



Management of treatment-related sequelae following colorectal cancer

Version 1.1

APPROVED

Content

June 1st 2024 (DCCG)

Form

September 10th 2024 (Center for Clinical Practice Guidelines | Cancer)

REVISION

Planned: October 1st 2026

INDEXING

Colorectal cancer, treatment-related sequelae, late adverse effects

Contents

| | |
|--|----|
| 1. Anbefalinger - DA (Quick Guide) | 4 |
| Fokus på senfølger i opfølgingsprogrammerne | 4 |
| Psykosociale senfølger | 4 |
| Senfølger i mave-tarm-kanalen efter koloncancer | 5 |
| Senfølger i mave-tarm-kanalen efter rektumcancer | 6 |
| Stomier | 7 |
| Senfølger i urinvejene | 8 |
| Seksuelle senfølger | 8 |
| Smerter og kemoinduceret neuropati (CIPN) | 9 |
| Kræftrelateret træthed | 10 |
| Recommendations - ENG (Quick Guide) | 11 |
| Focus on treatment-related sequelae in follow-up | 11 |
| Psychosocial distress | 11 |
| Bowel dysfunction after colon cancer | 12 |
| Bowel dysfunction after rectal cancer | 13 |
| Ostomies | 14 |
| Urinary dysfunction | 14 |
| Sexual dysfunction | 15 |
| Pain and chemotherapy-induced neuropathy | 16 |
| Cancer-related fatigue | 16 |
| Abbreviations | 18 |
| 2. Introduction | 21 |
| 3. Scientific Evidence | 22 |
| Focus on Treatment-related Sequelae in Follow-up | 22 |
| Psychosocial distress | 24 |
| Bowel dysfunction | 29 |
| Bowel dysfunction after rectal cancer | 32 |
| Ostomies | 38 |
| Urinary dysfunction | 42 |
| Sexual dysfunction | 44 |
| Pain and chemotherapy-induced neuropathy | 49 |
| Cancer-related Fatigue | 53 |
| Other | 55 |

4. Reference list56

6. Monitoring71

7. Appendix72

 Search Queries75

8. Background77

Revisions to previous version (changelog)

Revisions to version 1.0

The guideline has been critically reviewed by the author group, and stakeholders have been consulted. The conclusion was that the guideline and recommendations remain fully applicable. There is no significant new information in the literature. Only the version number, professional and administrative approval dates, and revision date have been changed.

1. Anbefalinger - DA (Quick Guide)

Fokus på senfølger i opfølgningsprogrammerne

Anbefalinger

1. Kontrol ud over standard-opfølgningsprogrammer anbefales ikke. Øget hyppighed af kontrolbesøg har ingen eller kun ringe effekt på livskvalitet, angst og depression (grad A)
2. Systematisk monitorering af livskvalitet og senfølger efter behandlingen for at identificere patienter med behov for yderligere vurdering eller støtte og for at kunne skræddersy et optimalt behandlingstilbud anbefales (grad D). Dette kan gøres ved brug af udvalgte validerede spørgeskemaer (PROMs) (grad B).

Psykosociale senfølger

Anbefalinger

3. Patienter bør rutinemæssigt vurderes for tegn på depression og angst, da en væsentlig andel udvikler angst, depressive symptomer eller nedsat mentalt velvære i et omfang, der påvirker deres livskvalitet (grad B).
4. Vurdering bør foretages tidligt i opfølgningen, da depression kan forekomme allerede inden for tre måneder efter diagnosen (med opmærksomhed på allerede eksisterende depressive tilstande) (grad B).
5. Frygt for tilbagefald af kræftsygdom (fear of cancer recurrence) bør anerkendes og behandles, da en stor andel af patienter lider heraf. Tilstanden er karakteriseret ved svær psykisk påvirkning med posttraumatisk stressforstyrrelses-lignende symptomer (post-traumatic stress disorder, PTSD) og nedsat livskvalitet (grad B).
6. Negativ kropsopfattelse (body image distress) bør anerkendes og behandles. Her bør man have særligt fokus på rektumcancerpatienter, patienter med stomi, patienter med vedvarende tarmdysfunktion, samt kvinder og yngre patienter (alder < 50 år) (grad B).
7. Det anbefales, at patienter med tegn på klinisk depression henvises til relevant specialist med henblik på korrekt diagnosticering og håndtering (grad D).

Strategier

- Vurdering af psykisk påvirkning kan gennemføres med den danske version af Distress Thermometer (DIS-A) som et første skridt til identifikation af patienter, der har behov for yderligere opfølgning (grad B).
- Fysisk aktivitet og kostændringer kan bedre livskvaliteten, men der mangler konsensus vedrørende både omfanget og indholdet af denne type interventioner (grad B).

Senfølger i mave-tarm-kanalen efter koloncancer

Anbefalinger

8. Patienter behandlet for kolon-cancer bør rutinemæssigt screenes for tarmdysfunktion (grad B).
9. I tilfælde af kronisk diarré anbefales, at der henvises til en gastroenterolog med henblik på yderligere udredning (grad D).
10. Det anbefales, at patienter med vedvarende tarmdysfunktion henvises til specialiserede enheder (grad D).

Strategier

- Udelukkelse af underliggende organiske årsager, der kan forklare patientens symptomer efter operationen bør foretages før behandling (grad D).
- Behandling af galdesyremalabsorption med en lav dosis af galdesyrebindere til natten (colestyramin 4 g) for at undgå bivirkninger og interaktion med anden medicin anbefales (grad D). En fedtreduceret diæt kan have en additiv effekt eller kan vælges som første tiltag afhængig af se-hcat-scanningsresultatet (grad C).
- Symptomatisk bakteriel overvækst i tyndtarmen skal behandles med rifaximin, da det er det antibiotikum, der har den bedst påviste dosisrelaterede effekt (grad A). En dosis på 600 mg x 2 i seks dage anbefales (grad D).
- Det anbefales, at behandling med loperamid eller afføringsmidler følger anbefalingerne for behandling af idiopatisk diarré og obstipation (grad D).

- Patienter med kronisk obstipation/obstrueret defækation uden effekt af afføringsmidler og ved Low Anterior Resection Syndrome (LARS)-lignende symptomer kan behandles med transanal irrigation (grad D).
- Visse patienter kan have gavn af kostændringer med fokus på indtag af fibre, fedt og kulhydrater (grad D).

Senfølger i mave-tarm-kanalen efter rektumcancer

Anbefalinger

11. Patienter behandlet for rektumcancer bør rutinemæssigt screenes for tarmdysfunktion, da svær LARS findes hos > 40%. Væsentlige risikofaktorer er strålebehandling, lav tumorhøjde og anamnese med aflastende stomi (grad B).
12. Screening for tarmdysfunktion bør udføres ved hjælp af den validerede LARS-score (grad B).
13. Det anbefales, at alle patienter behandlet for rektumcancer med efterfølgende svær LARS tilbydes behandling; enten lokalt eller ved henvisning til en specialiseret enhed (grad D).

Strategier

- Udelukkelse af underliggende organiske årsager, der kan forklare patientens symptomer efter operationen bør foretages før behandling (grad D).
- Objektive test er ikke nødvendige for at diagnosticere LARS (grad C).
- Indtag af fibre kan muligvis reducere antallet af hyppige, fragmenterede afføringer (clustering) og forbedre afføringens konsistens, forudsat at fibre indtages i relevante doser (grad D).
- Bækkenbundsrehabilitering, herunder muskeltræning, biofeedback og træning med rektalballon, kan forbedre funktionaliteten af lukkemuskulaturen (grad B).
- Patienter med en svær grad af tarmdysfunktion kan muligvis have gavn af transanal irrigation (grad B).
- Patienter med behandlingsrefraktær tarmdysfunktion kan muligvis have gavn af sakral nervestimulation (grad B).

- Perkutan tibial nervestimulation kan reducere LARS-symptomer hos selekterede patienter (grad B).
- Stomianlæggelse bør forbeholdes patienter med refraktær LARS som en sidste behandlingsmulighed (grad D).

Stomier

Anbefalinger

14. Patienter med permanent stomi kan tilbydes screening for påvirkning af livskvalitet (grad C).

Strategier

- Det anbefales, at patienter har livslang åben kontakt til stomi-sygeplejerske (grad D)
- Stomi-irrigation kan hjælpe patienter til øget kontrol over output, luftafgang og lugt (grad C).
- Det anbefales, at peristomal dermatitis behandles af en stomisygeplejerske (grad D).
- Ildelugtende flatulens kan behandles med forstærkning af filtre eller kostvejledning (grad D) eller ved brug af lavendelolie i stomiposen (grad C).
- Parastomale hernier/buler kan behandles konservativt med stomibrokbælte (grad D)
- Det anbefales, at patienter med vedvarende symptomer fra parastomale hernier/buler kan henvises til et specialiseret kirurgisk center med henblik på vurdering (grad D).
- Simple prolaps kan håndteres konservativt af en stomisygeplejerske (grad D).
- Stenose kan behandles konservativt med kostændringer (grad D). Hos kolostomipatienter med stenose kan skylning i stomien være nyttige (grad D). Hvis dette ikke har tilstrækkelig effekt, kan patienten henvises til vurdering ved en specialiseret kirurgisk enhed (grad D).

Senfølger i urinvejene

Anbefalinger

15. Patienter bør rutinemæssigt screenes for urinvejsdysfunktion, da 10-98% har symptomer, som kan påvirke livskvaliteten (grad B).
16. Det anbefales, at patienter med vedvarende symptomer > 3-6 måneder efter initial basal behandling tilbydes henvisning til behandling på specialiserede enheder (grad D).

Strategier

- Registrering af væskeindtag, tømningsfrekvens og urinvolumen med et tredages væske-vandladnings-skema hos patienter med urinvejsdysfunktion anbefales (grad D).
- Standardbehandling af urinvejsdysfunktion er konservativ, herunder livsstilsinterventioner såsom væskerestriktioner, ophør af indtag af blæreirriteranter såsom koffein og alkohol, samt rygestop (grad D).
- Det anbefales, at behandle postmenopausale kvinder med symptomer på overaktiv blære og vaginal slimhindeatrofi med vaginale østrogener (grad D).
- Træning af bækkenbundsmuskulaturen med eller uden biofeedback afhjælper stressinkontinens (grad A).
- Rækkefølgen i brugen af alfablokkere og antimuskarine medikamenter/mirabegron (beta-agonist) bør tilrettelægges efter det mest generende symptom (grad D).

Seksuelle senfølger

Anbefalinger

17. Patienter bør rutinemæssigt screenes for seksuel dysfunktion, da det påvirker op mod 93% af mænd 88% af kvinder (grad B).
18. Vurdering af den seksuelle funktion kræver fokuseret vurdering, der er mere specifik end vurdering af livskvalitet (grad D). Man bør være opmærksom på, at strålebehandling, stomi og tarmdysfunktion er forbundet med en højere risiko for seksuel dysfunktion.

19. Det anbefales, at patienter med vedvarende symptomer tilbydes henvisning til behandling i specialiserede enheder (grad D).

Strategier

- Kønshormoner bør måles hos patienter med relevante symptomer, og substitutionsbehandling bør overvejes om nødvendigt (grad B).
- Data tyder på, at tidligt påbegyndt penil rehabilitering giver bedre funktionelle resultater (grad D).
- Mænd med erektil dysfunktion skal tilbydes behandling med orale fosfodiesterase-5-hæmmere (grad A).
- Hos kvinder med seksuel dysfunktion har psykoedukative interventioner vist lovende resultater (grad B).
- Behandling med hormonsubstitution ± vaginale østrogener af kvinder med behandlingsinduceret menopause og superficiel dyspareuni anbefales (grad D).
- Introital eller vaginal fibrose og/eller dyb dyspareuni bør behandles med vaginal dilatation (grad B).

Smerter og kemoinduceret neuropati (CIPN)

Anbefalinger

20. Det anbefales, at patienter med vedvarende smerter udredes med henblik på fastlæggelse af årsag (grad D).
21. Det anbefales, at patienter behandlet med oxaliplatin screenes for CIPN (grad D).

Strategier

- Behandling med duloxetin reducerer smerter ved smertefuld CIPN (grad A).
- Medicin, der anbefales til behandling af neuropatisk smerte, kan være effektiv til behandling af smertefuld CIPN (grad D).
- MR bør være den foretrukne billeddiagnostiske modalitet til påvisning af insufficiensfrakturer i bækkenet (grad B).

- Overvej behandling med calcium og D-vitamin ved planlagt strålebehandling (grad D).

Kræftrelateret træthed

Anbefalinger

22. Patienter bør tilbydes rutinemæssig screening for træthed, da det er almindeligt forekommende, og af patienterne selv opfattes som det sværeste symptom (grad B).

Strategier

- Relevant udredning af differentialdiagnoser til træthed anbefales (grad D).
- Fysisk aktivitet kan forbedre træthed, men der mangler evidens (grad B).
- Et højere indtag af grøntsager kan muligvis mindske træthed (grad C).

