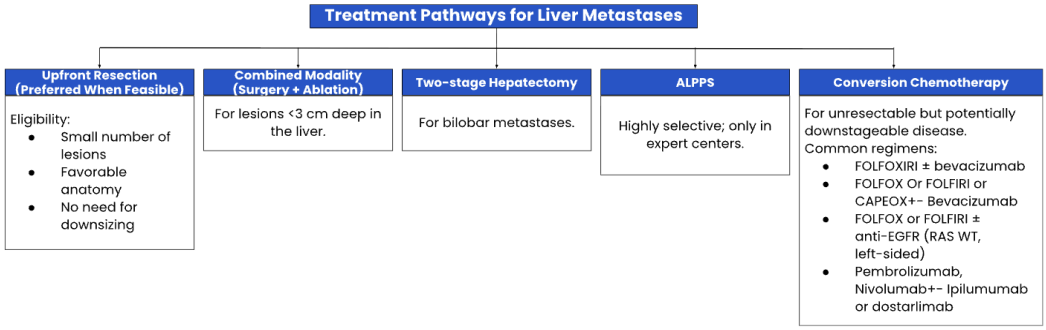
- Triphasic contrast-enhanced CT of chest/abdomen/pelvis
- MRI liver with hepatobiliary contrast (preferred). MRI liver increases detection of <1 cm metastases by 30–40%.

4.2.2 Criteria for Potentially Curable Liver Metastases

Curative approach considered when:

- All lesions can be fully resected or ablated
- Future Liver Remnant FLR ≥30% (normal liver) or ≥40% (chemotherapy-injured liver)
- No uncontrolled extrahepatic metastases
- Primary tumor controllable/resectable

4.2.3 Treatment Pathways for Liver Metastases [115 – 121]



4.2.4 Ablation

Techniques:

- Radiofrequency ablation (RFA)
- Microwave ablation (MWA)
- Thermal ablation (liver/lung)
- Histotrypsy
- Hepatic artery infusion (HAI).
- Transarterial chemoembolization (TACE) with drug-eluting beads.
- Transarterial radioembolization (TARE) (Y-90).

Indications:

- Lesions ≤3 cm
- Unfavourable surgical anatomy
- Combined with resection to achieve complete clearance.

4.2.5 Stereotactic body Radiotherapy [122 – 128] **(LoE II,GoR B)**

SBRT is adapted according to lesion size, location, and liver dose constraints. More than one lesion may be treated during the same course of therapy. All such cases must be reviewed in an MDT.

4.2.6 Hepatic Arterial Infusion HAI[129-131]

Placement of a hepatic arterial port or implantable pump during surgical intervention for liver resection with subsequent infusion of chemotherapy is an option (category 2B). In a randomized study of patients who had undergone hepatic resection, administration of floxuridine with dexamethasone through HAIC and IV 5-FU with or without LV was shown to be superior to a similar systemic chemotherapy regimen alone with respect to 2-year survival free of hepatic disease. The study was not powered for long-term survival, but a trend (not significant) was seen toward better long-term outcomes in the group receiving HAIC at later follow-up periods.

Eligibility:

- Multidisciplinary experience with HAI therapy
- Unresectable colorectal liver metastases **or** resectable colorectal liver metastases at high risk for recurrence
- Treated with at least one line of systemic chemotherapy
- No extrahepatic disease: primary tumor may be in place
- Suitable hepatic arterial anatomy
- No portal hypertension
- No active viral hepatitis
- Direct bilirubin ≤ 1.5 mg/dL
- Alkaline phosphatase < 2 × ULN
- HAI chemotherapy cannot be delivered with concurrent bevacizumab or other VEGF inhibitors
- No prior radiation to the liver

4.3 LUNG METASTASES

4.3.1 Criteria for Resection

- Primary tumor controlled
- All pulmonary lesions resectable
- Adequate lung function
- No widespread metastatic disease

4.3.2 Techniques

- VATS preferred
- Wedge resection sufficient
- Stereotactic Body Radiotherapy (SBRT) with a high Biological effective dose of more than 150 Gy when safely feasible as an alternative for high risk or nonsurgical candidates [132-141]

4.4. PERITONEAL METASTASES

4.4.1 Patient Selection for CRS

- Consider CRS for selected patients with:
  - Isolated, limited peritoneal disease (PCI <= 15)
  - Good performance status (ECOG 0-1).
  - No unresectable extra-peritoneal metastases.
- CRS combined with systemic chemotherapy improves OS compared with systemic therapy alone in selected patients, in **high-volume specialist centers**.
- Prioritize achievement of CCR-0 cytoreduction. This—not HIPEC—drives long-term outcomes.
- Strength of Recommendation: strong
- Strength of evidence: moderate

4.4.2 Role of HIPEC

- Current evidence (e.g., PRODIGE-7) shows no clear OS benefit for oxaliplatin-based HIPEC after optimal CRS.
- ESMO and NCCN consider HIPEC experimental or recommend use only in clinical trials or highly selected cases.
- Do not use HIPEC routinely outside clinical trials.
- Strength of recommendation: Strong (against HIPEC)

4.4.3 Selection Tools and Considerations

- Mandatory referral to specialized peritoneal disease programs; treatment in inexperienced centers associated with higher morbidity/mortality and worse outcomes.
- Use **Peritoneal Cancer Index (PCI)** to guide selection.
- Limited or no benefit when **PCI >15**.
- Provide detailed counselling on:
  - High morbidity
  - Prolonged recovery
  - Need for structured postoperative surveillance

4.4.4 Pressurized Intraperitoneal Aerosol Chemotherapy (PIPAC)

- Laparoscopic locoregional therapy delivering aerosolized chemotherapy under pressure
- Enhances tissue penetration while limiting systemic toxicity
- Option (Category 2B) for unresectable peritoneal metastases after prior systemic therapy
- Best performed at experienced centers
- Nonrandomized prospective and retrospective studies show:
  - Histopathologic tumor regression
  - Disease stabilization
  - Acceptable toxicity profile
  - Not powered for long-term survival outcomes
- Repeated treatments associated with: Improved peritoneal disease control

.

Eligibility

- Multidisciplinary experience with PIPAC therapy
- Histologically confirmed **peritoneal metastases** from gastrointestinal, tumors*(eg, colorectal, gastric, appendiceal)*
- Unresectable peritoneal disease or disease not amenable to complete cytoreductive surgery (CRS ± HIPEC)
- Prior treatment with **at least one line of systemic chemotherapy** (unless contraindicated or intolerant)
- Predominantly peritoneal disease with no uncontrolled extra-abdominal metastases *(limited, stable extraperitoneal disease may be considered case-by-case)*
- Eastern Cooperative Oncology Group (**ECOG**) performance status **0–2**
- Adequate organ function:
    - Hemoglobin ≥ 8 g/dL
    - Absolute neutrophil count ≥ 1.5 × 10^9/L
    - Platelets ≥ 75–100 × 10^9/L
    - Total bilirubin ≤ 1.5 × ULN
    - AST/ALT ≤ 2.5 × ULN
    - Creatinine clearance ≥ 50 mL/min
- Absence of bowel obstruction, perforation, or uncontrolled ascites requiring continuous drainage
- No extensive intra-abdominal adhesions precluding safe laparoscopic access
- No active intra-abdominal infection
- Interval of ≥ 4–6 weeks from prior major abdominal surgery
- Interval of ≥ 2–4 weeks from last systemic chemotherapy (agent-dependent)
- No known hypersensitivity to the planned intraperitoneal agents
- Ability to tolerate repeated laparoscopic procedures under general anesthesia
- Informed consent with understanding of **palliative intent** and investigational nature (where applicable)

Common Exclusion Criteria:

- Candidates for complete CRS ± HIPEC with curative intent
- Extensive extra-abdominal metastatic disease
- ECOG ≥ 3
- Severe cardiopulmonary comorbidity prohibiting laparoscopy
- Pregnancy or breastfeeding
- Prior intraperitoneal chemotherapy causing severe toxicity (relative)

PIPAC is primarily considered a **palliative, locoregional treatment strategy** aimed at disease control, symptom palliation, and potential chemo sensitization in patients with advanced peritoneal metastases who have exhausted or are unsuitable for standard surgical options. [132]

4.5. NON-REGIONAL LYMPH NODE METASTASES

4.5.1 General Principles

- All Lymph nodes outside standard mesocolic/mesorectal basins (e.g., paraaortic, retroperitoneal, common iliac, inguinal), classified as M1 disease in TNM.
- All recommendations are weak/low quality and should be applied case by case in MDT settings.
- Most data focus on paraaortic lymph node metastases (PALNM) [142 – 145]
- Treat NRLNM within a multimodal framework

4.5.2 Recommendations

- Systemic chemotherapy (standard metastatic regimens) is indicated for essentially all patients considered for local therapy to assess biology and treat micrometastatic disease. Strength: Moderate recommendation; Evidence quality: Low–moderate
- For fit patients (ECOG 0–1) with truly isolated, resectable PALNM, favourable response/stability on systemic therapy, and potential for R0 resection, PALND or focal RT can be considered with curative intent, ideally in high volume centres and within clinical trials when available.
  Strength**:** Weak/conditional recommendation; Evidence quality: Low–very low
- In patients unfit for surgery or with technically challenging NRLNM, consider definitive or consolidative RT/CRT, or SBRT to involved nodal basins as part of an oligometastatic strategy. Strength: Weak/conditional; Evidence quality: Low (small series).

4.6. BONE METASTASES [146-149] **(LoE II, GoR B)**

Stereotactic Body Radiotherapy (SBRT) can be considered for oligometastatic bone lesions from colorectal cancer, achieving durable local control in selected patients.

4.7. OLIGOMETASTATIC DISEASE

Definition: Limited number of metastases in one or two organs, technically resectable or ablatable.

Curative intent treatment is recommended when criteria met.