Recommendations - ENG (Quick Guide)

Focus on treatment-related sequelae in follow-up

Recommendations

1. **Follow-up programs beyond standard is not recommended. Increased frequency of follow-up visits has little or no effect on quality of life (QoL), anxiety, and depression (Grade A).**
2. **Systematic monitoring of quality of life-related and treatment-related sequelae following treatment to identify patients who require further specialist evaluation or support after treatment, and to offer optimal tailored treatments is recommended (Evidence level 5) (Grade D). Monitoring should employ selected validated patient-related outcome measures (Grade B).**

Psychosocial distress

Recommendations

3. **Survivors should be assessed for signs of depression and anxiety as a significant group of patients experience clinically relevant anxiety, depressive symptoms, or reduced mental wellbeing affecting quality of life (QoL) (Grade B).**
4. **Assessment should be done at early follow up as depression may occur within three months of a colorectal cancer diagnosis (with attention to pre-existing depressive conditions) (Grade B).**
5. **Fear of recurrence should be acknowledged and addressed as a large proportion of survivors report high levels of fear of recurrence characterized by higher levels of distress, post-traumatic stress symptoms, and a lower QoL (Grade B).**
6. **Body image distress should be acknowledged and addressed. Particular attention should be paid to survivors of rectal cancer, ostomates, survivors with persisting bowel dysfunction, female and younger (age < 50 years) survivors (Grade B).**
7. **Referral of patients with signs of clinical depression upon assessment for proper diagnosis and management is recommended (Grade D).**

Management strategies

- Assessment of psychological distress should be performed using the Danish version of the Distress Thermometer (DIS-A) as a first step in identifying persons in need of support (Grade B).
- Physical activity and dietary interventions may affect QoL, but consensus is lacking in terms of both form and contents (Grade B)

Bowel dysfunction after colon cancer

Recommendations

8. Colon cancer survivors should be offered routine screening for bowel dysfunction (Grade B).
9. In case of chronic diarrhea, it is recommended to refer colon cancer survivors to a gastroenterologist for further investigations (Grade D).
10. It is recommended to offer referral of patients with persisting symptoms for treatment in specialized units (Grade D).

Management strategies

- Ruling out underlying 'organic' lesions that may explain a patient's symptoms after surgery is a prerequisite for treatment (Grade D).
- Bile acid malabsorption should be treated with a low-dose bile acid binder (colestyramine 4 g) at nighttime to avoid side-effects and interaction with other medicines (Grade D). Additional benefit may be gained by adding a fat-reduced diet. Fat-reduced diet may also be a first-choice treatment according to the se-hcat scan result (Grade C).
- Symptomatic small intestinal bacterial overgrowth is treated with rifaximine as this antibiotic has the best established dose-related effect (Grade A). A dose of 600 mg x 2 for six days is recommended (Grade D).
- Treatment with anti-diarrheal or laxatives should follow recommendations for treatment of idiopathic diarrhea and constipation (Grade D).

- Patients with chronic constipation/obstructive defecation syndrome or low anterior resection syndrome (LARS)-like symptoms with no effect of laxatives could be offered transanal irrigation (Grade D).
- Some patients may benefit from dietetic intervention regarding their intake of fibers, fat, and carbohydrates (Grade D).

Bowel dysfunction after rectal cancer

Recommendations

11. Rectal cancer survivors should be offered routine screening for bowel dysfunction as major LARS is found in > 40%. High-risk factors are radiotherapy, low tumor height and a history of preventive ileostomy (Grade B).
12. Screening for bowel dysfunction should be performed using the validated LARS score (Grade B).
13. All survivors with major LARS should be offered treatment, either locally or following referral to a specialized unit (Grade D).

Management strategies

- Ruling out underlying 'organic' lesions that may explain a patient's symptoms after surgery is a prerequisite for treatment (Grade D).
- Objective tests are unnecessary to diagnose LARS (Grade C).
- Soluble fibers (bulking agents) may be beneficial in decreasing clustering and improving stool consistency, provided adequate doses are taken (Grade D).
- Pelvic floor rehabilitation, including pelvic floor muscle training, biofeedback training, and rectal balloon training may improve functional outcome (Grade B).
- Patients with a more severe dysfunction may benefit from transanal irrigation (Grade B).
- Patients with severe refractory symptoms may benefit from sacral nerve stimulation (Grade B).
- Percutaneous tibial nerve stimulation may reduce symptoms of LARS in highly selected patients (Grade B).

- Stoma formation should be reserved for patients with refractory LARS as a final treatment option (Grade D).

Ostomies

Recommendations

14. Survivors with a permanent stoma may be offered routine screening for stoma impact on health-related QoL (Grade C).

Management strategies

- Stoma patients should have a life-long open contact to a specialized ostomy nurse (Grade D)
- Stomal irrigation may possibly help patients gain control over bodily functions such as output, gas, and odor (Grade C).
- It is recommended, at peristomal dermatitis is treated by a specialized ostomy nurse (Grade D).
- Foul-smelling flatulence may be treated by enhancement of filters or dietary counseling (Grade D) or by adding lavender oil to the ostomy bag (Grade C).
- Parastomal hernias/bulging may be managed by using an ostomy hernia belt (Grade D).
- It is recommended that patients with persisting symptoms from parastomal hernias/bulging are referred to a specialized surgical center for evaluation (Grade D).
- Simple prolapse may be managed conservatively by a specialized ostomy nurse (Grade D).
- Stomal stenosis may be conservatively treated with dietary measures (Grade D). In colostomy patients with stenosis, irrigations may be useful (Grade D). If the problem is not resolved, the patient may be referred to a specialized surgical unit for evaluation (Grade D).

Urinary dysfunction

Recommendations

15. Survivors should be screened routinely for urinary dysfunction as symptoms are present in 10-98% of patients and may affect QoL (Grade B).
16. Patients with persisting symptoms > 3-6 months following initial basic treatment should be offered referral for treatment in specialized units (Grade D).

Management strategies

- Using a three-day voiding diary with registration of fluid intake, voiding episodes, and voided volume in patient with urinary dysfunction is recommended (Grade D).
- The standard of care for urinary dysfunction is conservative management including lifestyle interventions such as moderating fluid intake, avoiding known bladder irritants such as caffeine and alcohol, and smoking cessation (Grade D).
- In postmenopausal women with overactive bladder symptoms and vaginal atrophy, treatment with vaginal estrogens is recommended (Grade D).
- Pelvic floor muscle training with or without biofeedback may alleviate symptoms in stress incontinence (Grade A).
- Sequencing of oral medication should be tailored depending on the most bothersome symptom identified at assessment and includes alpha-blockers and antimuscarinics or mirabegron (Grade D).

Sexual dysfunction

Recommendations

17. Survivors should be offered routine screening for sexual dysfunction as this affects up to 93% of men and 88% of women (Grade B).
18. Sexual function in survivors requires focused assessment beyond broad QoL evaluation (Grade D). Attention should be paid to the fact that radiotherapy, stoma formation, and bowel dysfunction are associated with an increased risk of sexual dysfunction.
19. Patients with persisting symptoms should be offered referral for treatment in specialized units (Grade D).

Management strategies

- Sex hormones in survivors with relevant complaints should be measured and replacement therapy considered, if needed (Grade B).
- Data suggest that the timing of penile rehabilitation is important and that early initiation of penile rehabilitation after injury yields improved outcomes (Grade D).
- Male patients with erectile dysfunction shall be offered treatment with oral phosphodiesterase type-5 inhibitors (Grade A).
- In female survivors with sexual dysfunction, psychoeducational interventions have shown promising results (Grade B).
- It is recommended to offer hormone replacement therapy \pm vaginal estrogens to women with treatment-induced menopause and superficial dyspareunia (Grade D).
- Introital- or vaginal fibrosis and/or deep dyspareunia should be treated with vaginal dilation (Grade B).

Pain and chemotherapy-induced neuropathy

Recommendations

20. It is recommended that survivors with persisting pain should undergo diagnostic work up to determine the cause of their pain (Grade D).
21. It is recommended that survivors treated with oxaliplatin should be screened for CIPN (Grade D).

Management strategies

- Duloxetine reduces pain in painful CIPN (Grade A).
- Agents recommended for the treatment of neuropathic pain may be effective in the treatment of painful CIPN (Grade D).
- MRI should be the preferred imaging modality for detecting pelvic insufficiency fractures (Grade B).
- Consider treatment with calcium and vitamin D in case of radiotherapy (Grade D).

Cancer-related fatigue

Recommendations

22. Survivors should be offered routine screening for cancer-related fatigue as this is a common symptom, which is rated the most severe by patients (Grade B).

Management strategies

- Relevant laboratory assessment for differential diagnostics of fatigue is recommended (Grade D).
- Physical activity may improve cancer-related fatigue, but conclusive evidence is lacking (Grade B).
- A higher intake of vegetables may lower levels of fatigue (Grade C)

Abbreviations

| | |
|-----------------|---|
| ASCO | American Society of Clinical Oncology |
| BAM | Bile acid malabsorption |
| BMI | Body Mass Index |
| CC | Colon cancer |
| CI | Confidence interval |
| CIPN | Chemotherapy-induced peripheral neuropathy |
| CRC | Colorectal cancer |
| CRF | Cancer-related fatigue |
| CRT | Chemoradiotherapy |
| CT | Computed tomography |
| DC | Diversion colitis |
| DCCG | Danish Colorectal Cancer Group |
| DIS-A | Distress Thermometer |
| ED | Erectile dysfunction |
| EJD | Ejaculatory dysfunction |
| EORTC | The European Organization for Research and Treatment of Cancer |
| EORTC QLQ-38/29 | Site-specific CRC Module of The European Organization for Research and Treatment of Cancer core questionnaire |
| FCR | Fear of cancer recurrence |
| FCRI | Fear of Cancer Recurrence Inventory |
| GI | Gastrointestinal |
| HADS | Hospital Anxiety and Depression Scale |
| HR-QoL | Health-related quality of life |

| | |
|------------|--|
| IBS | Irritable bowel syndrome |
| ICI | Intracavernosal injection |
| ICIQ-FLUTS | International Consultation on Incontinence Modular Questionnaire - Female Lower Urinary Tract Symptoms |
| ICIQ-MLUTS | International Consultation on Incontinence Modular Questionnaire - Male Lower Urinary Tract Symptoms |
| IENFD | Intraepidermal nerve fiber density |
| IFSF | Female Sexual Function Index |
| IIEF | International Index of Erectile Function |
| IPSS | International Prostate Symptom Score |
| LARS | Low anterior resection syndrome |
| LUTS | Lower urinary tract symptoms |
| MCOHQOLQO | Modified City of Hope Colorectal Cancer Quality of Life Questionnaire Ostomy |
| MRI | Magnetic resonance imaging |
| MSK-BFI | Memorial Sloan Kettering Cancer Center Bowel Function Instrument |
| NCCN | National Comprehensive Cancer Network |
| ODS | Obstructed defecation syndrome |
| OR | Odds ratio |
| PA | Physical activity |
| PDE-5is | Phosphodiesterase type-5 inhibitors |
| PFE | Pelvic floor muscle exercise |
| PO-LARS | Pre-operative low anterior resection syndrome score |
| PROM | Patient-reported outcome measure |
| PTNS | Percutaneous tibial nerve stimulation |
| PTSD | Post-traumatic stress syndrome |
| QoL | Quality of life |

| | |
|---------|---|
| RC | Rectal cancer |
| RCT | Randomized controlled trial |
| RT | Radiotherapy |
| Se-hcat | Selenium-75 homocholic acid taurine |
| SFSUNS | Short Form Survivor Unmet Needs Survey |
| SIBO | Small intestinal bacterial overgrowth |
| SNS | Sacral nerve stimulation |
| SPS | Sphincter-preserving surgery |
| SUNS | Survivor Unmet Needs Survey |
| SVQ | Sexual Function Vaginal Changes Questionnaire |
| TAI | Transanal irrigation |
| TRS | Treatment-related sequelae |
| VD | Vaginal dilators |
| VED | Vacuum erection device |

2. Introduction

In 2020, colorectal cancer (CRC) was the third most commonly diagnosed malignancy in the world, with almost 2 million new cases. CRC was also the second most common cause of cancer death worldwide, causing almost 1 million deaths (1). Significant improvements in survival have been achieved owing to evolving treatment modalities and screening initiatives, which promote earlier diagnosis. Almost two-thirds of CRC survivors are alive 5 years after their diagnosis (2), and in Denmark, the current 5-year survival is 71.3% (DCCG Yearly Report, 2019). Additionally, a substantial increase has been recorded in the incidence of CRC (2). Thus, CRC survivors are one of the most rapidly growing groups of patients living with and beyond cancer. Cancer survivorship has evolved to become more than a measure of time; focus has broadened to encompass the survivor, their quality of life (QoL), and survivorship care as well as epidemiological concerns related to survival rates, morbidity, and mortality (3).