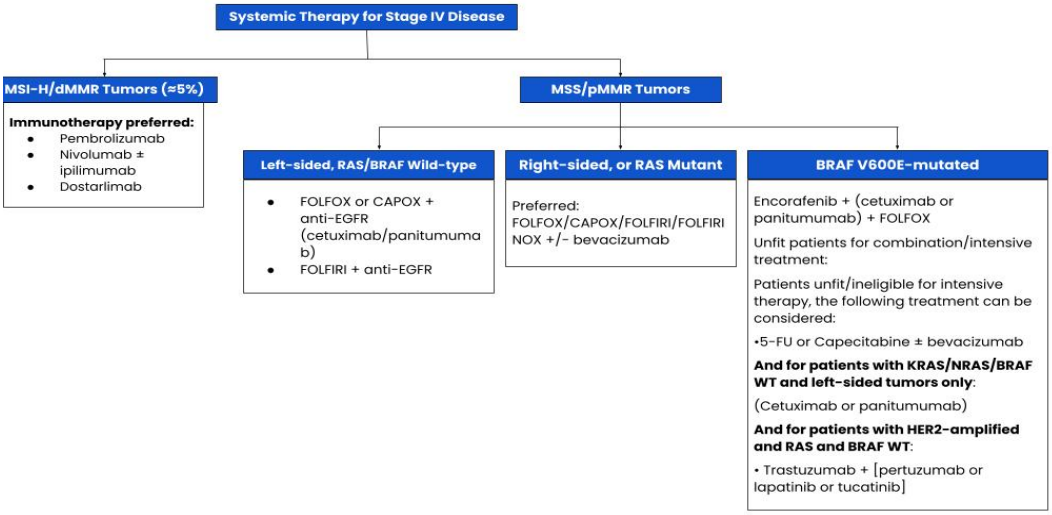
Approaches:

- Surgery
- SBRT
- Ablation
- Combination therapies

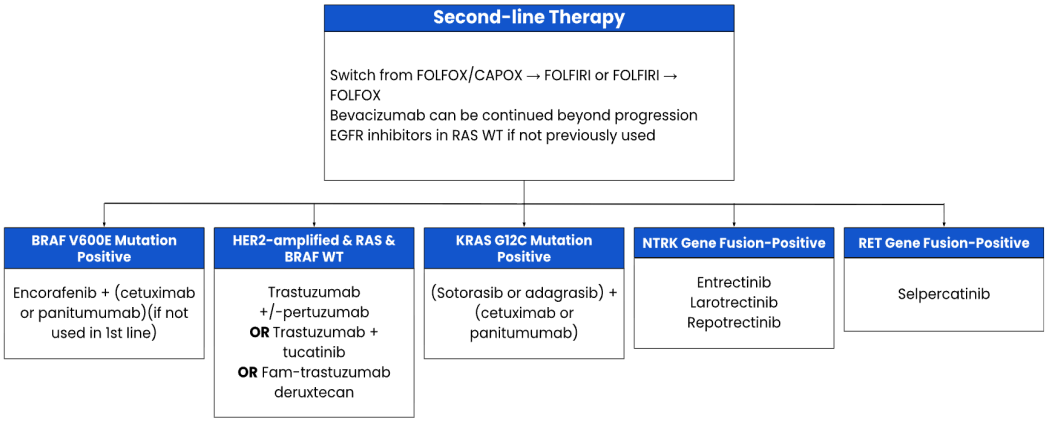
4.8. SYSTEMIC PALLIATIVE THERAPY FOR STAGE IV DISEASE

Choice guided by: Molecular profile (MMR, RAS, BRAF, HER2), Tumor sidedness, Patient performance status, Extent of disease and Treatment goals (curative, conversion, palliative). *For comprehensive updated drug regimens , please refer to "PRINCIPLES OF SYSTEMIC THERAPY FOR ADVANCED OR METASTATIC DISEASE" , NCCN , Colon Cancer , 2026.2 version or later*

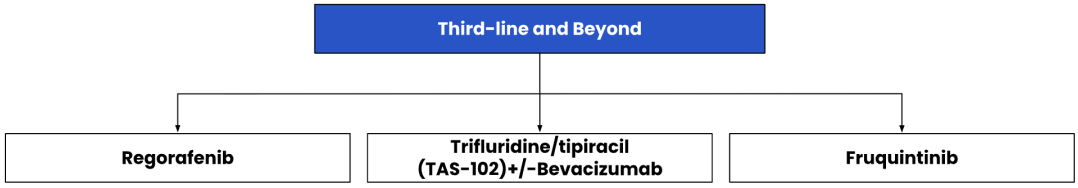
4.8.1 First-Line Therapy (Strong Recommendation) (GoR A, LoE I)[150 – 180]



4.8.2 Second-Line Therapy(Strong Recommendation) (GoR A, LoE I) [181 – 190]



4.8.3 Third -Line and Beyond(Strong Recommendation) (GoR A, LoE I) [191 - 195]



4.9. PALLIATIVE ENDOSCOPIC/SURGICAL MANAGEMENT

Indications for palliative surgery / stenting are Obstruction, Perforation and Uncontrolled bleeding

All indications, technical requirements, and management protocols for malignant colonic stenting must follow the European Society of Gastrointestinal Endoscopy (ESGE) 2020 guideline (and newer version if it may appear). These recommendations are consistent with major surgical society guidance, including ASCRS.

1. Indication for Palliation (Strong Recommendation) (GoR A, LoE I)

For patients with incurable, obstructing malignant colorectal cancer, endoscopic placement of a self-expandable metal stent (SEMS) is the preferred first-line treatment, provided appropriate expertise is available.

SEMS placement is recommended over emergency palliative surgery.

2. Indication for Bridge-to-Surgery (Conditional Recommendation)

- Routine use of SEMS as a bridge-to-surgery (BTS) in curable, left-sided obstructing colon cancer is not recommended. (GoR B, LoE I)
- Mandatory MDT Review:
    - The decision to perform BTS must be made in a multidisciplinary team (MDT) meeting.
    - BTS may be considered as an alternative to emergency resection for high-risk surgical candidates, such as: GoR B, LoE II)
        - Age >70 years
        - ASA ≥ III
        - Strong patient desires to avoid stoma
    - Decisions must balance surgical risk with long-term oncologic safety.

3. Prerequisites for Stent Placement (Strong Recommendation)

- SEMS should be placed only when both:
    - (1) Clinical symptoms of large bowel obstruction are present
    - (2) Radiological evidence of obstruction is confirmed on CT scan
- Prophylactic stenting of asymptomatic strictures is not recommended.

4. Expertise Requirements

Colonic stenting is a high-risk, advanced therapeutic procedure. It must be performed only by an advanced therapeutic endoscopist with:

- Documented competence
- Routine experience in colonic stenting

5. Contraindications

- Bowel perforation
- Extensive peritoneal carcinomatosis
- Ongoing treatment with **anti-angiogenic agents** (e.g., bevacizumab), due to elevated perforation risk

6. Stent Selection [196 - 197] (GoR A, LoE I)

- **Uncovered SEMS** are the recommended stent type for malignant colonic obstruction in Palliative settings and Curative-intent scenarios (including BTS consideration)

SECTION 5 — SPECIAL POPULATIONS

Certain subgroups of patients require tailored diagnostic, therapeutic, and surveillance strategies due to distinct tumor biology, higher risk profiles, or unique clinical challenges. These include:

- **Inflammatory Bowel Disease (IBD)–associated colorectal cancer**
- **Young-Onset Colorectal Cancer (YOCRC)** (<50 years)
- Patients with **hereditary cancer syndromes**
- **Appendiceal neoplasms** (epithelial tumors)
- **Emergency Presentation of colon cancer**

5.1 INFLAMMATORY BOWEL DISEASE (IBD)–ASSOCIATED COLON CANCER [198]

Surgical intervention recommended for:

- High-grade dysplasia
- Multifocal low-grade dysplasia
- Unresectable lesions
- Invisible dysplasia confirmed on repeat evaluation

5.1.2 Surgical Principles in IBD-Associated CRC

Ulcerative Colitis (UC)

- Because UC typically involves diffuse, continuous colonic inflammation, most patients with UC-associated colon cancer should undergo definitive removal of the entire colon and rectum.

- The recommended procedure is Total proctocolectomy with central vascular ligation plus:
    - o Ileal pouch–anal anastomosis (IPAA) — preferred option when feasible.
    - o Permanent end ileostomy — recommended when IPAA is contraindicated or not appropriate.
    - o Segmental colectomy may be considered in:
    - ♣ Elderly patients
    - ♣ Significant comorbidities
    - ♣ Localized sporadic-type cancer
    - ♣ Strong patient preference

      (GoR C, LoE III)

Crohn's Disease

- Crohn's disease is characterized by segmental and discontinuous involvement, allowing for more limited resections.

- Segmental colectomy with oncologic resection principles is appropriate for most Crohn's-related colon cancers.

5.2 YOUNG-ONSET COLORECTAL CANCER (YOCRC)

(Defined as diagnosis age <50 years)

YOCRC rates are rising globally and are disproportionately high in the UAE. These cancers frequently display more aggressive biology.

5.2.1 Key Considerations

- Higher prevalence of hereditary syndromes
- More frequent left-sided and rectal tumors
- Greater incidence of mucinous or signet-ring histology
- Higher likelihood of advanced stage at diagnosis

All YOCRC patients must undergo:

- Germline genetic testing
- MSI/MMR testing
- Fertility counselling and preservation counselling (where applicable)

5.2.2 Diagnostic/Management Principles

Surgical management follows standard colorectal oncology principles; however, consider:

- Greater emphasis on fertility, nerve preservation
- Avoid permanent stomas when feasible
- Increased need for psychosocial and survivorship support

5.3 HEREDITARY COLORECTAL CANCER SYNDROMES

Hereditary factors account for 5–10% of all CRC cases. Identifying these syndromes is critical for patient and family management.

5.3.1 Universal Genetic Testing Recommendation

All patients diagnosed with colorectal cancer <50 years and any patient with suspicious family history should undergo germline multigene panel testing.