Whereas clinical practice guidelines exist for diagnosis and treatment, only a few evidence-based clinical care guidelines on survivorship care have been published. The National Comprehensive Cancer Network (NCCN) has developed consensus-based guidelines on the treatment of patients with colon and rectal cancers that also include some recommendations regarding follow-up care after completion of treatment (4, 5). In addition, the NCCN has developed survivorship care guidelines addressing long-term or late occurring psychosocial and physical problems and preventive health measures (6). The American Society of Clinical Oncology's (ASCO) clinical practice guidelines for cancer survivorship care focus on the prevention and management of symptoms experienced by survivors of a wide range of cancers. To date, the ASCO has released three evidence-based cancer survivor care guidelines focused on fatigue, anxiety and depression, and neuropathy (7).

This guideline examines the extent of late treatment-related sequelae (TRS) in colorectal cancer survivors and presents the scientific evidence for management of late TRS in this patient category. Symptoms have been divided into overall categories including: psychosocial, bowel-related, urinary, sexual (male and female), pain/neuropathy, and fatigue symptoms or complaints that are examined individually.

Objective

The overall objective is to guide clinical management of TRS in survivors after CRC treatment.

Target population

This guideline applies to all CRC survivors.

Target user

This guideline is developed to support clinical decision-making and quality improvement. Thus, the target users are healthcare professionals working with CRC treatment and follow-up.

3. Scientific Evidence

Focus on Treatment-related Sequelae in Follow-up

Recommendations

1. **Follow-up programs beyond standard is not recommended. Increased frequency of follow-up visits has little or no effect on quality of life (QoL), anxiety, and depression (Grade A).**
2. **Systematic monitoring of quality of life-related and treatment-related sequelae following treatment to identify patients who require further specialist evaluation or support after treatment, and to offer optimal tailored treatments is recommended (Evidence level 5) (Grade D). Monitoring should employ selected validated patient-related outcome measures (Grade B).**

CRC survivors develop a combination of health, information, and support needs due to their CRC diagnosis. New challenges specific to the nature of the treatment require significant practical and psychological support to facilitate adjustment (8) (2b). The overall health and QoL experienced by survivors are influenced, in part, by the stage at diagnosis and by the types and duration of therapy given (2) (2a), in part by the type of cancer affecting the patient (rectal cancer (RC) survivors report a greater need for interventions than colon cancer (CC) survivors) and age at diagnosis (9-12) (2b).

A substantial risk exists that surveillance for cancer recurrence may be prioritized higher than the management of any treatment-related sequelae (TRS), and provision of information for and support to survivors. Haggstrom et al. (2009) reported that just seven percent of CRC survivors saw a medical professional for management of TRS, whereas 85% attended follow-up tests (13) (3a).

The lack of focus on TRS is well documented in a recent review of current European guidelines on post-CRC follow-up. The review showed significant variation in terms of follow-up intervals and methods, and revealed that identification and treatment of TRS received only limited attention. More specifically, the authors found that management of TRS was mentioned in only 12 of the 21 guidelines and was recommended explicitly in only four (14) (2a). Wiltink et al. found 51 CRC (including anal cancer) guidelines among which only 13 (25%) comprised recommendations on how to manage TRS (15) (3a).

Patients reported positive perceptions of CRC surveillance in 75% of the studies included in a recent review. Positive perceptions included high rates of overall satisfaction with follow-up care with one study identifying a correlation between a longer patient-physician relationship and the perceived quality of follow-up care (16) (3a). In 37.5% of the included studies, negative perceptions of follow-up were also described. These included anxiety or stress related to follow-up visits or tests, unmet expectations regarding information exchange, lack of psychosocial evaluation and emotional support, and overall dissatisfaction (16) (3a). Patients were

dissatisfied with the available information regarding how the treatment would affect their body and sexuality. Furthermore, patients expressed dissatisfaction with communication between providers and the extent to which their family was included and considered in care planning. The review identified room for improvement in information exchange, sensitivity towards psychosocial and QoL issues, and emphasis on general health maintenance and prevention. This was supported by a 2019 cross-sectional study reporting that more than two-thirds of Irish CRC survivors reported unmet information needs (68%) or social difficulties (66%), whereas 40% reported some dissatisfaction with continuity of care. Greater social difficulty was consistently associated with a poorer QoL in all domains, whereas lower satisfaction with continuity of care predicted a poorer physical, social, functional, and overall QoL (16, 17) (3a).

Intensified follow-up programs have been suggested to improve overall patient outcomes: A meta-analysis comprising six reviews found that intensified follow-up programs were associated with a survival benefit (odds ratio, OR: 0.73; 95% confidence interval: 0.59 to 0.91), but reported no impact on QoL (18) (2a). Conversely, a more recent systematic Cochrane review including 19 studies found that intensified follow-up programs had little or no effect on the overall survival of CRC patients, little or no effect on CRC-specific or -relapse-free survival, and little or no effect on QoL, anxiety, or depression (19) (1b). Similarly, a large international randomized controlled trial (RCT) of standard versus intensified follow-up including 2,509 patients found no significant survival benefit of an intensified follow-up (20) (1b).

As the outcome of primary treatment of CRC is improving, the potential benefits of cancer surveillance for recurrence of cancer seem to be declining (21) (5). Consequently, we are facing a growing need to change our standard follow-up programs and to personalize them, thereby covering many additional aspects (21) (5). Various randomized approaches have attempted to tailor follow-up care to the need of CRC patients. However, many of these approaches have failed to significantly improve patients' health-related QoL (HR-QoL) (19, 20, 22, 23) (1b). Even so, patients were more satisfied with intensified follow-up care programs than with usual care. Possibly, survivor care may be an effective intervention in a more targeted population, perhaps including patients with higher levels of distress or patients with greater levels of unmet needs (22) (1b). Models specifically targeting CRC survivors with unmet needs seem beneficial – either by open access to the clinic rather than standard clinical visits, or by risk stratification (21, 24) (5).

Patient-reported outcome measures (PROMs)

The most used PROM to measure QoL after cancer treatment is The European Organization for Research and Treatment of Cancer core questionnaire (EORTC QLQ C-30), together with the site-specific CRC module (EORTC QLQ CR-38/29) (25). The EORTC QLQ-38/29 consists of 38 (29) items covering symptoms and sequelae related to various treatment modalities, body image, sexuality, and future perspective. The Danish version of the EORTC QLQ CR-38 has been validated and showed satisfactory psychometric properties for the scales of body image, sexual functioning, male sexual problems, and defecations problems. Suboptimal psychometric performances were found for the scales of micturition problems, symptoms of the gastrointestinal tract, and weight loss. It was not possible to assess the psychometric properties of female sexual problems and sexual enjoyment scales due to a high number of missing values (26). The EORTC QLQ-38/29 has been validated in more than 70 countries and has currently been translated into 108 languages (25, 26). However, the measurement properties of the EORTC QLQ-38/29 were evaluated in a recent systematic review

concluding that these properties were limited (27) (2a). The review called for better quality research on the measurement properties of the QLQ-CR29 and concluded that future validation studies should focus on assessing the structural validity and subsequently its internal consistency on unidimensional subscales. Further issues that should be examined included reliability and thereby measurement error, construct validity, and responsiveness with *a priori* hypotheses, and cross-cultural validity.

More specific PROMs for in-depth understanding of specific symptoms, screening, and monitoring are described in relation to the symptom categories and management.

Using an internet-based survival care plan platform, a study found that for lower gastrointestinal (GI) cancer survivors (including 792 CC survivors and 218 RC survivors), it was feasible to obtain PROMs from an Internet-based survivorship tool. Survivors reported a wide range of late and long-term sequelae, and these were used for counseling at the time of diagnosis and to help anticipate and respond to disease- and treatment-related sequelae during follow-up (28) (4).

A PROM-based, prospective cohort study including 1,721 CRC survivors invited patients to complete a survey about TRS at 3, 12, 24, and 36 months after surgery as part of their follow-up with an 80.5% participation rate. Patients were asked if they wished to be contacted by telephone in relation to TRS. Contact was requested by 19.0% of CC survivors and a total of 8.4% was referred for TRS treatment, primarily due to bowel dysfunction. In the RC group, contact was requested by 30.8%, and 16.2% was referred for TRS treatment, mainly due to bowel and sexual dysfunction. If requested, contact was made regardless of the PROM scores (29) (2b).

Psychosocial distress

Recommendations

3. **Survivors should be assessed for signs of depression and anxiety as a significant group of patients experience clinically relevant anxiety, depressive symptoms, or reduced mental wellbeing affecting quality of life (QoL) (Grade B).**
4. **Assessment should be done at early follow up as depression may occur within three months of a colorectal cancer diagnosis (with attention to pre-existing depressive conditions) (Grade B).**
5. **Fear of recurrence should be acknowledged and addressed as a large proportion of survivors report high levels of fear of recurrence characterized by higher levels of distress, post-traumatic stress symptoms, and a lower QoL (Grade B).**
6. **Body image distress should be acknowledged and addressed. Particular attention should be paid to survivors of rectal cancer, ostomates, survivors with persisting bowel dysfunction, female and younger (age < 50 years) survivors (Grade B).**

7. Referral of patients with signs of clinical depression upon assessment for proper diagnosis and management is recommended (Grade D).

Management strategies

- **Assessment of psychological distress should be performed using the Danish version of the Distress Thermometer (DIS-A) as a first step in identifying persons in need of support (Grade B).**
- **Physical activity and dietary interventions may affect QoL, but consensus is lacking in terms of both form and contents (Grade B)**

Cancer is a traumatic event. Cancer survivors often face adaptation problems, fear of cancer recurrence, and negative effects of cancer treatment. Furthermore, a significant proportion of CRC survivors experience anxiety, depressive symptoms, or reduced mental well-being (30, 31) (2b).

A 2010 systematic review found that, despite a good overall QoL, CRC survivors had poorer depression scores than the norm and suffered from long-term symptoms such as distress regarding cancer. The same review found that higher levels of depression and anxiety were significantly associated with lower values of global QoL, physical functioning, role functioning, cognitive functioning, emotional functioning, and social functioning scales over time (32) (3a). Time since diagnosis is associated with fewer depressive symptoms, but not with fewer anxiety symptoms (31) (2b). Screening for these symptoms is important, especially among survivors who are single, have a low level of education, and comorbid conditions, even years after their CRC diagnosis and treatment.

Apart from recurrence of the disease, general and health-related factors such as age, social network size, income, education, Body Mass Index (BMI) and a number of comorbidities are associated with QoL in CRC survivors (32-34) (3a). Greater medical comorbidities, poorer self-reported general health, bowel dysfunction, and physical symptom distress have all been correlated with poorer psychological outcomes (30, 35) (2b). Further, the risk of having a poorer mental health-related quality of life (HR-QoL) among women has been found to be twice as high as this risk among men, whereas protective factors are age > 70 years, retirement, being in a relationship, and having a higher level of education (30, 31, 36) (2b). Poorer mental HR-QoL scores may be indicative of psychosocial issues among CRC survivors that are not being adequately addressed, which would underscore the need to screen survivors for psychosocial distress and link them to appropriate support services (37) (2b).

Cancer stigma and self-blame affect a significant proportion of men with CRC and are independent predictors of depressive symptoms. A cross sectional study among North American veterans with CRC found that 31% of respondents endorsed at least one item in a measure of cancer stigma, 10% indicated that it was at least 'a little true' that other people blamed them for their illness, and 25% reported feeling that it was at least 'a little true' that they were to blame for their illness. All three independent variables were associated with depressive symptoms in bivariate models; cancer stigma and self-blame were significantly associated with depressive symptoms in the multivariate model (38) (2b).

However, long-term CRC survivors (> 5-15 years after the diagnosis) seem to have an excellent overall QoL when compared with non-cancer controls (39, 40) (2b). One explanation for the good overall QoL is the concept of reframing/response shift. This concept hypothesizes that CRC survivors either establish a new meaning of the concept of QoL or change the constitution of QoL dimensions. Another reason for the positive QoL assessment may be the finding of benefit in the cancer experience known as benefit finding or post-traumatic growth, both of which have been described for CRC survivors (32) (3a).

Specific aspects causing psychosocial distress in CRC survivors.

Pre-existing depression or anxiety

Comorbidities that are classified as limiting by patients have been found to be significantly associated with a poorer global health status/QoL as well as poorer symptom and functioning outcomes, including increased fatigue, pain, urinary, and bowel symptoms, and reduced physical, role, emotional, cognitive, and social functioning (35) (2b). Depression/anxiety appears to have the greatest association with poorer outcomes, with clinically meaningful differences being recorded across all outcomes (except for urinary and bowel symptoms) (35) (2b). In a prospective cohort study following 872 CRC survivors, approximately half of the patients stated that their depression/anxiety was not pre-existing, but had been diagnosed after CRC. The authors found a stable prevalence of depression/anxiety 3 months after surgery and at the 5-year follow-up suggesting that diagnoses may often occur within 3 months of a CRC diagnosis (35) (2b).

Fear of cancer recurrence

Fear of cancer recurrence (FCR) may be defined as the fear or worry that the disease will return or progress in the same organ or in another part of the body. Whereas a normal level of FCR may keep a person alert and aware of any symptoms, high levels of FCR may adversely affect a person's QoL and social activities (41) (2b). A cross-sectional study found that 38% of CRC survivors experienced high levels of FCR, characterized by higher levels of distress, post-traumatic stress symptoms, and lower QoL. These individuals particularly reacted to disease-related triggers, felt helpless, were worried, and experienced limitations in daily functioning (41) (2b). A systematic review found that even ≥ 5 years after their CRC diagnosis, many survivors were afraid of a recurrence, further spread of cancer, or a second cancer, and showed distress regarding future diagnostic tests (31) (2b).