5.3.2 Lynch Syndrome (MMR-deficient by germline mutation)

- High lifetime risk of CRC (up to 70%)
- Right-sided predominance
- Synchronous/metachronous tumors frequent

Surgical Treatment Options:

- Extended colectomy (subtotal colectomy) should be discussed.
- Segmental colectomy may be acceptable based on patient preference.

5.3.3 Familial Adenomatous Polyposis (FAP)

- Hundreds—thousands of adenomas
- Near-100% CRC risk by age 40

Surgical Treatment Options:

- Total proctocolectomy + ileal pouch–anal anastomosis (IPAA)
- Total abdominal colectomy + ileorectal anastomosis (IRA) (requires strict surveillance)

5.3.4 MUTYH-Associated Polyposis (MAP)

- Autosomal recessive
- Multiple adenomas (often fewer than FAP)

Surgical Treatment Options:

- Like attenuated FAP
- Colectomy + IRA or segmental resection depending on polyp burden

5.3.5 Hamartomatous Polyposis Syndromes

(Peutz–Jeghers, Juvenile Polyposis, PTEN/Cowden)
These require:

- Specialized multidisciplinary care
- Genetic counselling
- High-intensity surveillance

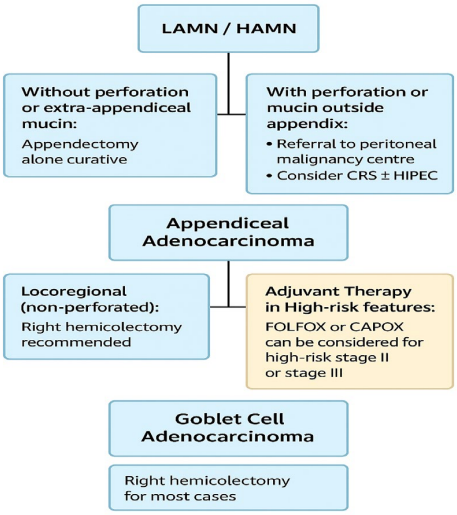
5.4 APPENDICEAL NEOPLASMS

Appendiceal tumors differ biologically from colon cancer and therefore require distinct classification and management.

5.4.1 Pathology Categories

- Non-neoplastic: Mucoceles, retention cysts
- Low-grade appendiceal mucinous neoplasm (LAMN)
- High-grade appendiceal mucinous neoplasm (HAMN)
- Appendiceal adenocarcinoma
- Goblet cell adenocarcinoma
- Neuroendocrine tumors (handled separately in NET guidelines)

5.4.2 Management



- Handle the appendix **atraumatically and avoid rupture**.
- Conversion to open is recommended if risk of spillage is high.
- Resect the specimen **en bloc with mesoappendix** and avoid violating the mucocele; protect extraction with a bag.
- Right hemicolectomy recommended **with regional lymphadenectomy**, aiming for ≥12 nodes, mirroring colon cancer standards
- **Strength:** Strong recommendation; moderate quality evidence (large population series + colon cancer data).

High-risk features:

- T4 disease
- LVI/PNI
- Mucinous / signet ring histology (in some cases)

5.5. EMERGENCY PRESENTATIONS OF COLON CANCER

Colorectal cancer is one of the most common malignancies in the UAE and is often diagnosed late. As a result, many patients are present with symptomatic or complicated disease, including Bowel obstruction, Perforation and Gastrointestinal bleeding

Although UAE-wide data are limited, regional observations and international trends indicate high rates of emergency presentations, associated with increased morbidity and mortality.

5-5.1. Initial Assessment

- Diagnose complete or partial obstruction based on clinical evaluation and imaging (not endoscopy).
- Determine treatment intent (curative vs. palliative) and ensure shared decision-making with the patient and family.
- Assess patient frailty and comorbidities; avoid invasive interventions in very high-risk or severely frail patients.

5.5.2. Emergency Resection

- Primary resection with anastomosis is the first-line option in suitable candidates. Consider on-table lavage and a protective diverting loop ileostomy when clinically indicated.
- Follow full oncologic surgical principles in all cases.
- In Right sided obstruction: Perform right hemicolectomy with primary anastomosis whenever feasible.
- Subtotal Colectomy should be reserved for cases where it is strictly necessary (e.g., extensive colonic damage, non-viable colon).
- In high risk or unstable patients Perform segmental resection with an end stoma (Hartmann's procedure). Or end ileostomy with mucous fistula in right side tumors and Defer anastomosis until the patient is stabilized and optimized.

5.5-3. Bridge-to-Surgery Approaches:

A. Temporary Stoma as a Bridge to Elective Resection

- Appropriate when immediate primary resection is high-risk or not feasible.
- Particularly indicated in:
    - cT4 tumors
    - Bulky obstructive lesions
    - Patients requiring medical optimization prior to major surgery or systemic therapy
- Benefits:
    - Relieves obstruction
    - Allow stabilization and preoperative optimization (nutrition, comorbidities)
- Timing:
    - Definitive oncologic resection is typically performed within 6 weeks, depending on recovery.

B. Self-Expandable Metallic Stents (SEMS)

- Effective in relieving obstruction and preparing patients for elective oncologic surgery.
- Benefits:
    - Improved short-term outcomes
    - Reduced postoperative morbidity

- Risks:
    - Perforation rate of 10–15%
    - Long-term oncologic safety remains debated

5.4-4. Treatment Planning Considerations

- Tailor the approach based on:
    - Patient comorbidities and frailty
    - Patient preferences
    - Tumor characteristics
    - Institutional expertise and availability of stenting
- Curative cT4 obstructive tumors:
    - Consider SEMS or a temporary stoma as a bridge prior to induction therapy or complex multivisceral resection.
- Palliative Setting:
    - Use SEMS if feasible.
    - If stenting is not possible, perform a decompressive stoma.
- Primary anastomosis with diverting stoma may be considered during acute resections if technically and clinically feasible.

SECTION 6 — POST-TREATMENT SURVEILLANCE AND FOLLOW-UP

Routine oncological follow-up after curative treatment for colon cancer is generally shared between surgical and medical oncology teams, with responsibilities delineated according to the phase and nature of care. Medical oncologists typically lead follow-up related to systemic therapy, surveillance for disease recurrence, and the coordination and delivery of adjuvant chemotherapy when indicated. Surgeons are primarily responsible for monitoring postoperative recovery, identifying and managing surgical complications, assessing anastomotic integrity, and overseeing follow-up for patients who do not require adjuvant or neoadjuvant therapy.

Effective and continuous communication between surgical and oncology teams is essential to ensure coordinated care, facilitate early detection of recurrence, and optimize long-term patient outcomes.

A centralized national electronic registry should be established to systematically track post-polypectomy and post–colorectal cancer resection outcomes, pathology findings, and adherence to recommended surveillance intervals. The development of such a registry is strongly recommended to support quality assurance, enhance population-level monitoring, and prevent patients from becoming lost to follow-up across healthcare providers and institutions

Post-treatment surveillance aims to detect:

1. Cancer recurrence (local or distant)
2. Metachronous colorectal neoplasia
3. Treatment-related complications
4. Genetic/hereditary syndromes requiring intensified follow-up
5. Long-term survivorship needs (cardiometabolic, psychosocial, fertility, QOL)

Approximately **80–90%** of recurrences occur within the first **3 years**, and **95%** within **5 years**, justifying an intensified schedule early on.

6.1 GENERAL PRINCIPLES OF SURVEILLANCE

6.1.1 Follow-up must be risk-stratified

- Stage I: minimal
- Stage II–III: intensive
- Stage IV (resected to NED): highest intensity

6.1.2 Surveillance duration

- Minimum 5 years required for all stages
- Longer surveillance may be recommended for:
    - Lynch syndrome
    - IBD-associated CRC
    - YOCRC
    - High-risk histology

6.1.3 LONG-TERM SURVIVORSHIP CARE

Survivors of colon cancer face long-term health challenges.

Must include:

- Monitoring for metabolic syndrome
- Bone health after chemotherapy
- Psychosocial well-being
- Return-to-work planning
- Lifestyle counselling (diet, physical activity)
- Screening for second primary cancers

6.1.4 Cessation of Surveillance

Surveillance should be discontinued when:

- Estimated **life expectancy is <10 years**, or
- Typically, at **age >75–80 years**, individualized according to comorbidities and functional status.

This aligns with recommendations from BSG/ACPGBI/PHE, ESGE, and AGA

6.1.5 Role of ctDNA in Surveillance (EMERGING EVIDENCE)

ctDNA is a promising tool for:

- Detecting minimal residual disease
- Identifying recurrence earlier than imaging/CEA
- Risk-stratifying Stage II–III patients

However:

- It must NOT replace standard surveillance yet
- Use is optional and institutional
- Should be considered in MDT context

6.2 STANDARD UAE SURVEILLANCE SCHEDULE

Stage I Colon Cancer

Domain	Surveillance Schedule	Notes
History & Physical	• Every 6–**12 months** for first 5 **years**	
CEA Monitoring	• Optional	Low yield
Imaging (CT Chest/Abdomen/Pelvis)	• Not routinely indicated	
Colonoscopy	• **1 year** after surgery • then **every 3 to 5 years** • If adenomas → shorten per polyp guidelines	Follow standard post polypectomy intervals

Stage II–III Colon Cancer

Domain	Surveillance Schedule	Notes
History & Physical	• Every **3–6 months** for first **3 years** • Every **6–12 months** for years **4–5**	Highest benefit of surveillance in this group
CEA Monitoring	• Every **3–6 months** for **3 years** • Then every **6–12 months** until year **5**	Use only if patient is a candidate for curative intent treatment
Imaging (CT Chest/Abdomen/Pelvis)	• **Annually** for **5 years**, OR • **Every 6–12 months** for first **3 years** if **high risk**	CT CAP preferred; MRI liver selectively; **PET/CT not routine**
Colonoscopy	• **1 year** after surgery • If normal → **next at 3 years**, then **every 5 years**	Follow standard post polypectomy intervals
CtDNA	• Not routinely indicated outside clinical trails	