Body image distress

An English national PROM-based survey including 21,802 CRC survivors found that 10.1% of respondents reported body image distress and that this percentage was higher among RC survivors than among CC survivors (13.9% versus 8.2%). Among ostomates (of whom the majority were treated for rectal cancer), 20.9% reported body image distress (42) (2b). Strong correlations have been found between a poorer body image, more severe depressive symptoms, and a poorer QoL (43) (2b). A 2020 systematic review and meta-analysis of the symptom experience in CRC survivors found that among ten post-cancer treatment symptoms analyzed, the pooled mean frequency was highest for body image distress and it was rated the third most severe symptom by survivors (44) (2a). A cross-sectional study found that diarrhea and gastrointestinal (GI) symptoms are distressing and directly related to a poorer body image and greater depressive symptoms, but

not to anxiety in female rectal and anal cancer survivors. Predisposing factors were young age and presence of stoma (45) (3b). Among these women, 47% reported feeling less feminine due to their disease and treatment, and 40% reported feeling less attractive. The development of body image distress may lead to an increased risk of depression. Periodic assessment of body image concerns in survivorship care may help identify the development of body image distress. One longitudinal study did find body image distress to decrease significantly over a period of 6 months (43) (2b).

Cognitive distress

The American Cancer Society's Colorectal Cancer Survivorship Care Guidelines recommend screening for cognitive decline in patients treated with chemotherapy as such therapy is associated with declining cognitive function, particularly for individuals who are younger than 70 years (2) (3b). In patients with lower GI cancer, cognitive changes were reported by 48.6% of patients at a mean 2.4 years after treatment (28) (2b). The symptoms reported by patients who complain of cognitive decline vary, but may include decreased executive functioning skills, longer processing time or reaction response time, diminished organizational skills, loss of language or math skills, and/or difficulty with concentration or attention. These often translate into lower HR-QoL scores, especially as patients transition back to work (2) (2b). The NCCN Guidelines for Survivorship suggest screening for treatable causes that may aggravate cognitive impairment, such as depression and anxiety, although data are lacking for evidence-based recommendations regarding routine screening for cognitive decline in this population (2) (2b).

Monitoring and evaluation

A simple option is the Distress Thermometer (DIS-A), which is similar to the rating scale used to measure pain on a scale from 0 (no distress) to 10 (extreme distress), in which a score of 4 or higher suggests a level of distress of clinical significance. In addition, a 38-item "Problem List" asks patients to identify their problems within five categories: practical, family, emotional, spiritual/religious, and physical. These tools are available from the NCCN Guidelines for Distress Management. Similarly, the Survivor Unmet Needs Survey (SUNS) and the Short-Form SUNS (SFSUNS) may be used to distinguish between problems that survivors experience and problems that they need help to manage across a range of life areas, including financial concerns, information and access, and continuity of care (2) (3b).

The Hospital Anxiety and Depression Scale (HADS) is designed to assess self-reported symptoms of anxiety and depression (46) (3b). The HADS consists of 14 items: seven items for depressive symptoms and seven items for anxiety. It assesses levels of symptoms in the past week. The questions may be answered on a four-point Likert scale, and the total score for each scale ranges from 0 to 21 (46) (3b).

The Fear of Cancer Recurrence Inventory (FCRI) is a multidimensional measure for FCR. The translated Danish version of the FCRI has been found to be a valid measure of FCR in a population of CC patients and was shown to identify patients with a need for special attention or interventions for high levels of FCR (47) (3b).

Failure to address psychosocial concerns may have significant health consequences in the form of depression and anxiety, lower QoL, lacking adherence to recommended surveillance protocols, and even lower survival rates (16) (3a).

Treatment options

Diet and exercise

A systematic review of the impact of nutritional interventions on QoL concluded that they seem to augment the health and QoL of CRC survivors (48) (2a). A more recent RCT assessed the effects of dietary and physical activity (PA) interventions on generic and cancer-specific QoL, anxiety, and depression levels among adult Chinese CRC survivors measured at baseline and at 6, 12, 18, and 24 months during/after a 12-month intervention. The authors found that participants receiving dietary intervention experienced a significant improvement in the generic measure of QoL at 12 months in the cancer-specific QoL scores, and in levels of depression at both 12 and 24 months of follow-up, but no significant changes were found in the levels of anxiety. Furthermore, participants receiving PA intervention only demonstrated a significant improvement in physical functioning at 6 months (49) (1b).

The effect of PA on HR-QoL has previously been established in a systematic review concluding that besides the obvious benefits of regular PA on general health and cancer recurrence, improved PA provided a positive contribution to HR-QoL. However, a lack of consensus and conclusive evidence exists regarding how such a program should be designed in terms of both its form and contents (48, 50, 51) (1b). Recently, a 2020 systematic review and meta-analysis of exercise interventions in CRC survivors found no evidence of the effect of exercise on psychosocial outcomes (QoL, fatigue, anxiety, and depression) (52) (2a).

Psychosocial interventions

A 2016 systematic review evaluating 14 RCTs with a minimum of one psychosocial or QoL outcome (including 2,476 CRC survivors) examined the effect of psychosocial interventions on QoL and psychosocial outcomes for CRC survivors of all disease stages. Psychosocial interventions were defined as group and/or individual psychotherapy or cognitive-behavioral training aiming to modify maladaptive thoughts and behaviors (30) (1b). Of the 14 RCTs, only three showed significant effects of the intervention on multiple mental health outcomes. These interventions included written and verbal emotional expression, progressive muscle relaxation training, and a self-efficacy-enhancing intervention. Three additional intervention trials showed an impact on outcomes related to mental health and QoL, including studies testing an Eastern body-mind-spirit intervention, nurse-administered information packets on RC and its treatment, and an intimacy enhancement intervention for patient-partner dyads (30) (1b). The majority of studies (10/14) used an individual delivery approach, and the number of sessions ranged from 1 to 12, with the exception that three studies did not have a standard number of sessions. Most studies (10/14) compared the intervention to standard care, and only one study included a comparison arm that controlled for time and attention given to participants. The review concluded that, overall, empirical support was limited for psychosocial interventions for CRC patients, and that further work is needed to address the unique QoL concerns of this population, such as embarrassing side effects of treatment and sexual dysfunction (30) (1b).

Bowel dysfunction

Recommendations

8. Colon cancer survivors should be offered routine screening for bowel dysfunction (Grade B).
9. In case of chronic diarrhea, it is recommended to refer colon cancer survivors to a gastroenterologist for further investigations (Grade D).
10. It is recommended to offer referral of patients with persisting symptoms for treatment in specialized units (Grade D).

Management strategies

- Ruling out underlying 'organic' lesions that may explain a patient's symptoms after surgery is a prerequisite for treatment (Grade D).
- Bile acid malabsorption should be treated with a low-dose bile acid binder (colestyramine 4 g) at nighttime to avoid side-effects and interaction with other medicines (Grade D). Additional benefit may be gained by adding a fat-reduced diet. Fat-reduced diet may also be a first-choice treatment according to the se-hcat scan result (Grade C).
- Symptomatic small intestinal bacterial overgrowth is treated with rifaximine as this antibiotic has the best established dose-related effect (Grade A). A dose of 600 mg x 2 for six days is recommended (Grade D).
- Treatment with anti-diarrheal or laxatives should follow recommendations for treatment of idiopathic diarrhea and constipation (Grade D).
- Patients with chronic constipation/obstructive defecation syndrome or low anterior resection syndrome (LARS)-like symptoms with no effect of laxatives could be offered transanal irrigation (Grade D).
- Some patients may benefit from dietetic intervention regarding their intake of fibers, fat, and carbohydrates (Grade D).
- Cancer survivors live with a sense of uncertainty from the moment they are diagnosed. Bowel dysfunction arising from CRC treatment is a constant reminder of potential recurrence, as symptoms often resemble those experienced prior to diagnosis (8) (2b).

- **Bowel dysfunction may persist as an ongoing issue even 15 years after colorectal cancer diagnosis (40) (2b).**

We have chosen to study treatment-related bowel dysfunction after colon and rectal cancer separately, as both needs and pathology differ substantially.

Bowel dysfunction after colon cancer

Late gastrointestinal TRS are common following surgery for CC. They include a broad spectrum of symptoms; loose to liquid stool (14.2-45.3%), fecal incontinence (6.2-34.1%), fecal urgency (9.3-37.2%), nocturnal defecation (20.2-32.1%), incomplete evacuation (26.4-66%) and obstructive, difficult emptying (14.9-71.1%) needing aid when defecating (14.2%) (53-56) (2b). The GI symptoms have a negative impact on QoL and show no improvement over time (53-55) (2b).

Bowel dysfunction after right-sided hemicolectomy

In a recent cross-sectional study including 3,306 right-sided hemicolectomy patients, the authors found that patients reported loose stools (15.5%), were incontinent for loose stool (28.8%), experienced urgency daily (18.8%), and suffered from nocturnal defecation (20.2%) significantly more than controls. They found no difference when comparing symptoms of obstruction, incomplete evacuation, use of laxatives, or bloating. Furthermore, the authors concluded that adjuvant chemotherapy (given in 34% of cases) did not affect bowel function or QoL (54)(2b).

In support, a review found that one in five right-sided hemicolectomy patients had loose stool, increased bowel frequency, and/or nocturnal defecation (57) (3a).

The literature on monitoring and need for investigation and treatment of bowel dysfunction after a right-sided hemicolectomy is scarce. In a multicenter cohort study, 953 patients with previous CC were invited to complete PROMs. The study recorded a response rate of 80.5%. Among these, 9.9% responded with a request for further investigation and treatment even though more patients reported bowel dysfunction in their PROMs. The referred patients' primary symptoms were urgency (65%) and fragmented stools (70%). Among the patients referred for treatment, 56.8% were women with a right-sided hemicolectomy. Among these, 54% had loose stools and 62% were fecally incontinent (58) (2b).

Etiology of symptoms

Only few studies have investigated the etiology of chronic diarrhea following a right-sided colectomy for CC. A recent study investigating 45 symptomatic and 19 asymptomatic right-sided hemicolectomy patients found that 82% of cases had bile acid malabsorption (BAM) (defined as a sehelium-75 homocholic acid taurine (se-hcat) scan < 15%) versus 39% of controls, whereas approximately 70% of both cases and controls had small intestinal bacterial overgrowth (SIBO) (positive breath test for hydrogen or methane) (Larsen et al. – under submission) (2b). The authors found no association between BAM and SIBO, or between diarrhea and SIBO. However, treatment with antibiotics produced sufficient symptom relief in 16% of patients with both SIBO and BAM. In the patients treated for BAM with a bile acid binder and/or a fat-reduced diet, defecation frequency, Bristol Stool type, urgency, and fecal incontinence were all significantly improved.

In a previous study, all of 14 patients with chronic diarrhea and previous cecal cancer were diagnosed with BAM (se-hcat < 15%) (59) (4). In addition, a recent review concluded that a positive association exists between the resected length of terminal ileum, loss of bile acid, and diarrhea (60) (3a).

Bowel dysfunction after left-sided hemicolectomy/sigmoid resection

A large cross-sectional study including 3,061 patients with a previous sigmoid resection due to cancer reported that 17.9% of patients presented with obstructed defecation symptoms (ODS) compared to 7.3% of polypectomy controls (55) (2b). The most prevalent symptoms were nocturnal defecation (32.1%), use of aid during defecation (24.2%), fragmentation of stools at least weekly (21.5%), daily bloating (20.4%), and sense of outlet obstruction at least weekly (14.9%). The adjusted OR for ODS after a sigmoid resection was 2.57. Predictive factors were female gender and smoking. ODS was associated with a substantially impaired QoL. Applying the LARS score, significantly more patients than control had major LARS. Predictive factors for LARS in the colon group were female gender and a previous stoma. Major LARS was associated with impaired QoL (55) (2b). In a retrospective cross-sectional study from the Netherlands, 51.2% of patients with a rectal resection reported major LARS compared with 20.4% of patients with a sigmoid resection and 14.3% of patients with a left-sided hemicolectomy (61) (2b).

Monitoring and evaluation

Attention to late gastrointestinal TRS after CC is relatively new. Therefore, no PROMs for screening, monitoring, or grading of bowel dysfunction after a right- or left-sided hemicolectomy exist. Previous studies have used the EORTC QLQ-38 (29), the Wexner Fecal Incontinence Score, the LARS score, or the McDonald & Heald Continence Grade to evaluate and compare the significance of bowel dysfunction between types of colectomy (53) (2b). Although a review and meta-analysis found no significant difference between scores after a right- or left-sided hemicolectomy (53) (2b), it seems that the overall symptom pictures and etiology of symptoms differ according to the resection performed (54, 55, 62, 63) (2b).

Treatment options

Physicians should ensure that no underlying 'organic' lesion may explain a patient's symptoms after surgery (e.g. mucosal lesion, anastomotic stricture, local recurrence) (5).

Bile acid malabsorption is generally treated with a bile acid binder. However, Gupta et al. have proposed a multidisciplinary approach with bile acid sequestrants and/or a fat-reduced diet advised by a dietician depending on the se-hcat scan results when treating BAM in cancer survivors: se-hcat: 15-20%; solely a fat-reduced diet; 10-14.9%; a fat-reduced diet with or without a bile acid binder, 5-10%; a bile acid binder with or without a fat-reduced diet, and <5%; a fat-reduced diet and treatment with a bile acid binder. In the study, 70% of patients reported significant symptom relief (64) (4). In support, Jackson et al. applied the algorithm in patients previously treated for cancer and diagnosed with BAM and showed a significant reduction in abdominal pain and nocturnal defecation (65) (4).

Side effects to bile acid binders are often dosage dependent and the bile acid binder is prone to interact with other medications. Thus, a low initial dosage at nighttime is preferable with gradual titration for optimal effect

(66) (5). Colestyramine should be first choice. If no effect is achieved, Coleveselam may be attempted as up to 70% of patients will respond positively despite no effect of Colestyramine (66) (5).

Small intestinal bacterial overgrowth is generally treated with antibiotics. Rifaximine is the antibiotic with the best established and dose-related effect (67) (1b). Based on that trial, we recommend using rifaximine, 600 mg x 2 for 6 days (5). Due to the price of rifaximine, ciprofloxacin 500 mg x 2 for 7 days, metronidazole 500 mg x 3 for 7 days, or amoxicillin/clavulanic acid 500/125 mg x 3 for 7 days are often used despite lacking evidence.

Anti-diarrheal medications comprise fiber supplements, loperamide, and opioid tincture. Evidence is based on studies on chronic idiopathic diarrhea and diarrhea-predominant irritable bowel syndrome and is not specific to cancer survivors (65) (5).

Laxatives for chronic constipation comprise osmotic and peristaltic laxatives and second-line treatment with prucalopride (Resolor®) or linaclotide (Constella®). Evidence is based on studies on chronic idiopathic constipation and is not specific to cancer survivors (69) (5).

Non-pharmacological treatments may include transanal irrigation for chronic constipation/obstructive defecation syndrome with major symptoms of LARS (70) (5) and, in case of intractable bowel dysfunction, evaluation of indications for a colostomy.

Dietetic intervention. One third of CC patients report that their diet affects their bowel function negatively (Borre et al. - under submission) (2b). The food items most commonly reported to negatively impact bowel function are fat, spices, sweets, and meats. Whereas vegetables, fruit, and dairies are the items most frequently reported to have a positive impact on bowel function. Interestingly, more than 90% of clinicians state that they give dietary advice to CC patients, whereas only 24% of patients believe that they have received such advice. An unmet need exists for intervention studies focusing on dietary treatment principles to establish the role of dietetic interventions in CC patients.

Bowel dysfunction after rectal cancer

Recommendations

11. **Rectal cancer survivors should be offered routine screening for bowel dysfunction as major LARS is found in > 40%. High-risk factors are radiotherapy, low tumor height and a history of preventive ileostomy (Grade B).**
12. **Screening for bowel dysfunction should be performed using the validated LARS score (Grade B).**
13. **All survivors with major LARS should be offered treatment, either locally or following referral to a specialized unit (Grade D).**

Management strategies

- **Ruling out underlying ‘organic’ lesions that may explain a patient’s symptoms after surgery is a prerequisite for treatment (Grade D).**
- **Objective tests are unnecessary to diagnose LARS (Grade C).**
- **Soluble fibers (bulking agents) may be beneficial in decreasing clustering and improving stool consistency, provided adequate doses are taken (Grade D).**
- **Pelvic floor rehabilitation, including pelvic floor muscle training, biofeedback training, and rectal balloon training may improve functional outcome (Grade B).**
- **Patients with a more severe dysfunction may benefit from transanal irrigation (Grade B).**
- **Patients with severe refractory symptoms may benefit from sacral nerve stimulation (Grade B).**
- **Percutaneous tibial nerve stimulation may reduce symptoms of LARS in highly selected patients (Grade B).**
- **Stoma formation should be reserved for patients with refractory LARS as a final treatment option (Grade D).**

Due to surgical advances made in recent decades, an increasing number of RC patients will undergo sphincter-preserving surgery (SPS) with a low colorectal or coloanal anastomosis to avoid permanent colostomy. Unfortunately, 30-80% of RC patients develop a change in bowel habit including fecal incontinence, urgency, and frequent bowel movements (42, 71, 72) (2a). In a systematic review, the most frequently reported symptoms were incontinence (97%), stool frequency (80%), urgency (67%), evacuatory dysfunction (47%), and gas-stool indiscrimination (34%) (73) (2b). LARS has been used to encompass a wide array of symptoms after sphincter-preserving rectal surgery, including difficulty emptying the bowel, fecal urgency, -clustering and -incontinence. The syndrome is poorly defined (73), but may, however, be stratified by symptom severity into no, minor, or major LARS (74) (3b). A meta-analysis of 11 studies found that the estimated prevalence of major LARS was 41% (95% confidence interval (CI): 34-48) 1 year after SPS for RC (75) (2a). The symptoms usually appear immediately after surgery, develop during the first few months, and improve somewhat thereafter, reaching a steady state 1-2 years after surgery, after which further improvement with time is unlikely. The associated impairment has a severe impact on patients’ QoL after surgery (34,76-78) (2b), but also specifically impacts subscales of HR-QoL such as physical-, role-, emotional-, and social functioning; fatigue; and diarrhea (78) (4). The impact and prevalence of LARS are grossly underestimated by most physicians (79, 80) (4).

Radiotherapy (RT), tumor height (anastomotic height), and a preventive ileostomy history are the most frequently assessed variables showing a consistently negative effect on bowel function (71, 75, 81-85) (2a). Although RT has produced a reduction of the risk of local recurrences, the benefit of RT itself must be balanced against potential toxic damage to the surrounding tissue. A systematic review of late toxicity in RC survivors after RT found that up to 19% of all RC survivors suffer from significant late GI toxicity symptoms that clearly reduce QoL after RT treatment (most commonly diarrhea, rectal pain, bleeding, and incontinence) (81) (2a). Late toxicity tends to occur in tissues with a low cell turnover; such as subcutaneous tissue, fatty tissue, and muscle; and within tissues that contain rapidly proliferating cells, such as the wall of the intestine. This means that other unintentionally targeted organs (bladder, genitalia, small intestine) may suffer as well (75, 82-86) (2a).

The pre-operative LARS score (PO-LARS) was developed as a model to predict postoperative bowel function (LARS score) pre-operatively; it incorporates key predictive factors for LARS into a nomogram and online tool in order to individualize patient counseling and aid preoperative consent (87) (2b). The key predictive factors identified in this study were female gender, young age, total mesorectal excision, low tumor height, preventive ileostomy, and neoadjuvant radiotherapy. When guiding patients pre-operatively, PO-LARS may serve as a tool to help patients understand their risk of bowel dysfunction and to identify patients who may require additional postoperative support. Further, major LARS is relatively common in the general population, especially among 50-79-year-olds, which should be taken into account when guiding patients pre-operatively (83, 88) (2b).

Monitoring and evaluation

Two scores, the LARS score and the Memorial Sloan Kettering Cancer Center Bowel Function Instrument (MSK-BFI), were developed specifically to evaluate LARS and may be used to stratify patients based on the severity of their symptoms and to guide therapy (74, 80, 89) (3b). Although the development of both questionnaires was guided by the same purpose, they differ significantly in their clinical applicability and scope. Whereas the LARS score is a quick and clinically easy-to-use tool, the MSK-BFI is a more comprehensive instrument that may provide a more in-depth evaluation of LARS (80, 90) (2b). A recent comparative study of the two found that the MSK-BFI and LARS score showed good correlation and had a similar discriminant validity. They further concluded that, as the LARS score is easier to complete, it may be considered the preferred tool to screen for bowel dysfunction (90) (2b). However, the LARS score may be less useful as an outcome parameter for monitoring treatment effects as its capability for detecting changes over time has been questioned (91) (5).

The LARS score is based on the answers to five questions: incontinence for flatus, incontinence for liquid stool, fecal frequency (number of bowel movements per day), clustering of (less than an hour between) bowel movements, and urgency. The LARS score does not use a specific recall period, a linear scale, or equal-weighting scoring. The response score values are based on the impact of the particular symptom/frequency combination on QoL. The total score is based on the answers to these five questions and ranges from 0 to 42 points. Depending on the total score, patients are classified into three groups: no LARS (0-20), minor LARS (21-29), and major LARS (30-42) (74) (3b). The score has been translated into multiple languages and validated internationally (92) (3b).

The MSK-BFI consists of 18 questions recalling a 4-week timeframe. Fourteen questions are grouped into three subscales, each one of which evaluates an important dimension of bowel function (diet, urgency/soilage and frequency), with four individual questions. The MSK-BFI total score is obtained using a linear scale and an equal-weighting scoring system in which each question has five possible answers ranging from “never” to “always,” except for one question on the number of bowel movements per 24 h period. The MSK-BFI total score ranges from 18 to 90 with a score of 90 indicating the best possible bowel function measured with this questionnaire (89) (3b).

Clinical evaluation

Physicians should ensure that no underlying ‘organic’ lesion may explain a patient’s symptoms after surgery (e.g. radiation-related mucosal lesion, anastomotic stricture, local recurrence). This requires a minimal work-up, with at least digital rectal examination and proctoscopy to exclude anastomotic strictures or recurrence (91) (5).

Objective test methods, such as anorectal manometry and fecoflowmetry, may also be used. The physician may evaluate postoperative anorectal function based on these tests and suggest appropriate treatment. These tests are not needed to diagnose LARS, but they may be used to monitor the patient’s response to treatment (72) (4). Endoanal ultrasonography is not mandatory since it rarely influences the treatment strategy. Evidence of anal sphincter defects will very rarely justify a specific treatment (91) (5). The patient’s own rating should be the gold standard, as only the patient can experience the function and perceive its true implications in the context of his or her life (80, 91) (5).

Treatment options

Dietary management

Dietary and behavioral adjustments are common functional self-care strategies for managing bowel dysfunction (93, 94) (4). In a cross-sectional study exploring self-management and bowel symptoms, patients endorsed fruits and vegetables (cabbage or mustard family greens) as helpful for bowel symptoms (58% and 42.5%, respectively), whereas other vegetables (cabbage, beans, celery, corn, lettuce, onions, and spinach) were categorized as troublesome foods by 75.5%. Several foods and food groups were reported as both helpful and troublesome (93) (4).

Very little data exist on dietary management in RC patients. A systematic review of healthy eating interventions in CRC survivors found that the quality of identified studies was variable, with limited evidence to support dietary intervention in CRC survivors due to a lack of robust studies combining all dietary interventions linked to CRC. As a result of the heterogeneity of the studies identified, it was difficult to draw strong conclusions (95) (2a).

Laxatives, constipating agents, and medications

Soluble fibers (bulking agents) are well tolerated and may be beneficial in decreasing clustering and improving stool consistency provided adequate doses are taken (91) (5). When fecal incontinence is the dominant

symptom of LARS, bulking agents with a high fiber diet and antidiarrheal drugs are preferred choices because they can increase anal sphincter tone, leading to improved fecal continence (72) (4).

An RCT investigated the effect of 12 weeks of probiotics administration in CRC survivors. Upon inclusion, patients were screened for irritable bowel syndrome (IBS) according to the ROME III criteria. At baseline, around two thirds of patients in both groups exhibited IBS symptoms, but in the probiotic group, the proportion was significantly reduced over the course of the 12 weeks, whereas QoL increased (mental health status and cancer-related fatigue) (96) (1b). Results from long-term follow up are lacking.

Loperamide is one of the most commonly used medications for bowel control, together with sitz bath or local ointments for perianal soreness or itching. Protection of underwear with pads or other absorbents is usually reported. Enemas or lubricating suppositories are also used to optimize incomplete emptying or to plan defecation (91) (5).

Similar to LARS, urgency and multiple evacuations are frequently seen in patients with diarrhea-predominant IBS, which is often successfully treated with serotonin receptor antagonists because of their ability to slow gut transit (71) (3a). In a prospective cohort of 25 male patients with complaints of uncontrollable urgency or fecal incontinence following sphincter-preserving resections, Itagaki et al. investigated the efficacy of a daily dose of 5 µg of ramosetron on LARS symptoms and found that it may be efficient in improving both urgency, incontinence, and bowel frequency (97) (4). Currently, however, ramosetron is not available in Denmark.

Emphasizing the importance of conservative management, Dalsgaard et al. screened 286 patients with the LARS score of whom 89 had major LARS. Among these, 86 patients requested treatment for their bowel dysfunction and the majority (63%) obtained acceptable function after nurse-led optimized conservative treatment only (17 patients went on to transanal irrigation, seven patients were treated with biofeedback, five patients were referred for surgery, and three for gastroenterological evaluation). After treatment in the clinic, the prevalence of major LARS declined from 95% to 53% ($P < 0.001$) (98) (4).