Stage IV Colon Cancer

Domain	Surveillance Schedule	Notes
History & Physical	• Every **3 months** for **3 years** • Every **6 months** for years **4–5**	Highest recurrence risk (up to **70%**)
CEA Monitoring	• Every **3 months** for **3 years** • Every **6 months** for years **4–5**	
Imaging (CT Chest/Abdomen/Pelvis)	• Every **3–6 months** for first **3 years** • Every **6–12 months** for years **4–5**	Matches high recurrence pattern
Colonoscopy	• At **1 year** post surgery • Then **every 3–5 years**	Adjust interval if adenomas found
CtDNA	• Not routinely indicated outside clinical trails	

6.3 Surveillance Recommendations for Special Populations

Special Population	Colonoscopy / Endoscopic Surveillance	Imaging Surveillance	Other Key Recommendations
Young-Onset CRC (YOCRC)	1 year → 3 years → every 5 years (consider shorter intervals if high-risk pathology)	Standard postoperative CRC surveillance (as per Stage II–III)	Psychosocial support, fertility counselling, and survivorship planning recommended
Lynch Syndrome	Every 1–2 years lifelong. Start age 20–25, OR 2–5 years earlier than youngest CRC diagnosis in family (if <25)	Standard CRC surveillance after curative treatment	Extracolonic cancer screening according to Lynch syndrome guidelines
FAP / MAP	Flexible sigmoidoscopy or pouch endoscopy annually	Standard CRC surveillance	Thyroid ultrasound every 2–5 years (FAP)
IBD-Associated CRC	Regular surveillance colonoscopy (high-risk interval; individualized based on disease extent and activity)	Standard CRC postoperative imaging for first 5 years	Ongoing high risk for dysplasia and metachronous CRC

6.4 -Surveillance Recommendations for Appendiceal Neoplasms

Subtype	Recommended Follow-Up
LAMN/HAMN (no spread, completely resected)	No routine follow-up imaging required
Perforated LAMN / mucin deposits	Surveillance according to peritoneal malignancy oncology protocols
Appendiceal adenocarcinoma	Follow standard Stage II–III colon cancer surveillance protocol

SECTION 7: LIFESTYLE MEDICINE AND SURVIVORSHIP

Approximately 45–55% of CRC cases are attributable to modifiable lifestyle factors including physical inactivity, obesity, alcohol, tobacco, and diet [199]. Combining healthy lifestyle behaviours with endoscopic screening prevents up to 61% of CRC cases, compared with 32% through screening alone [200].

The CHALLENGE trial, the first phase 3 randomised controlled trial to show that structured exercise after adjuvant chemotherapy improves disease-free survival (HR 0.72; P = 0.02; 5-year DFS 80.3% vs. 73.9%) and overall survival (HR 0.63; 8-year OS 90.3% vs. 83.2%) in resected stage II–III colon cancer, confirmed that lifestyle intervention can deliver oncological benefit of clinical significance [201]. The 2026 NCCN Survivorship Guidelines incorporate CHALLENGE findings as a Category 1 recommendation, adopted in full by these UAE National Guidelines.

7.1 Physical Activity and Exercise (LoE I; GoR A)

Physical activity has the highest WCRF/AICR evidence grade for reducing colon cancer risk, with the highest versus lowest activity levels associated with 20–35% lower risk [202-204]. Vigorous intermittent lifestyle physical activity averaging 4.5 minutes per day is associated with 31–32% lower cancer incidence in adults who do not otherwise exercise [205], a finding relevant for UAE patients who report barriers to structured exercise. High sedentary time is independently associated with 25% higher colon cancer risk, and each additional 2 hours of daily television viewing with 7% increased risk [206,207]

- ≥150 minutes per week of moderate-intensity aerobic activity; progress towards 300 minutes per week for additional survivorship benefit **(LoE I; GoR A)**
- ≥2 resistance training sessions per week targeting all major muscle groups **(LoE I; GoR A)**
- Interrupt prolonged sitting at intervals of no more than 60 minutes **(LoE II; GoR B)**
- Begin graduated exercise as soon as clinically safe after surgery and chemotherapy **(LoE I; GoR A)**
- Refer patients not meeting activity targets to a supervised or tele-supervised exercise oncology programme **(LoE I; GoR A)**
- Schedule outdoor exercise in early morning or late evening between May and October; use indoor climate-controlled facilities during summer months **(LoE V; GoR D – UAE-specific adaptation)**

7.2 Nutrition and Dietary Patterns (LoE I–II; GoR A)

Evidence from CUP Global systematic reviews assigns strong-probable evidence to adherence to WCRF/AICR dietary-lifestyle recommendations for reduced CRC risk [208] Mediterranean diet adherence is associated with 16% lower CRC risk across 26 prospective studies [209]; plant-based diets with 9–10% lower risk; and vegetarian diets with 14% lower risk [211]. In a randomised trial of stage III colon cancer survivors, the Western dietary pattern was associated with a 3.25-fold higher rate of cancer recurrence compared with the lowest quintile of Western diet adherence [212]. In the UAE, dietary counselling should be adapted to incorporate traditional food patterns to improve adherence.

- Adopt a predominantly plant-based diet rich in whole grains, vegetables, legumes, nuts, seeds, and fruits **(LoE I–II; GoR A)**
- Limit red meat to no more than 18 oz (500 g) cooked per week; eliminate all processed meats (associated with 15% and 21% increased CRC risk respectively) [213] **(LoE I; GoR A)**
- Reduce ultra-processed foods, refined grains, and sugar-sweetened beverages [214,215] **(LoE I; GoR A)**
- Include low-fat dairy or calcium-rich foods; each 300 mg/day increment in calcium intake is associated with 8% lower CRC risk [216]; food sources are preferred over supplements **(LoE I; GoR B)**
- Coffee, whether caffeinated or decaffeinated, may be included in a healthy dietary pattern; cohort data report a 22% improvement in overall survival associated with post-diagnosis coffee consumption [217] **(LoE II; GoR B)**
- Aim for a plate composition of at least two-thirds vegetables, whole grains, and fruits, with no more than one-third lean protein **(LoE II; GoR B)**

7.3 Weight Management and Metabolic Health (LoE I–II; GoR A–B)

Obesity is a causally established CRC risk factor (IARC: sufficient evidence); meta-analytic data associate overweight and obesity with approximately 36% increased CRC risk [209] . Central adiposity is a stronger predictor than body mass index alone; waist circumference and waist-to-hip ratio each account for approximately 17% of the CRC population attributable fraction [218].Overweight or obesity in adults under 50 years is associated with 59–81% higher early-onset CRC risk [219], which is of particular relevance in the UAE where more than 41% of CRC cases are diagnosed before age 50 . Metabolic syndrome is independently associated with 36% increased CRC risk [220] .

- Achieve and maintain BMI 18.5–24.9 kg/m² **(LoE II; GoR A)**
- Assess waist circumference and waist-to-hip ratio alongside BMI; apply lower metabolic risk thresholds for patients of South Asian background [219] **(LoE II; GoR A)**
- Prevent unintentional weight loss; conduct formal dietitian assessment throughout treatment **(LoE II; GoR B)**
- Include resistance training to preserve muscle mass, particularly during active weight reduction or GLP-1 receptor agonist use **(LoE I; GoR A)**
- Consider CT-derived body composition assessment at diagnosis and during follow-up in patients with sarcopenic obesity **(LoE III; GoR B)**

7.4 Tobacco, Alcohol, and Harmful Substances (LoE I; GoR A)

Tobacco: Long-term smoking is associated with approximately 20% increased CRC risk, and smoking after diagnosis is associated with 49% higher all-cause mortality in CRC survivors [221] . The population attributable fraction for tobacco is 11.7% . In the UAE, shisha (waterpipe) carries equivalent carcinogenic risk to cigarette smoke; the same cessation recommendations apply to all tobacco forms. All patients should receive cessation support at every clinical contact using the 5A model (Ask, Advise, Assess, Assist, Arrange) with pharmacotherapy (varenicline, bupropion, or NRT) and specialist referral.

Alcohol: Alcohol is associated with 60% increased CRC risk at highest versus lowest consumption levels, with a 7% increase per 10 g/day ethanol increment [222]. The population attributable fraction for alcohol is 12.8% [199]. No safe threshold for alcohol consumption has been identified in relation to CRC risk. All patients should receive a documented recommendation to avoid alcohol entirely.

- Advise complete cessation of tobacco in all forms (cigarettes, shisha, and vaping); offer pharmacotherapy and specialist referral at every clinical contact **(LoE I; GoR A)**
- Advise complete alcohol abstinence; any level of consumption is associated with increased CRC risk **(LoE I; GoR A)**

7.5 Sleep, Stress, and Mental Wellbeing (LoE I–III; GoR A–B)

Sleep: Sleep disruption is associated with activation of insulin resistance, systemic inflammation, and immune dysregulation, all of which are relevant to CRC progression [223]. Obstructive sleep apnoea is underdiagnosed in UAE populations; screening and referral for polysomnography and CPAP therapy are recommended where clinically indicated. CBT-I is the first-line intervention for chronic insomnia.

Mental wellbeing: Clinically significant anxiety and depression affect 20–40% of patients with CRC and are associated with reduced treatment adherence, lower surveillance engagement, and worse survival outcomes. In the UAE, psychological morbidity may be compounded by stigma, financial concerns, body image issues in younger patients with stomas, and disruption to family and occupational roles. A network meta-analysis of 22 randomised controlled trials in 1,676 CRC survivors found combined aerobic and resistance training to be most effective for reducing fatigue, depression, and anxiety [224]. An analysis of 38 randomised controlled trials in digestive system cancer survivors identified MBSR and mind-body exercise as the interventions with the highest quality-of-life improvement scores [30]; these are also compatible with cultural and religious practice in the UAE.