Pelvic floor rehabilitation

Pelvic floor rehabilitation, including pelvic floor muscle training, biofeedback training, and rectal balloon training, has been accepted as a standard technique for the treatment of fecal incontinence. A 2014 systematic review found that four of five included studies showed that incontinence scores assessed by the Wexner or the modified Cleveland incontinence scores were significantly improved after pelvic floor rehabilitation in RC patients following sphincter-sparing surgery (99) (3a). Supporting this, a recent systematic review including 11 studies of mixed designs found that fecal incontinence was improved in seven studies, and bowel frequency decreased in five studies (100) (3a). Specifically, the stool frequency seems to be reduced by biofeedback and pelvic floor muscle training in combination (101) (3a). Overall, the use of pelvic floor rehabilitation seems useful for improving the functional outcome, but the different protocols and durations of training hamper the drawing of solid conclusions (71, 101) (3a).

Transanal irrigation

Increasing evidence suggests that transanal irrigation (TAI) is an effective therapy for selected LARS patients. In a 2010 systematic review by Christensen et al., TAI showed a positive effect in 79-100% of patients with

LARS following surgery for RC (70) (3a). In a study by Martellucci et al., authors enrolled patients with a rectal resection and postoperative major LARS (LARS score >30). After 6 months of TAI, the median LARS Score declined from 35.1 (range 30-42) to 12.2 (range 0-21) ($p < 0.0001$); and at the end of the study, 85% of the patients chose to continue the treatment. Interestingly, benefits of TAI were observed irrespective of early commencement after the closure of diverting ileostomy or after many years of LARS symptoms (102) (2b). In a study by Rosen et al., patients were randomly assigned to TAI and supporting therapy or supportive therapy only after rectal resection and stoma closure regardless of the LARS score or other functional evaluation values. After 12 months of follow-up, >50% of patients continued with TAI, showing a significantly lower number of defecation episodes per day and per night than the supportive therapy group. However, although the LARS scores were lower in patients who used TAI, the decline failed to reach significance ($p = 0.063$); and evaluation of the Wexner score and the 36-item Short Form Health Survey failed to find any statistically significant difference between TAI and supportive therapy (103) (1b). These results may suggest that patients with a more severe dysfunction may benefit more from the use of TAI, whereas the use of TAI may not be necessary in patients with a less severe dysfunction (104) (5). Patient selection will need to focus on symptom severity, but also on the patient's mobility and physical ability to perform TAI on a regular basis. The irrigation process itself needs some training and mental capacity. For this reason, it is absolutely mandatory to provide patients with support by experienced staff capable of providing ongoing assistance until the patient is able to perform TAI autonomously (91) (5).

Sacral nerve stimulation/percutaneous tibial nerve stimulation

A 2019 systematic review (including ten studies) and meta-analysis of the use of sacral nerve stimulation (SNS) in refractory LARS found an overall median improvement in the scoring system used of 67.0% (range 35.5-88.2%) after SNS implantation (105) (3a). The improvement in LARS was considerable with a mean reduction of the Cleveland Clinic Incontinence Score and the LARS score by 11.2 points (95% CI 9.4-13.1) and 17.9 points (95% CI 10.2-25.6), respectively (105) (3a). A small case-series evaluating possible predictive factors associated with treatment success found that a direct relationship exists between the height of anastomosis and the LARS score, and the largest LARS score changes (pre-/post-SNS therapy) were found in patients with higher anastomoses, and vice versa (106) (4).

Given the potential risk of infection associated with implantation of a neurostimulator, the less invasive alternative percutaneous tibial nerve stimulation (PTNS) has been proposed (107-109) (1b). Marinello et al. conducted an RCT including 46 patients with severe LARS assigning patients to either PTNS or sham therapy (16 30-minute sessions once a week for 12 consecutive weeks, followed by four additional sessions at 2-week intervals the following 8 weeks). LARS scores were reduced in both groups, but only patients who received PTNS maintained the effect in the long term. The fecal incontinence score was also significantly improved after 12 months in the PTNS group. However, no major changes in either QoL or sexual function were observed in either group (107) (1b).

Stoma

Stoma formation may be proposed to patients with severe LARS with refractory symptoms and impaired HR-QoL as a final treatment option (91) (5).

Ostomies

Recommendations

14. **Survivors with a permanent stoma may be offered routine screening for stoma impact on health-related QoL (Grade C).**

Management strategies

- **Stoma patients should have a life-long open contact to a specialized ostomy nurse (Grade D)**
- **Stomal irrigation may possibly help patients gain control over bodily functions such as output, gas, and odor (Grade C).**
- **It is recommended, at peristomal dermatitis is treated by a specialized ostomy nurse (Grade D).**
- **Foul-smelling flatulence may be treated by enhancement of filters or dietary counseling) (Grade D) or by adding lavender oil to the ostomy bag (Grade C).**
- **Parastomal hernias/bulging may be managed by using an ostomy hernia belt (Grade D).**
- **It is recommended that patients with persisting symptoms from parastomal hernias/bulging are referred to a specialized surgical center for evaluation (Grade D).**
- **Simple prolapse may be managed conservatively by a specialized ostomy nurse (Grade D).**

Stomal stenosis may be conservatively treated with dietary measures (Grade D). In colostomy patients with stenosis, irrigations may be useful (Grade D). If the problem is not resolved, the patient may be referred to a specialized surgical unit for evaluation (Grade D).

Surgery for CRC results in a permanent ostomy in 10-19% of the cases (110, 111) (2a). Several studies have shown that the overall complication rate after ostomy surgery falls in the 21-70% range, including late complications such as peristomal dermatitis, parastomal hernia, prolapse, and stenosis (110) (2a).

Among CRC survivors with a permanent ostomy, 18-32% report moderate-to-severe QoL concerns; however, with less difficulty adjusting to their ostomies than non-cancer ostomates (112, 113) (2a). A systematic review of ostomy-related problems described leakage, skin complications, sexual problems (having a stoma is a predictor of sexual dysfunction (114) (2a), depressive feelings, gas, constipation, dissatisfaction with appearance, change in clothing, travel difficulties, interference with work and activities, feeling tired, and worrying about stomal noises (110) (2a). Survivors spoke of unpredictability when describing the loss of control over the body that resulted from the ostomy. Ostomy function varied daily, causing embarrassment and loss of

confidence as leakage, incontinence or flatulence from the ostomy were anticipated (8) (2b). A longitudinal, population-based study found that challenges related to ostomies decrease somewhat over time (115) (3b). In general, however, survivors continue to face challenges related to bowel function, clothing restrictions, and dietary adjustments (116) (3b).

Despite the described challenges, a revised 2012 Cochrane review of 35 studies (5,127 patients) found insufficient evidence to allow a firm conclusion to the question of whether the QoL is lower in CRC survivors with or without a stoma (117) (2a). This has subsequently been challenged by larger cross-sectional studies finding that RC survivors with an ostomy reported a significant, clinically relevant poorer physical, role, and social functioning, and global health status/QoL, poorer body image, more male sexual problems, and fewer gastrointestinal problems than RC survivors without ostomies (118-120) (2b). A recent systematic review found more conflicting results with some studies finding that younger patients had inferior HR-QoL compared with older patients, whereas others found no differences. Furthermore, several studies found that both generic and stoma-specific HR-QoL were lower in females than in males (121) (3a).

Attention should be paid to discrepancies in the perception of stoma-related problems and how they impact QoL between healthcare professionals and ostomates (122) (4).

Monitoring and evaluation

The two PROMs most commonly used to evaluate stoma function and QoL are the Modified City of Hope Colorectal Cancer Quality of Life Questionnaire Ostomy (MCOHQOLQO)(123)(3b) and the Stoma QoL Questionnaire (124)(3b). In these questionnaires, QoL is calculated as the sum of the scores on several ostomy related items. The MCOHQOLQO has four dimensions (physical well-being, psychological well-being, social well-being, and spiritual well-being). The Stoma QoL questionnaire includes 20 items covering four domains – sleep, sexual activity, relations to family and close friends, and social relations to others than family and close friends (124) (3b).

More recently, the Colostomy Impact Score (CIS) was developed to quantify the negative impact on QoL for patients living with an end colostomy. The CIS is weighted to evaluate aspects of colostomy-related problems that have a negative impact on QoL from the patients' point of view. The colostomy impact score includes seven items (odor, leakage, stool consistency, pain at the stoma site, skin problems, herniation, and stoma management help) with a total range from 0 to 38 points. A score of ≥ 10 indicates major colostomy impact (125) (3b). The score has undergone international validation and has been proved reliable, with equal colostomy impact scores between test and retest and an intraclass correlation coefficient in the moderate-to-excellent range (126) (3b).

Challenges in ostomy self-care

A 2018 survey found that nearly two thirds (63%) of respondents reported at least one ostomy self-care challenge. Respondents reported having problems with leakage from the ostomy (28%), skin problems around the ostomy site (26%), and difficulty with ostomy care (22%). More than a quarter reported needing to change their pouching system frequently, whereas 14% needed more than 30 min for ostomy care daily. Younger age and higher BMI were consistently related to ostomy self-care challenges (127) (4).

These same issues were identified in a pooled qualitative analysis by Sun et al. identifying eight prominent themes of stoma self-care issues: bleeding, pain, leakage, skin problems/irritation/rash, wafer-related issues, materials getting under the wafer, time to care for ostomy, and solutions to clean the stoma (116) (4).

A close collaboration with specialized ostomy nurses is important as re-adjustment to change is often necessary (127) (4) and a life-long open contact to a specialized ostomy nurse should be established for all CRC survivors with a permanent ostomy (5).

Colostomy irrigation: Studies report that 16-30% irrigate their stoma (113, 128, 129) (2b). Positive aspects included controlling output, gas, odor, and being able to function with only a bandaid® over the stoma (116, 128) (4). Negative aspects all related to the time involved in completing the irrigation procedure. Colostomy irrigation involves instillation of 500-1,500 ml of tap water into the colon via the stoma to wash out fecal material. This is generally done daily or every 2-3 days, and results in little or no stool evacuation from the stoma until the next irrigation. The procedure takes up to an hour and includes a short (about 6-10 minutes) instillation period followed by an evacuation lasting up to an hour (128) (4).

For further advice on general ostomy care, please refer to the ASCN Stoma Care National Guidelines, which can be found at www.ascnuk.com.

Late complications to ostomy formation

Peristomal dermatitis

Peristomal dermatitis is more common with ileostomy than colostomy and is caused by contact with chemical irritants, mainly effluent from the stoma (130) (2b). Major episodes of peristomal dermatitis are largely a problem for ileostomy patients and is reported in 5-25% of patients, but the cumulative long-term risk of developing the condition is an estimated 34% (131) (3a). Severity varies from mild dermatitis to cutaneous necrosis and ulcers. Correct treatment is essential to prevent the vicious circle of peristomal dermatitis and stoma malfunction. Treatment consists of careful cleaning of the skin with water, drying, and the application of stoma pastes, powders and protective creams. The diameter of the opening must be adapted to the stoma size. Appliances attached to the skin for 48–72 h must be used to prevent frequent changing. To reduce ileostomy output, dietary recommendations must be established and both fiber and antidiarrheal medication must be used. Topical corticosteroids and barrier creams may also be used (132) (5). Performing biopsies may be needed to rule out other etiologies, such as inflammatory bowel disease or malignancy (132) (5). Around 40% of patients with colostomy report skin problems, the most frequent being reddening (113, 129) (2b), typically caused by inappropriate appliance and aperture, and mechanical issues such as skin stripping.

Parastomal hernia/bulge

Parastomal hernia is one of the most common complications of a colostomy with a reported incidence for end colostomy and loop colostomy ranging from 4% to 48% and 0% to 30.8%, respectively (131) (3a). Risk factors associated with the development of parastomal hernia are higher body BMI and increasing age (130) (1a). A 2016 cross-sectional study found that, of the 495 operated RC patients with permanent colostomy included in the study, 56 patients developed symptomatic parastomal hernia. Patients with symptoms from their colostomy

experienced distress, which highlights the need to reduce all symptoms from the colostomy. Foul-smelling flatulence was the most common symptom (patients with symptomatic parastomal hernia had a 53% higher risk of flatulence), troublesome when loud and/or smelly, along with constipation, diarrhea, and leakage. Authors suggest that enhancements of the filters in the appliances may be a way to alleviate problems related to flatulence. A more personalized dietary counseling might be another way (129) (2b). A qualitative study found that the bulge may threaten patients' ability to manage stoma care and pointed to the importance of easy and swift access to counseling with a stoma care nurse to regain control. To cover the bodily asymmetry and disfigurement, patients found new clothing solutions or used hernia belts or garments (134) (4c). A small RCT exploring the use of essential lavender oil in the colostomy bag found a decrease in the proportion of CRC patients who complained of odor as a problem after 1 month of treatment. No information about the patients' diet was provided in the study (135) (2b). Another study comparing CRC survivors with and without stoma found that among 336 ostomates, 31.5% had a bulge or a hernia around the stoma, and operation due to parastomal hernia had been performed in 11.7% in the stoma group. Ostomates with a bulge/hernia had significantly more sexual problems and significantly more pain, and the bulge or hernia around the stoma had an additional negative impact on HR-QoL. Stoma-related complaints led to acute medical care for nearly 21% of the stoma patients (136) (2b).