- Target at least 7 hours of sleep per night; screen for obstructive sleep apnoea and refer for assessment and CPAP therapy were indicated [222] **(LoE II; GoR B)**
- Offer CBT-I for persistent insomnia; restrict pharmacological sleep aids to short-term use only **(LoE II; GoR B)**

- Screen for anxiety and depression using PHQ-9 and GAD-7 at diagnosis, at treatment completion, and at each survivorship visit (**LoE II; GoR A)**
- Offer MBSR, CBT, or mind-body exercise (yoga, tai chi) for identified anxiety or depression [224, 223] **(LoE I; GoR A)**
- Refer to clinical psychology or psychiatry for significant or persistent psychological distress **(LoE II; GoR B)**

7.6 Social Connection and Survivorship Support (LoE II–III; GoR B)

Family engagement in lifestyle counselling is associated with better long-term behavioural adherence [225]. For younger CRC survivors, survivorship planning should address fertility, return to employment, psychosexual wellbeing, and stoma adjustment [226]. The UAE's large internationally mobile population requires portable Survivorship Care Plans (SCPs) accessible via DHA and DOH telehealth platforms. Ramadan fasting, dietary restrictions, gender-specific exercise preferences, and stigma around mental health diagnoses should be considered in programme design.

- Engage family members in lifestyle counselling to support home environment change and long-term adherence **(LoE II; GoR B)**
- Facilitate access to peer support groups and patient navigation services **(LoE II; GoR B)**
- Provide all patients with a written SCP documenting lifestyle medicine recommendations, surveillance schedule, and care contacts; offer in digital format for internationally mobile patients **(LoE V; GoR D)**

7.7 Implementation in UAE Healthcare Settings

7.7.1 Primary Care Integration

Primary care physicians should deliver brief lifestyle interventions using the 5A framework, screen for depression and anxiety using validated tools (PHQ-9, GAD-7), support smoking cessation, and facilitate referral to allied health specialists [227, 228]. Integration of lifestyle medicine checklists into electronic health record systems across UAE primary care facilities is recommended to support systematic screening and documentation at every consultation.

7.7.2 Oncology Survivorship Clinics

All major cancer centres in the UAE should establish dedicated, MDT-coordinated survivorship clinics. Each patient completing curative-intent CRC treatment should receive a structured survivorship consultation within three months of treatment completion, covering all lifestyle medicine domains, with referral pathways to clinical dietetics, exercise physiology or oncology physiotherapy, clinical psychology, and smoking cessation services [227-229].

7.7.3 Multidisciplinary Team Roles

MDT Role	Key Responsibilities
Colorectal Surgeons and Medical Oncologists	Initiate lifestyle discussion; prescribe exercise and nutrition referrals; document recommendations in clinic letters and discharge summaries.
Clinical Dietitians	Conduct nutritional assessment; provide culturally adapted dietary counselling; manage malnutrition and weight throughout treatment and follow-up.
Exercise Physiologists / Oncology Physiotherapists	Prescribe and supervise individualised exercise programmes; adapt for post-surgical and stoma-related limitations; monitor adherence and progression.
Clinical Psychologists / Psychiatrists	Manage anxiety, depression, and psychological distress; deliver CBT-I and MBSR; support behaviour change.
Specialist Nurses / Patient Navigators	Coordinate survivorship care pathways; provide stoma education; facilitate specialist referrals; deliver patient education.
Primary Care Physicians	Long-term lifestyle monitoring, metabolic risk management, mental health surveillance, and care continuity for internationally mobile patients.

7.8 Summary of Key Recommendations

Recommendation	LoE	GoR	Domain
Engage in ≥150 min/week of moderate-intensity aerobic activity; progress to 300 min/week.	I	A	Physical Activity
Include ≥2 resistance training sessions/week targeting all major muscle groups.	I	A	Physical Activity
Interrupt prolonged sitting at intervals of ≤60 minutes.	II	B	Physical Activity
Refer patients not meeting activity targets to a supervised exercise oncology programme.	I	A	Physical Activity
Adopt a predominantly plant-based diet: whole grains, vegetables, legumes, fruits.	I–II	A	Nutrition
Limit red meat to ≤18 oz cooked/week; eliminate all processed meats.	I	A	Nutrition
Reduce ultra-processed foods, refined grains, and sugar-sweetened beverages.	I–II	A	Nutrition
Include low-fat dairy or calcium-rich foods; prefer food sources over supplements.	I	B	Nutrition
Achieve and maintain BMI 18.5-24.9 kg/m²; reduce waist circumference.	II	A	Weight
Prevent unintentional weight loss; dietitian assessment throughout treatment.	II	B	Weight
Offer smoking cessation support (cigarettes, shisha, vaping) at every clinical contact.	I	A	Tobacco/Alcohol
Advise complete alcohol abstinence; no safe threshold exists.	I	A	Tobacco/Alcohol
Target ≥7 hours of sleep per night; screen for obstructive sleep apnoea.	II	B	Sleep
Offer CBT-I for persistent insomnia; avoid long-term pharmacological sleep aids.	II	B	Sleep
Screen with PHQ-9 and GAD-7 at diagnosis, treatment completion, and each survivorship visit.	II	A	Mental Health
Offer MBSR, CBT, or mind-body exercise for anxiety or depression.	I	A	Mental Health
Engage family members in lifestyle counselling to support long-term adherence.	II	B	Social Support
Provide all patients with a written Survivorship Care Plan (SCP).	II	A	Social Support

LoE = Level of Evidence; GoR = Grade of Recommendation. All recommendations should be delivered within a personalised, MDT-coordinated survivorship care plan, accounting for cancer stage, treatment history, comorbidities, cultural background, and patient preferences

SECTION 8 — GENETIC TESTING IN COLON CANCER

This part covers: the MMR/MSI decision algorithm, BRAF/MLH1 methylation interpretation, gene-risk reference, extracolonic surveillance schedules, aspirin chemoprevention in Lynch syndrome, and the genetic counselling framework.

8.1 MMR/MSI Reflex Testing — Decision Algorithm*(LoE I, GoR A)*

Mandatory reflex testing on all newly diagnosed CRC: Section 2.2 of guideline)

The main guideline mandates MMR/MSI testing on all newly diagnosed CRC. [231,-238,,247]This section details the step-by-step interpretation algorithm following IHC results, which is not covered in the main guideline.

8.1.1 IHC Result Interpretation and Next Steps

IHC Result	Immediate Next Step	Interpretation / Action
MLH1 + PMS2 loss	BRAF V600E AND/OR MLH1 promoter methylation testing	BRAF mutant OR MLH1 methylated = sporadic (somatic CIMP). BRAF WT + unmethylated = refer for germline MLH1 testing (Lynch syndrome)
MSH2 + MSH6 loss	Germline MSH2 and EPCAM testing	Lynch syndrome until disproven
Isolated PMS2 loss	Germline PMS2 testing	Lynch syndrome; most common isolated IHC loss pattern
Isolated MSH6 loss	Germline MSH6 testing	Lynch syndrome; consider EPCAM deletion if MSH6 negative
All 4 proteins retained (pMMR)	No Lynch workup unless strong clinical suspicion (Amsterdam II family history)	Sporadic in most cases; if YOCRC or strong family history, proceed to germline panel regardless
Discordant or uninterpretable IHC	PCR-based MSI testing (confirmatory)	MSI-H on PCR warrants full Lynch workup as per loss pattern above

8.1.2 Distinguishing Lynch Syndrome from Sporadic dMMR — Key Rule

- **MLH1/PMS2 loss is the most common IHC pattern and is usually sporadic (somatic CIMP/BRAF pathway)**[239]
- BRAF V600E mutation OR MLH1 promoter hypermethylation = sporadic; no germline Lynch workup needed[239]
- BRAF wild-type AND MLH1 unmethylated = germline MLH1 testing required; Lynch syndrome likely[231,238]
- MSH2, MSH6, or PMS2 loss is more likely Lynch syndrome; germline testing always indicated[232,237]
- All other dMMR patterns (MSH2/MSH6, isolated PMS2, isolated MSH6): germline testing always indicated[232,233]

8.1.3 Clinical Impact of MMR/MSI Status on Treatment

- dMMR / MSI-H Stage II: Excellent prognosis; chemotherapy adds no benefit in low-risk Stage II dMMR — observation preferred[249]
- dMMR / MSI-H Stage III: Atezolizumab in addition to standard adjuvant chemotherapy (ATOMIC trial, 2025)[249]
- dMMR / MSI-H Stage IV: Immunotherapy is first-line preferred (pembrolizumab, nivolumab +/- ipilimumab, dostarlimab) — see Section 4.6 of main guideline[235,249]
- pMMR / MSS: Anti-EGFR therapy eligibility requires RAS/BRAF testing — see Section 4.6 of main guideline[235,2]

8.2 Hereditary Syndrome Gene-Risk Quick Reference

For hereditary syndrome definitions, clinical features, and surgical options, refer to Section 5.3 of the main guideline. This table provides the genetic testing trigger and cancer risk data as a rapid clinical reference. [4,5,6,7]

Gene / Syndrome	Lifetime CRC Risk	Key Extracolonic Cancers	Primary Testing Trigger
MLH1 (Lynch)	Up to 70%	Endometrial (up to 60%), ovarian, gastric, urothelial, small bowel, pancreatic	dMMR on IHC; YOCRC; family history
MSH2 (Lynch)	Up to 60–70%	Same as MLH1; higher urothelial cancer risk	dMMR on IHC; YOCRC; family history
MSH6 (Lynch)	25–44%	Endometrial (high), ovarian	Isolated MSH6 loss on IHC
PMS2 (Lynch)	15–20%	Endometrial, ovarian (lower risk)	Isolated PMS2 loss on IHC
EPCAM[4]	MSH2-like	MSH2 spectrum	MSH2+MSH6 loss; no MSH2 germline mutation found
APC (FAP/AFAP)	~100% FAP; ~70% AFAP	Duodenal/ampullary, thyroid, desmoid, hepatoblastoma	Polyposis phenotype; >10 adenomas
MUTYH (MAP, biallelic)	43–100%	Duodenal polyps (lower risk)	Oligopolyposis; attenuated FAP; APC negative
STK11 (PJS)	~39%	Pancreatic, small bowel, breast, ovarian, cervical	Mucocutaneous pigmentation; GI hamartomas
SMAD4 / BMPR1A (JPS)	17–68%	Gastric; HHT (SMAD4 only)	Juvenile polyps; family history
PTEN (Cowden)	9–18%	Breast, thyroid, endometrial, renal	Macrocephaly; mucocutaneous lesions

8.2.1 Standardized Family History Collection and Preliminary Risk Assessment

Essential Elements of a Minimal Cancer Family History:

- **Kinship Documentation:** Coverage of first-degree relatives (FDR: parents, siblings, children) and second-degree relatives (SDR: grandparents, aunts/uncles, nieces/nephews, grandchildren, half-siblings).
- **Premalignant Conditions:** Mandatory documentation of both cancer diagnoses and premalignant GI conditions (e.g., adenomas, serrated polyps).
- **Mandatory Data Points:**
    - Cancer/Condition type and histology (if available).
    - Age at diagnosis (critical for defining screening start dates).
    - Lineage (maternal vs. paternal) documented separately.
    - Presence of polyps in an FDR: While histology is ideally noted, the mere presence of polyps in an FDR is a mandatory trigger for further evaluation.