Hernias with mild symptoms may be managed conservatively with an ostomy hernia belt (132) (5). One third of patients will require surgery for complications. Several options are available: local repair, relocation of the stoma, and correction with meshes with or without a laparoscopic approach (132) (5).

Prolapse

Prolapse occurs when a proximal segment of the bowel intussuscepts and slides to protrude through the stomal orifice. The prolapsed stoma may cause distress for the patient, but it is usually of no clinical/functional significance. Rarely, prolapse may cause ischemia or strangulation resulting from excessive edema of the prolapsed loop. Simple prolapse may be managed by conservative treatment. This should include reassurance for the patient and the fitting of a new stoma appliance (131) (3a). In case of signs of ischemia or gangrene, surgery is the only treatment option. Surgery may include reversal, if indicated, or refashioning of the new stoma after excising the redundant prolapsed bowel (131) (3a).

Stenosis

Stomal stenosis is reported in 2-15% of stomas (131) (3a). Stomal stenosis often results in a noisy stoma when flatus is passed, which may be distressing and embarrassing for the patient. Dietary measures may be used for treatment, ensuring that fiber is processed. In colostomy patients, laxatives to maintain soft stool and irrigations may be useful. If the problem is not resolved, the stoma may be reconstructed through laparotomy or laparoscopy. Occasionally, it may be repaired locally by a plastia (132) (5).

Diversion colitis

The surgical interruption of fecal flow may induce inflammation in the non-functional region of the distal colon, referred to as diversion colitis (DC). Theoretically, the inflammation typically resolves when the fecal passage resumes. However, a few studies have shown a persisting effect with mucosal and transmural changes in the colon long after reversal of fecal passage (137) (5). The estimated incidence of DC ranges from 70% to 100%

(85) (2b). DC symptoms include abdominal pain, bleeding, mucous discharge, and tenesmus, though many patients do not present with definitive symptoms. The severity of DC is related to diarrhea after an ileostomy reversal and may adversely affect QoL (85) (2b). An RCT has investigated the use of probiotics in improving bowel function following ileostomy closure but found no difference between active treatment and placebo (138) (1b).

Urinary dysfunction

Recommendations

15. **Survivors should be screened routinely for urinary dysfunction as symptoms are present in 10-98% of patients and may affect QoL (Grade B).**
16. **Patients with persisting symptoms (> 3-6 months following initial basic treatment) should be offered referral for treatment in specialized units (Grade D).**

Management strategies

- **Using a three-day voiding diary with registration of fluid intake, voiding episodes, and voided volume in patient with urinary dysfunction is recommended (Grade D).**
- **The standard of care for urinary dysfunction is conservative management including lifestyle interventions such as moderating fluid intake, avoiding known bladder irritants such as caffeine and alcohol, and smoking cessation (Grade D).**
- **In postmenopausal women with overactive bladder symptoms and vaginal atrophy, treatment with vaginal estrogens is recommended (Grade D).**
- **Pelvic floor muscle training with or without biofeedback may alleviate symptoms in stress incontinence (Grade A).**
- **Sequencing of oral medication should be tailored depending on the most bothersome symptom identified at assessment and includes alpha-blockers and antimuscarinics or mirabegron (Grade D).**

A well-known sequela to treatment for CRC cancer is urinary dysfunction, defined as voiding dysfunction and/or incontinence. The symptoms may be transient and mild, but for others dysfunction is permanent. Post-treatment urinary dysfunction is primarily described in relation to RC survivors, where it is found in 10-98%, subject to great variability. This variability is due mainly to differences in how urinary dysfunction is defined and graded, and to differences in patient selection and methods of assessment (42, 44, 77, 119, 139-144) (2a).

A large cross-sectional study on female CRC survivors (5,211 patients; colon, $n = 3,533$, rectum $n = 1,678$) found that urinary dysfunction had a significant impact on QoL in 18.7% of RC survivors and 14.3% of CC survivors ($p < 0.0001$) (145) (2b). Similarly, a large cross-sectional study on male CRC survivors ($n = 5,710$; colon, $n = 3,400$, rectum $n = 2,310$) found that urinary dysfunction had a significant impact on QoL in 15.8% of RC survivors and 13.6% of CC survivors ($p = 0.017$) (146) (2b). Rectal resection seems to be an independent risk factor for developing urinary dysfunction with abdominoperineal excision and/or radiotherapy increasing the risk even further (139, 141, 145-147) (2b). However, one study reported the urinary symptoms induced by radiotherapy to affect males only and to be transient (142) (2b). Other risk factors include low tumor height (< 5 cm from the anal verge), lymph node involvement, pre-operative urinary dysfunction, and advanced age (142, 145, 146, 148) (2b).

Monitoring and evaluation

Evaluating patients with post-operative urinary complaints requires consideration of symptoms, severity of complaints, and any pre-existing urinary dysfunction. Preoperative urinary dysfunction, often due to prostate disease or pelvic floor disorders, is common among patients undergoing treatment for CRC.

The most commonly used PROMs with which to diagnose and monitor urinary dysfunction are listed below. It should be noted that none of these PROMs are validated specifically for assessment of CRC survivors.

The International Prostate Symptom Score (IPSS) was developed for assessment of benign prostatic hyperplasia. It is a validated questionnaire containing seven items, including incomplete bladder emptying, frequency, intermittency, urgency, weak stream, straining, and nocturia (149) (3b).

The International Consultation on Incontinence Modular Questionnaire - Male Lower Urinary Tract Symptoms (ICIQ-MLUTS) is validated and covers relevant symptoms regarding both regular urinary tract symptoms and the most prominent symptoms following pelvic surgery (150) (3b). By adding up the prevalence scores of the individual items, a voiding symptoms subscale (0-20) and an incontinence symptoms subscale (0-24) can be calculated. There is, however, no defined cut-off point for good versus poor function, nor a definition of a clinically relevant difference. The same score is available for female patients (the female version is the International Consultation on Incontinence Modular Questionnaire - Female Lower Urinary Tract Symptoms (ICIQ-FLUTS) (151) (3b).

Assessment

General assessment of post-treatment urinary dysfunction includes self-reported incontinence, PROMs, and a 3-day voiding diary with registration of fluid intake, voiding episodes, voided volume, and a pad test. Moreover, dipstick urinalysis is employed for leucocytes and nitrites to rule out infection and hematuria. Additional uroflow rate and bladder ultrasound for identifying residual urine may be useful (152) (5). In men, it is important to keep in mind that the prevalence of LUTS increases with age, and new LUTS may be indicative of prostate hyperplasia or cancer, and physical examination should include a prostate exam (152) (5). In women, gynecological examination is recommended to evaluate pelvic organ prolapse and/or vaginal atrophy (152) (5).

Treatment

Evidence-based management of urological dysfunction in CRC survivors is lacking. Although several treatments to treat urological symptoms are available, the evidence is insufficient to support their effectiveness in CRC survivors. Recommendations are thus based on indirect evidence (grade D).

Urinary incontinence may be divided into stress, urge, and overflow incontinence. Regardless of subtype, initial treatment should consist of behavioral modification, which includes moderating fluid intake, avoiding known bladder irritants such as caffeine and alcohol, and smoking cessation. Use of pads and collecting devices (body-worn urinals) is possible, but should be temporary, until proper management concerning the urinary incontinence has been initiated. Use could also be permanent if the patient is satisfied with the device or is not a candidate for further treatment due to comorbidity (152, 153)(5). A small prospective series in 45 RC survivors (29 males) showed great reversibility in urinary incontinence (stress incontinence) after early initiation of pelvic floor muscle exercise (PFE) (144) (2b). Moreover, concomitant biofeedback could synergistically reinforce the pelvic floor muscle exercise (154) (1b). Another first-line treatment option is bladder training wherein scheduled voiding is used to eliminate pollakiuria and/or urinary incontinence (155) (5).

Pharmacologic options are available as second-line therapy. Oral medication is centered on the use of alpha-blockers and antimuscarinics/mirabegron (beta-3 agonist). Sequencing of medication should be tailored according to the most bothersome symptom identified upon assessment. Alpha-blockers may be used in case of compromised bladder emptying. Antimuscarinics/mirabegron may be used to treat urgency and incontinence (overactive bladder) as they relax smooth muscles (139, 156) (2a). The European Association of Urology guidelines recommend initiating with antimuscarinics in case of urgency urine incontinence (157) (1b). In postmenopausal women, vaginal estrogen treatment has been shown to improve overactive bladder symptoms and is recommended as initial treatment, particularly if other symptoms of vulvovaginal atrophy are present (158) (1a).

The treatment options for urinary retention and resultant overflow incontinence are limited. No pharmacologic options have been approved that may increase bladder contractility in the setting of urinary retention. Clean intermittent catheterization, done either by the patient or a caretaker, is a common technique used to facilitate regular bladder emptying, thereby avoiding overflow (13) (5). If intermittent catheterization is not possible, the patients may have a urethral or a suprapubic catheter.

Sexual dysfunction

Recommendations

17. **Survivors should be offered routine screening for sexual dysfunction as this affects up to 93% of men and 88% of women (Grade B).**
18. **Sexual function in survivors requires focused assessment beyond broad QoL evaluation (Grade D). Attention should be paid to the fact that radiotherapy, stoma**

formation, and bowel dysfunction are associated with an increased risk of sexual dysfunction.

- 19. Patients with persisting symptoms should be offered referral for treatment in specialized units (Grade D).**

Management strategies

- Sex hormones in survivors with relevant complaints should be measured and replacement therapy considered, if needed (Grade B).**
- Data suggest that the timing of penile rehabilitation is important and that early initiation of penile rehabilitation after injury yields improved outcomes (Grade D).**
- Male patients with erectile dysfunction shall be offered treatment with oral phosphodiesterase type-5 inhibitors (Grade A).**
- In female survivors with sexual dysfunction, psychoeducational interventions have shown promising results (Grade B).**
- It is recommended to offer hormone replacement therapy ± vaginal estrogens to women with treatment-induced menopause and superficial dyspareunia (Grade D).**
- Introital- or vaginal fibrosis and/or deep dyspareunia should be treated with vaginal dilation (Grade B).**

Sexual well-being is a significant health and QoL issue in cancer survivorship. The term “sexual dysfunction” is poorly defined, and the term is inconsistent across comparative literature. It includes both physical and psychological factors. Significant heterogeneity in the prevalence of sexual dysfunction following treatment for CRC is reported in the literature with rates ranging from 5% to 93% (42, 44, 114, 119, 141, 142, 159-161) (2a).

RC survivors report a higher alteration of sexual desire and more difficulty reaching an orgasm than CC survivors (161,162) (2b). Also, having a stoma is a predictor of sexual dysfunction with a strong level of evidence (114) (2b). Studies have found that bowel dysfunction is associated with a lack of sexual desire, sexual inactivity, and sexual dissatisfaction. Specifically, fecal incontinence has a significant impact on sexuality (desire, frequency of intercourse, reaching orgasm, and satisfaction with hugging and kissing (141, 161, 163) (2b). In a case-control study, CRC survivors with ostomy were more anxious than healthy volunteers, and a low frequency of sexual intercourse was significantly more common in this patient group (68% versus 30%), with 54% avoiding intercourse compared with 4% among controls (164) (3b).

Sexual dysfunction in males

Male sexual dysfunction is reported in up to 93% of CRC survivors (160) (4) and is defined as the inability to achieve a satisfactory sexual relationship, which may involve inadequacy of erection (erectile dysfunction

(ED)) or problems with ejaculation (ejaculatory dysfunction (EJD)). However, male sexual dysfunction as a late TRS after CRC may also include penile shortenings, penile curvature, dysorgasmia, and/or other ejaculatory disorders including retrograde ejaculation, loss of or alterations in ejaculation, urine leakage at the time of orgasm (climacturia), azoospermia, and low testosterone levels caused by scrotal radiation (165, 166) (2a).

ED or impotence is defined as the persistent inability to attain and maintain an erection sufficient to permit satisfactory sexual performance and is reported in 11-93% of CRC survivors (160, 162, 163, 167-170) (2b), whereas EJD is reported in 19-68% (162, 163, 168) (2b).

Cross-sectional studies have found that RC survivors have significantly more problems with ED than CC survivors (162, 171) (2b) and that both a stoma and the use of radiotherapy were independent risk factors for developing ED (167, 171) (2b). It is important to remember that the incidence of male sexual dysfunction increases with age and is common in the general population (172) (3a).

In RC patients also treated with radiotherapy, the testes may be exposed to direct and/or scattered radiation. A systematic review of men exposed to long-course RT during RC treatment found an increased risk of developing testicular dysfunction with decreased serum testosterone levels compared with both pretreatment values and with men treated with surgery alone (166) (2a).

Monitoring and evaluation

For most patients, sexual dysfunction is a private matter and therefore they will not speak frankly about this unless asked directly. Hence, it is of outmost importance to screen and monitor function following treatment.