Outpatient Triage: The Three-Question Screen: For rapid triage in busy settings, a "Yes" to any of the following necessitates a comprehensive genetic risk assessment:

1. Do you have an FDR diagnosed with CRC or a Lynch-related cancer (endometrium, ovary, stomach, small bowel, urinary tract, etc.) before age 50?
2. Have you been diagnosed with CRC or colorectal polyps before age 50?
3. Do you have three or more relatives with a history of CRC?

8.2.2: Clinical Indications for Genetic Testing: Lynch Syndrome and Syndromic CRC

Indications for Lynch Syndrome (LS) Testing

- **Known Familial Mutation:** Testing is indicated for any individual with a blood relative who has a known pathogenic or likely pathogenic (P/LP) variant in an LS-associated gene.
- **Universal Tumor Screening Results:** NCCN recommends universal screening for all newly diagnosed CRC and endometrial cancers. Testing is indicated if a tumor specimen shows:
    - **Mismatch repair deficiency (dMMR)** via immunohistochemistry (IHC) or **microsatellite instability-high (MSI-H)** via PCR or NGS.
- **Personal History of LS-Related Cancer:** Testing is indicated if an individual has a personal history of an LS-related cancer (including CRC, endometrial, gastric, ovarian, pancreatic, biliary tract, brain, small intestine, or sebaceous neoplasms) and meets any of the following:
- Diagnosed at **age < 50 years**.
- Presence of **synchronous or metachronous LS-related cancers** regardless of age.
- **1 first- or second-degree relative** with an LS-related cancer diagnosed at < 50 years.
- **2 first- or second-degree relatives** with LS-related cancers regardless of age.

- **Family History Thresholds:** Testing is indicated for unaffected individuals with:
    - 1 first-degree relative with CRC or endometrial cancer diagnosed at < 50 years.
    - 1 first-degree relative with CRC or endometrial cancer and another synchronous or metachronous LS-related cancer.
    - 2 first- or second-degree relatives with LS-related cancers, including at least one diagnosed at < 50 years.
    - 3 first- or second-degree relatives with LS-related cancers regardless of age.
- **Risk Prediction Models:** Genetic evaluation is recommended for individuals with a **5% predicted risk** of an MMR gene mutation using validated tools like **PREMM5, MMRpro, or MMRpredict**.
- A lower threshold of **2.5%** may be considered for individuals with a personal history of CRC or endometrial cancer to increase sensitivity.

Indications for Other Syndromic CRC (Polyposis and Non-Polyposis)

Genetic testing is also clinically indicated for several other hereditary syndromes that increase CRC risk:

- **Adenomatous Polyposis Syndromes (FAP, AFAP, MAP):**
    - **Recommended:** Individuals with a personal history of **20 cumulative colorectal adenomas**.
    - **Considered:** Individuals with **10-19 cumulative adenomas**, or those with a personal history of characteristic extracolonic features such as **desmoid tumors, hepatoblastomas**, or cribriform-morular variant of papillary thyroid cancer.
- **Hamartomatous Polyposis Syndromes:**
- **Peutz-Jeghers Syndrome (PJS):** Clinical diagnosis is made with at least two of: 2 PJS-type GI polyps; characteristic mucocutaneous hyperpigmentation; or a family history of PJS.
- **Juvenile Polyposis Syndrome (JPS):** Indicated for individuals meeting established clinical criteria for JPS.
- **Other Syndromes:**
    - **Serrated Polyposis Syndrome (SPS):** Individuals meeting clinical criteria (e.g., 5 serrated lesions proximal to the rectum with two 10 mm) should undergo genetic evaluation.
    - **Cowden Syndrome / PTEN Hamartoma Tumor Syndrome (PHTS):** Indicated for individuals meeting clinical diagnostic criteria.
    - **Li-Fraumeni Syndrome (LFS):** Indicated for individuals meeting testing criteria for *TP53* mutations.
    - **Hereditary Diffuse Gastric Cancer (HDGC):** Indicated for individuals with diffuse gastric cancer or a strong family history of the disease.

8.3 Germline Multigene Panel — Minimum Required Gene Set *(LoE II, GoR A)*

The main guideline recommends germline multigene panel testing for all CRC under 50 years and any patient with suspicious family history. [,245,246]This section specifies the minimum gene content of that panel.

> NCCN highlights that multigene panels are often more efficient and sensitive than single-gene testing. For patients with CRC, panels should include at minimum: ***APC, BMPR1A, EPCAM, MUTYH, MLH1, MSH2, MSH6, PMS2, PTEN, SMAD4, STK11,*** and ***TP53***. MGPT should also be considered for patients diagnosed with **CRC at age 50** who do not meet other criteria and have no known MMR deficiency in their tumor (Category 2B).

8.3.1 Minimum Panel — All Indications

- MMR genes: MLH1, MSH2, MSH6, PMS2, EPCAM[232,235]
- Polyposis: APC (sequencing + large rearrangement analysis by MLPA)[,241]
- Recessive polyposis: MUTYH (biallelic analysis required — test both alleles)[242]
- Hamartomatous polyposis: STK11, SMAD4, BMPR1A, PTEN

8.3.2 Extended Panel — When Clinically Indicated

- BRCA1, BRCA2: YOCRC with relevant personal or family history; ovarian involvement[245]
- POLE, POLD1: Ultra-hypermutated tumors (TMB >100 mut/Mb); young patients with multiple adenomas
- NTHL1, MSH3: Oligopolyposis with negative APC/MUTYH
- RNF43: Serrated polyposis syndrome

8.3.3 Result Interpretation

- **Pathogenic / likely pathogenic:** Act on result — initiate syndrome-specific pathway
- **Variant of uncertain significance (VUS):** Do not alter clinical management based on VUS alone; re-contact patient when reclassified
- **Negative result with strong family history:** Provide empirical risk counselling; consider panel re-testing as technology evolves; relatives may still benefit from colonoscopy from age 40

8.4 Aspirin Chemoprevention in Lynch Syndrome *(LoE I, GoR A — CAPP2 randomised controlled trial)*

- **Aspirin 600 mg daily significantly reduces CRC incidence in Lynch syndrome carriers (CAPP2 RCT, Burn et al., Lancet 2020)**[12]
- Benefit was demonstrated across all MMR gene subgroups[240]
- Optimal dose is under investigation (CAPP3 trial ongoing — lower doses being evaluated)
- Aspirin should be discussed and offered to all confirmed Lynch syndrome carriers who are fit for long-term use
- This recommendation applies to Lynch syndrome germline mutation carriers only — not to sporadic dMMR CRC[240]

8.5 Extracolonic Cancer Surveillance by Hereditary Syndrome

Syndrome / Gene	Organ / Cancer	Surveillance Method	Start Age / Interval
Lynch (MLH1/MSH2)	Endometrium	Annual endometrial sampling +/- transvaginal ultrasound	Age 30–35; annually
Lynch (all genes)	Stomach / small bowel	Gastroscopy	Age 30–35; every 2–3 years
Lynch (MSH2/MLH1)	Urinary tract (urothelial)	Annual urinalysis; urine cytology if indicated	Age 30–35; annually
Lynch (selected families)	Pancreas	MRI/MRCP or EUS	Age 40 in families with pancreatic cancer history
FAP (APC)	Duodenum / ampulla (Spigelman staging)	Upper GI endoscopy	Age 25–30; every 1–5 years per Spigelman stage
FAP (APC)	Thyroid (papillary)	Annual ultrasound	Age 15–20; annually
PJS (STK11)	Small bowel	Capsule endoscopy or MRI enterography	Age 8; every 2–3 years
PJS (STK11)	Pancreas	MRI/EUS	Age 30–35; annually
PJS (STK11)	Breast (women)	Annual MRI	Age 25
PJS (STK11)	Gynaecological (ovary, cervix)	Annual gynaecological exam + cervical smear	Age 18–20
Cowden/PTEN	Breast	Annual MRI and mammogram	Age 30–35 or 10 years before earliest family diagnosis
Cowden/PTEN	Thyroid	Annual ultrasound	At genetic diagnosis
Cowden/PTEN	Endometrium	Annual sampling / ultrasound	Age 30–35
JPS (SMAD4)	Stomach	Annual upper GI endoscopy	At diagnosis; annually for SMAD4 carriers

All extracolonic surveillance should be coordinated by the clinical geneticist or a hereditary cancer program in conjunction with the relevant specialty (gynaecology, gastroenterology, radiology). Intervals shown are minimums; findings may necessitate shortening.

8.6 Genetic Counselling Framework *(LoE II, GoR A)*

Genetic counselling is not detailed in the main guideline. All patients undergoing germline testing must have access to pre- and post-test counselling by a clinical geneticist or certified genetic counsellor.

Genetic counseling is not an adjunct; it is a core diagnostic component.

8.6.1 Pre-test Counselling Must Cover

- Purpose and scope of the germline panel being ordered
- Possible result types: pathogenic, likely pathogenic, variant of uncertain significance (VUS), negative
- Clinical implications of a positive result: surveillance changes, prophylactic interventions, systemic therapy eligibility
- Implications for first-degree relatives and the cascade testing process
- Psychological impact and available support resources
- Insurance and employment implications
- Cultural and family communication considerations — particularly relevant in UAE's multicultural, family-centred society[248]
- Reproductive planning options where applicable

8.6.2 Cascade Testing Protocol

- Identify the Informative Candidate: Test the affected relative first to identify the pathogenic mutation.
- Targeted Evaluation: Once found, provide targeted, mutation-specific testing to all FDRs and SDRs.
- **Offer germline testing to all first-degree relatives (parents, siblings, children) of confirmed pathogenic variant carriers**
- Recommended testing age: 18 years for adult-onset syndromes (Lynch, MAP); age 10–12 for FAP/AFAP; age 8 for PJS
- Each relative requires independent pre-test counselling before testing
- Relatives who test negative for the family variant revert to standard population-level screening

In "mutation-negative" families (high clinical suspicion but no gene identified), no **family members may be released from high-risk surveillance**.

8. 6.3 UAE-Specific Recommendations

- Genetic counsellors should be embedded within MDT cancer boards in major UAE cancer centres[21]
- Establish linkage between genetics services, colorectal surgery, medical oncology, gynaecology, and gastroenterology for coordinated hereditary cancer care
- Develop a UAE national hereditary CRC registry to track mutation carriers and ensure surveillance continuity across providers and Emirates
- Given high rates of consanguinity in some UAE communities, biallelic recessive conditions (MAP, JPS) should be specifically considered in phenotypically appropriate cases

SECTION 9 — STANDARDIZED UAE TEMPLATES

This section provides harmonized national templates for reporting, documentation, operative notes, MDT processes, and surveillance.

This section provides harmonized national templates for reporting, documentation, operative notes, MDT processes, and surveillance. These templates support:

- Standardization across UAE healthcare facilities
- Clear communication between disciplines
- Improved data capture for national registries
- Enhanced quality assurance and adherence to best practices

9.1. MDT Colon Cancer Referral Template
9.2. MDT Colon Cancer Outcome Summary Template
9.3. Synoptic Operative Report – Colon Cancer
9.4. CT TAP Staging and Imaging Reporting Template
9.5. Follow-Up Imaging Reporting Template
9.6. MRI Liver Reporting Template
9.7. Pathology Synoptic Reporting Standards for Colon Cancer
9.8. TNM Staging (AJCC 8th Edition)

9.1.MDT Colon Cancer Referral Template

Patient Details:
Name: _____
MRN: _____
DOB: _____
Age: _____
Sex: _____
Nationality: _____
Diagnosis (suspected/confirmed):
Colon cancer (site): _____
Stage (clinical/pTNM): _____
Reason for MDT Review:
Treatment planning: ☐
Neoadjuvant therapy consideration: ☐
Metastatic disease: ☐
Complex surgical decision: ☐
Recurrence: ☐
Hereditary syndrome assessment: ☐
Pathology discrepancy: ☐
Other: ☐_____
Clinical Summary (brief):
Presentation: _____
Key comorbidities: _____
ECOG performance status: _____
Investigations Completed:
Colonoscopy (Date, Findings, Tattoo location): _____
Pathology (Biopsy results):
_____
CT CAP (Date, summary):
_____
MRI liver (if applicable):
_____
PET/CT (if applicable):
_____
CEA baseline:
_____
Genetic testing (MMR/MSI, RAS, BRAF, HER2): _____

Referring Clinician:
Name: _____
Specialty: _____
Contact: _____

9.2.MDT Colon Cancer Outcome Summary Template

Date: _____
Attendees: _____
Diagnosis: _____
Stage: _____

Discussion Points (tick all that apply)
Imaging review: ☐
Pathology review: ☐
Resectability assessment: ☐
Genetic/molecular results: ☐
Patient suitability (performance status, comorbidities): ☐

Consensus Recommendations
Surgery (Type, urgency, referral if needed):
_____
Neoadjuvant therapy:
_____
Adjuvant therapy:
_____
Systemic therapy (Stage IV):
_____
Additional imaging/tests:
_____
Referral to (HPB/Thoracic/Peritoneal center): _____
Clinical trials:
_____
Supportive care:
_____
Planned Follow-up:
_____
Chair/Coordinator: _____

9.3. Synoptic Operative Report – Colon Cancer Template

1. Patient & Procedure Information

Patient Name: _____
Medical Record Number: _____
Date of Surgery: _____
Surgeon(s): _____
Assistants: _____
Anesthesiologist: _____
Procedure Performed: _____
Surgical Approach:
Open: ☐Laparoscopic: ☐ Robotic:
☐Converted to open (specify reason): ☐____

2. Indication for Surgery

Tumor location (tick):
Cecum: ☐
Ascending: ☐
Hepatic flexure: ☐
Transverse: ☐
Splenic flexure: ☐
Descending: ☐
Sigmoid: ☐
Clinical stage (if known): _____
Indication (tick all that apply):
Curative resection: ☐
Obstruction: ☐
Perforation: ☐
Bleeding: ☐
Biopsy-proven malignancy: ☐
Suspicious lesion: ☐

3. Preoperative Considerations

Bowel preparation: Yes ☐ No ☐
Preoperative marking for stoma: Yes ☐ No ☐
Neoadjuvant therapy (if any): _____
Relevant comorbidities / risk factors: _____

4. Intraoperative Findings

Tumor location: _____
Other findings: _____
Tumor appearance (tick all that apply):
Obstructing: ☐ Non-obstructing: ☐
Perforated: ☐ Bleeding: ☐
Local invasion:
None: ☐ Suspected: ☐
Confirmed (specify involved structures): ☐___
Peritoneal disease: None ☐ Present ☐
Liver metastasis: None ☐ Present ☐

5. Surgical Procedure Details

Type of colectomy performed: _____
Proximal margin length (cm): _____
Distal margin length (cm): _____
Mesocolic plane integrity (tick):
Mesocolic: ☐
Intramesocolic: ☐
Muscularis propria plane: ☐

6.Lymphadenectomy

Central vascular ligation performed:
Yes ☐ No ☐
Vessels ligated: _____

7. Specimen Removal

Specimen retrieved via (tick):
Mini laparotomy: ☐
Pfannenstiel incision: ☐
Extraction site (specify): ☐_____
Use of wound protector: Yes ☐ No ☐

8. Reconstruction / Anastomosis

Anastomosis:
Yes ☐ No (end stoma created) ☐
Anastomosis type (tick all that apply):
Stapled: ☐ Hand-sewn: ☐
Perfusion assessment:
Clinical: ☐
ICG fluorescence: ☐
Diverting stoma: Yes ☐ No ☐ Type (if yes): _

9. Additional Procedures (tick all that apply)

Liver biopsy: ☐
Omentectomy: ☐
Small bowel resection: ☐
Abscess drainage: ☐
Peritoneal lavage: ☐
Stoma creation: ☐
Other (specify): ☐_____

10. Intraoperative Safety & Quality Measures

Estimated blood loss (mL): _____
Intraoperative complications (specify): _____
Prophylactic antibiotics given: Yes ☐ No ☐
VTE prophylaxis: Yes ☐ No ☐

9.4. CT TAP Staging and Imaging Reporting Template

Clinical History
Indication for imaging: _____
Presenting symptoms: _____
Relevant surgical history: _____
Prior chemotherapy or radiotherapy: _____
CEA levels and trend: _____
Technique
Acquisition phases: _____
Intravenous contrast use: _____
Slice thickness: _____
Oral contrast status: _____
Primary Tumor
Morphology: _____
Border: _____
Location: _____
Advancing border: _____
Bowel wall involvement: _____
Peritoneal infiltration: _____
Extramural tumor spread (mm): _____
Tumor diameter (mm): _____
Tumor thickness (mm): _____
Obstruction: _____
Lymph Nodes
Suspicious lymph nodes: Present ☐ Absent ☐
If present: size, morphology, distribution: ___
Venous Invasion
Extramural venous invasion (EMVI):
Present ☐ Absent ☐
Peritoneal Disease
Ascites: Present ☐ Absent ☐
Peritoneal nodularity: Present ☐ Absent ☐
Omental cake: Present ☐ Absent ☐
Liver
Metastases: Present ☐ Absent ☐
Segmental involvement / comments: _____
Lungs
Pulmonary metastases: Present ☐ Absent ☐
Description of lesions: _____
Opinion
Overall stage (T N M): _____
Resectability: _____
EMVI: _____

9.5. Follow-Up Imaging Reporting Template

Comparison
- Compare with baseline imaging and most recent prior study

Response Assessment
- Complete response /Partial response/ Stable disease/ Progressive disease

Additional Considerations: Liver volumetry when evaluating for hepatic resection

8.6. MRI Liver Reporting Template

Clinical History
Diagnosis of colorectal cancer: _____
Treatment history: _____
Purpose of assessment: _____

Protocol
Sequences included: _____
Contrast agent type (hepatobiliary vs extracellular): _____

Findings
Liver parenchyma background:
Normal ☐ Steatosis ☐
Fibrosis ☐ Cirrhosis ☐
Number of lesions: _____
Size and segmental location: _____
Morphology and margins: _____
Enhancement characteristics: _____
DWI features: _____
Extra-hepatic findings: _____

Conclusion
Summary of hepatic metastatic burden: _____
Interval change: _____
Impression: _____
Recommendations: _____

9.7. Pathology Synoptic Reporting Standards for Colon Cancer Template (CAP-Compliant)

Specimen Handling and Processing
Fresh Specimen Handling: Intact colectomy specimens should be opened longitudinally, except when perforation is suspected or the tumor is close to a margin.
• The mesentery must be carefully dissected to maximize lymph node retrieval
Fixation (10% NBF, 24–48 hours): •
Representative sections must include:
o Deepest point of tumor invasion
o Peritumoral tissues
o All margins
o Any perforation sites
o Suspicious nodules or tumor deposits
_____

Specimen Types (CAP-Compliant)
Right hemicolectomy: _____
Transverse colectomy: _____
Left hemicolectomy: _____
Sigmoidectomy: _____
Low anterior resection: _____
Total abdominal colectomy: _____
Abdominoperineal resection: _____
Other: _____

Mesorectal Evaluation (Rectal cancer)
Complete: _____
Near complete: ____
Incomplete: _____
Cannot be determined: _____

Tumor Assessment
Tumor Site: _____
Histological Type (WHO): _____
Tumor Grade: _____
Tumor Size (cm): _____

Additional Tumor Features
Macroscopic Tumor Perforation: _____
Lymphovascular Invasion: _____
Perineural Invasion: _____
Tumor Budding: _____
Polyp Type: _____
Treatment Effect: _____

Margin Assessment
Proximal margin: _____
Distal margin: _____
Radial/circumferential margin: _____
Mesenteric margin: _____
Deep margin: _____
CRM distance: _____
Distal rectal margin: _____

Lymph Node Evaluation
Total nodes: _____
Positive nodes: _____
Tumor deposits: _____
Notes: _____

Distant Metastasis
Organ/site: _____
Extent: _____
Peritoneal metastasis: _____

pTNM Classification
pT: _____
pN: _____
pM: _____
Modifiers (y, r, m): _____
• y: Post-neoadjuvant
• r: Recurrent tumor
• (m): Multiple primary sites

A note must indicate that final staging is determined by the treating clinician, integrating clinical and radiologic information.

Additional Findings
Adenomas: _____
IBD-associated dysplasia: _____
UC/CD: _____
Diverticulosis: _____
Other: _____

9.8. TNM Staging (AJCC 8th Edition)

Primary Tumor (T):

T stage	Description
Tis	Carcinoma in situ (intraepithelial or lamina propria)
T1	Tumor invades submucosa
T2	Tumor invades muscularis propria
T3	Tumor invades subserosa or non-peritonealized pericolic/perirectal tissues
T4a	Tumor penetrates to surface of visceral peritoneum
T4b	Tumor directly invades or adherent to other organs/structures

Regional Lymph Nodes (N):

N stage	Description
N0	No regional lymph node metastasis
N1a	1 regional lymph node
N1b	2–3 regional lymph nodes
N1c	Tumor deposits in subserosa, mesentery, or pericolic tissue without nodal metastasis
N2a	4–6 regional lymph nodes
N2b	≥7 regional lymph nodes

Distant Metastasis (M):

M stage	Description
M0	No distant metastasis
M1a	Metastasis is confined to one organ or site (e.g., liver or lung)
M1b	Metastasis to more than one organ/site
M1c	Peritoneal metastasis ± other sites

Stage Grouping (Summary)

Stage	TNM Example
I	T1–T2 N0 M0
II	T3–T4 N0 M0
III	Any T N1–2 M0
IV	Any T Any N M1

GLOSSARY OF ABRRREVIATIONS

- **ADR**: Adenoma Detection Rate
- **AJCC**: American Joint Committee on Cancer (8th Edition TNM staging)
- **ALPPS**: Associating Liver Partition and Portal vein ligation for Staged hepatectomy (referenced in treatment pathway diagrams)
- **ASA**: American Society of Anesthesiologists (physical status classification, e.g., ASA ≥ III)
- **ASCRS**: American Society of Colon and Rectal Surgeons
- **AST/ALT**: Aspartate Aminotransferase / Alanine Aminotransferase

B

- **Bd2–3**: Tumor budding grade 2–3 (high-grade)
- **BRAF V600E**: B-Raf proto-oncogene serine/threonine kinase V600E mutation
- **BTS**: Bridge-to-Surgery
- **BSG/ACPGBI/PHE**: British Society of Gastroenterology / Association of Coloproctology of Great Britain and Ireland / Public Health England

C

- **CAP**: College of American Pathologists (synoptic reporting)
- **CAPEOX / CAPOX**: Capecitabine + Oxaliplatin (chemotherapy regimen)
- **CCR-0**: Complete Cytoreduction (R0)
- **CEA**: Carcinoembryonic Antigen
- **CME**: Complete Mesocolic Excision
- **CME/CPD**: Continuing Medical Education / Continuing Professional Development
- **CRC**: Colorectal Cancer (or Colon Cancer)
- **CRLM**: Colorectal Liver Metastases
- **CRS**: Cytoreductive Surgery
- **CT**: Computed Tomography (e.g., CT Chest/Abdomen/Pelvis)
- **ctDNA**: Circulating tumor DNA
- **CVL**: Central Vascular Ligation

D

- **D2**: D2 lymphadenectomy
- **DoH**: Department of Health (Abu Dhabi)
- **DWI**: Diffusion-Weighted Imaging

E

- **ECOG**: Eastern Cooperative Oncology Group (performance status)
- **EMA**: Emirates Medical Association
- **EMR**: Endoscopic Mucosal Resection

- **EORTC–ESOI–ESGAR**: European Organisation for Research and Treatment of Cancer – European Society of Oncologic Imaging – European Society of Gastrointestinal and Abdominal Radiology
- **ERAS**: Enhanced Recovery After Surgery
- **ESCRS**: Emirates Society of Colon & Rectal Surgery
- **ESGE**: Emirates Society of Gastroenterology and Hepatology (also references European Society of Gastrointestinal Endoscopy)
- **ESMO**: European Society for Medical Oncology
- **ESOI**: European Society of Oncologic Imaging
- **ESP**: Emirates Society of Pathology
- **ESR**: Emirates Society of Radiology
- **ESRO**: Emirates Society of Radiation Oncology
- **ESD**: Endoscopic Submucosal Dissection

F

- **FAP**: Familial Adenomatous Polyposis
- **FDG**: Fluorodeoxyglucose (18F-FDG in PET/CT)
- **FLR**: Future Liver Remnant
- **FOLFIRI**: Folinic acid + 5-Fluorouracil + Irinotecan (chemotherapy regimen)
- **FOLFOX**: Folinic acid + 5-Fluorouracil + Oxaliplatin (chemotherapy regimen)

G

- **GoR**: Grade of Recommendation (A–D)

H

- **HAI / HAIC**: Hepatic Arterial Infusion (Chemotherapy)
- **HAMN**: High-grade Appendiceal Mucinous Neoplasm
- **HER2 IHC ± ISH**: Human Epidermal Growth Factor Receptor 2 Immunohistochemistry ± In Situ Hybridization
- **HIPEC**: Hyperthermic Intraperitoneal Chemotherapy

I

- **IBD**: Inflammatory Bowel Disease
- **IHC**: Immunohistochemistry
- **IPAA**: Ileal Pouch–Anal Anastomosis
- **IRA**: Ileorectal Anastomosis
- **ISH**: In Situ Hybridization

K

- **KRAS/NRAS**: KRAS / NRAS (RAS family gene mutations)

L

- **LAMN**: Low-grade Appendiceal Mucinous Neoplasm
- **LoE**: Level of Evidence (I–V)
- **LVI**: Lymphovascular Invasion

M

- **MAP**: MUTYH-Associated Polyposis
- **MDT**: Multidisciplinary Team
- **MIS**: Minimally Invasive Surgery (laparoscopic or robotic)
- **MMR / dMMR / MSI / MSI-H**: Mismatch Repair (deficient) / Microsatellite Instability (High)
- **MRI**: Magnetic Resonance Imaging
- **MWA**: Microwave Ablation

N

- **NCCN**: National Comprehensive Cancer Network
- **NED**: No Evidence of Disease
- **NET**: Neuroendocrine Tumors
- **NGS**: Next-Generation Sequencing
- **NRLNM**: Non-Regional Lymph Node Metastases

O

- **ORR**: Objective Response Rate

P

- **PALND**: Paraaortic Lymph Node Dissection
- **PALNM**: Paraaortic Lymph Node Metastases
- **PCI**: Peritoneal Cancer Index
- **PCR**: Polymerase Chain Reaction
- **PET/CT**: Positron Emission Tomography / Computed Tomography (18F-FDG)
- **PIPAC**: Pressurized Intraperitoneal Aerosol Chemotherapy
- **PNI**: Perineural Invasion
- **PONV**: Postoperative Nausea and Vomiting
- **pT1 / pTNM**: Pathological Tumor stage / Pathological Tumor Node Metastasis

Q

- **QOL**: Quality of Life

R

- **R0 / R1 / R2**: Resection margin status (R0 = microscopically negative; R1 = microscopically positive; R2 = macroscopically positive/gross residual)
- **RFA**: Radiofrequency Ablation
- **RT/CRT**: Radiotherapy / Chemoradiotherapy

S

- **SBRT**: Stereotactic Body Radiotherapy
- **SEMS**: Self-Expandable Metal Stent

T

- **T1/T2**: T1/T2 weighted MRI sequences
- **T4b**: Tumor stage T4b
- **TACE**: Transarterial Chemoembolization (with drug-eluting beads)
- **TARE (Y-90)**: Transarterial Radioembolization (Yttrium-90)
- **TNM**: Tumor, Node, Metastasis (AJCC 8th edition staging)
- **UAE**: United Arab Emirates
- **UAE-NCR**: UAE National Cancer Registry
- **UC**: Ulcerative Colitis
- **ULN**: Upper Limit of Normal
- **USMSTF**: U.S. Multi-Society Task Force on Colorectal Cancer

V

- **V600E**: Specific BRAF mutation (see BRAF V600E)
- **VATS**: Video-Assisted Thoracoscopic Surgery
- **VEGF**: Vascular Endothelial Growth Factor (inhibitors)

Y

- **YOCRC**: Young-Onset Colorectal Cancer (<50 years)

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