Over the years, several instruments for monitoring of sexual function have been developed. The most frequently used tools will be discussed below.

The EORTC QoL CRC questionnaire module (QLQ-CR38 (29)) consists of 38 (29) items including items on body image and sexuality.

PROMs specifically for male patients

The most used PROM for evaluating sexual function in men is the *International Index of Erectile Function* (IIEF), though it must be noted that the IIEF score was not specifically developed and validated for post-surgery ED (114) (2a). The IIEF is a validated, multidimensional, self-administered questionnaire comprising five domains: erectile function, orgasmic function, intercourse satisfaction, sexual desire, and overall satisfaction. Each domain has a maximum score of 30, 10, 10, 15, and 10 points, respectively, and a minimum score of 1, 0, 2, 0, and 2, respectively (173) (3b).

Treatment options

ED: The most common ED management strategies include psychological evaluation and support, pharmacological therapies, and mechanical treatments (e.g., vacuum erection devices and penile prosthesis implantation). Medical treatments comprise oral administration of phosphodiesterase type-5 inhibitors (PDE-5is) and the direct drug delivery of prostaglandins via topical creams, intra-urethral suppositories, or intracavernosal injections (174) (1a). Oral PDE-5is are currently considered the first-line therapy for ED as a

recent systematic review of RCTs concluded that despite the limited evidence available in the literature, the oral administration of PDE-5is appears to improve IIEF score, especially in the short term, in male patients diagnosed with ED after rectal surgery (174) (1a). The literature lacks long-term studies (follow-up >12 months) on important treatment efficacy parameters such as the response rate, dose adjustment, and patient satisfaction over time.

In the treatment of patients undergoing radical prostatectomy, penile rehabilitation is defined as the use of any device, pharmacologic agent, or intervention to promote male sexual function (including girth, length, curvature and, quality and longevity of tumescence) before and after any insult to the penile erectile physiologic axis. Data suggest that the timing of penile rehabilitation is important, with an early initiation after injury yielding improved outcomes (175) (5).

Vacuum erection devices (VEDs) are progressively being used as part of the treatment regimen in penile rehabilitation following radical prostatectomy. Due to the mechanism of action of VEDs, they may improve erectile function regardless of the underlying pathology (175) (5). However, the use of the device has not formally been investigated in CRC survivors.

Prostaglandin E1 may be administered in two ways; as an intracavernosal injection (ICI) or as an intra-urethral suppository. Current guidelines from the American Urological Association only recommend the use of prostaglandins in select patients who are either not candidates for or have failed therapy with oral PDE-5is.

Sex hormones in radiated RC patients with relevant complaints should be measured as testosterone levels <8 nmol/L may precipitate specific symptoms caused by testosterone deficiency such as impaired physical, psychological, and sexual function after treatment (166) (2a).

Sexual dysfunction in females

Sexual dysfunction has been reported in up to 88% of female CRC survivors (160, 176, 177) (2b). A clinical definition of female sexual dysfunction is the persistent/recurring decrease in sexual desire, the difficulty/inability to achieve an orgasm, and/or pain during sexual intercourse. However, sexual dysfunction in women covers a broad spectrum of symptoms also including impairment of one's typical pattern of intimate sexual response, changes in sexual desire and arousal, pain, lack of femininity, sexual attractiveness, and confidence (176) (3a). It is important to bear in mind that different aspects of sexual dysfunction are common in the general population and were reported in up to 70-80% of 55-74-year-old women (172) (3a). The association between sexual/relationship satisfaction and measures of psychological well-being is consistent and strong (178, 179) (2b).

A recent large cross-sectional study including 2,402 female CRC survivors found that overall, female RC survivors reported more sexual inactivity and problems than female CC survivors, but no differences were observed in any sexual function domains when excluding irradiated patients and patients with a permanent stoma (180) (2b). A systematic review by Canty et al. found that among female CRC survivors not engaging in sexual activities post treatment, the main reason was a physical issue making sexual activity difficult or uncomfortable (176) (3a). Dyspareunia is found among 36-60%, and decreased lubrication/vaginal dryness in 67-72% of female CRC survivors (141, 181, 182) (2a). A permanent stoma is associated with sexual inactivity and overall sexual dysfunction (180) (2b). Canty et al., however, found that having a stoma did not directly

affect sexual desire or function, but that women worried about their partner's response to the stoma, or about leakage during intimacy (176) (3a).

In RC survivors, radiotherapy exposure increases the odds for overall sexual dysfunction and is associated with dyspareunia (180) (2b). Compared with patients who had surgery only, pre-operative radiotherapy had a negative effect on sexual functioning (sexual interest, pleasure, and satisfaction), whereas a similar level of vaginal dryness and dyspareunia was found across treatments (168, 181) (2a). Radiotherapy induces a loss of vaginal epithelium, usually resolving within 3-6 months post treatment but, histologically, the new epithelium is different from normal epithelium (168) (5). The addition of chemotherapy may cause amenorrhea, weight changes, hair loss, and fatigue, hereby impairing the sexual response and reducing motivation to engage in sexual activity (168) (5).

Premature iatrogenic menopause secondary to chemo- and/or radiotherapy may cause infertility, mood disorders (depression, loss of self-esteem, relational difficulties), disorders secondary to the estrogenic loss (hot flashes, insomnia, memory difficulties, vaginal dryness, joint pain, osteopenia/osteoporosis), and disorders secondary to the androgenic loss (loss of sexual interest, orgasmic difficulties, fatigue, loss of assertiveness) (183) (4).

Monitoring and evaluation

Basing sexual well-being outcomes on measures primarily focused on genital function, sexual response cycle, and heteronormative penetrative intercourse may miss important aspects of women's intimate relationships with their partners.

The most used PROM for evaluating female sexual function is the *Female Sexual Function Index* (FSFI) (114) (2a); a 19-item questionnaire assessing key dimensions of female sexual function. It was developed for healthy patients and does not consider cancer-related symptoms such as vaginal dimension or bleeding and is therefore not relevant in this population (184) (3b).

The *Sexual Function Vaginal Changes questionnaire* (SVQ) is a 17-item instrument that addresses the key dimensions of female sexual dysfunction and vaginal problems in patients with gynecological cancer, with specific questions on vaginal dimension and bleeding. Hence, it has been found to be useful in female CRC survivors. However, it does not take into consideration the impact on QoL. It was originally developed and validated in Danish patients (185) (3b).

The *Rectal Cancer Female Sexuality Score* was developed specifically for female RC survivors. The score includes seven items with weighted scoring values based directly on QoL impact. The values are added to yield a total score ranging from 0 to 29 points. A score ≥ 9 indicates sexual dysfunction. The score has a sensitivity/specificity of 76%/75% for detecting patients bothered by sexual dysfunction with a negative QoL impact (180) (3b).

Treatment options

To enhance intimacy, it is essential to evaluate the patient's specific sexual concerns and to efficiently address the patient's worry and distress. A systematic review exploring interventions to improve sexual wellbeing among female pelvic cancer survivors found that sexual distress and intimacy were correlated with sexual

communication. Sexual distress, sexual communication, and intimacy were significantly associated with self-efficacy: self-efficacy to communicate effectively about issues related to physical intimacy or sex, self-efficacy to deal effectively with sexual difficulties, and self-efficacy to enjoy intimacy despite physical limitations (186) (3a). Psychoeducational interventions have thus shown promising results (176, 187) (1b).

Sexual pain difficulties in women are predominantly associated with vaginal dryness, vaginal stenosis, and dyspareunia. The most effective management for superficial dyspareunia in women with treatment-induced menopause is the prompt offer of hormone replacement therapy and, where appropriate, vaginal estrogens (188)(2b). If contraindicated, non-hormonal vaginal moisturizers may be used. Furthermore, most women will need to use an intimate lubricant (water-, oil-, or silicone-based) to reduce the friction associated with penetrative sexual intercourse or vulval contact.

Sex hormones in radiated RC survivors with relevant complaints should be measured and replacement therapy considered as needed (183) (4). For women with introital- or vaginal fibrosis and/or deep dyspareunia after radiotherapy, vaginal dilation is recommended. A systematic Cochrane review by Denton et al. found that evidence is sufficient to endorse widespread use of vaginal dilators (VDs) (189) (2a). A prospective intervention study in female pelvic cancer survivors found that when introducing VDs of increasing sizes three times weekly after concluding radiotherapy treatment, 63% of patients were able to return to the pre-RT size at 6 and 12 months (190) (3b). However, a lack of evidence exists on the optimal timing, frequency, and duration of VD use.

Pain and chemotherapy-induced neuropathy

Recommendations

- 20. It is recommended that survivors with persisting pain should undergo diagnostic work up to determine the cause of their pain (Grade D).**
- 21. It is recommended that survivors treated with oxaliplatin should be screened for CIPN (Grade D).**

Management strategies

- **Duloxetine reduces pain in painful CIPN (Grade A).**
- **Agents recommended for the treatment of neuropathic pain may be effective in the treatment of painful CIPN (Grade D).**
- **MRI should be the preferred imaging modality for detecting pelvic insufficiency fractures (Grade B).**
- **Consider treatment with calcium and vitamin D in case of radiotherapy (Grade D).**

Pain assessment and treatment of cancer-related pain in general are beyond the scope of this guideline, and we refer to other publications on the subject. In this guideline, we focus on pain related to side effects from treatments specific to CRC.

Prolonged pelvic pain is defined as pain that has persisted for more than 6 months. Cancer-related pain may originate from any of the organs of the pelvis and arise after cancer treatment. Prolonged pain may, via various mechanisms in the nervous system, lead to altered function and various symptoms/discomfort of the skin, bladder, muscles, intestines, and gynecological organ (191)(3a).

A cohort study on opioid use in CC survivors (n = 2,039) showed an increased use of opioids after diagnosis. The majority of survivors were treated with surgery alone, 13.6% received concomitant chemotherapy, and 1.5% radiotherapy. Administration of chemotherapy was related to an increased risk of pain (192) (2b).

A recent systematic review on late (>3 months) gastrointestinal toxicity after treatment for RC reported rectal pain in 13% of patients. Further, a trend towards increased rectal pain was shown in patients treated with radiotherapy and surgery compared with surgery alone. Furthermore, an increased toxicity to chemoradiotherapy was recorded compared with radiotherapy alone, although insignificant (86) (3a).

In a previous Danish study including 1,369 RC patients, 31% reported chronic pain in the pelvic area or lower extremities, and 13% experienced pain daily. Pain was associated with female gender, type of surgery, (chemo-)radiotherapy, and young age, all of which impacted patients' QoL (193) (2b). Among 100 CRC survivors (diagnosis 1-10 years prior) selected for a telephone survey, 23% reported chronic pain and 39% found pain to be related to their cancer treatment (194) (2b). In CRC survivors, pain was found to be multifactorial, including co-morbidities, age, and gender besides oncological treatments (194, 195) (2b). Pain was related to several aspects of CRC survivorship including a poorer self-related health and overall QoL (12, 196) (2b).

Screening for pelvic pain may be done using a validated short form RC pain score (196) (3b).

Evidence-based pain rehabilitation programs, available through referral in most regions, focus on learning to manage and live with pain as a long-term condition if no specific therapy is available.

Specific causes of treatment-related pain in CRC, pelvic insufficiency fracture (PIF) and chemotherapy-induced peripheral neuropathy (CIPN), will be addressed in the following.

Chemotherapy-induced peripheral neuropathy (CIPN)

CIPN is a well-known side effect to certain types of chemotherapy. Oxaliplatin used in CRC causes chronic neuropathy, which is dose-dependent and correlated with the cumulative dose of oxaliplatin (197, 198) (2b). Symptoms have a characteristic 'glove-and-stockings-like' distribution and include sensory loss, paresthesia, dysesthesia, and pain (199, 200) (2b). A study, including 406 patients, found the prevalence of CIPN to be 31.3% and a third of these patients (36.5%) also had neuropathic pain (201) (2b). This finding is supported by a Danish study in which a third of patients with symptoms of neuropathy reported neuropathic pain 5 years after treatment with oxaliplatin (202) (2b). Both studies concluded that little improvement in CIPN occurred

from 1 year until 5 years after chemotherapy. Sensory symptoms in the lower extremities in particular are a prominent late sequela after treatment with oxaliplatin, and several studies have found that chronic CIPN has a negative influence on QoL (200-202) (2b). One study suggested that the negative influence on QoL is only related to painful CIPN, since they found no difference in QoL of survivors with non-painful CIPN and survivors without CIPN. Patients with high CIPN (upper 30% scores in the EORTC QLQ-CIPN20) also reported more anxiety and depressive symptoms and more fatigue than patients with a low CIPN. However, the relationship between CIPN and fatigue is possibly mediated by both anxiety and depression (203) (2b).

CIPN risk factors have been discussed in several studies. However, agreement is limited. A study including 3,607 patients aged > 65 years found that the incidence of oxaliplatin-induced CIPN increased with advancing age, and, specifically, was greater among patients aged > 70 years (204) (2b). In contrast, another study in 406 patients found no correlation between age and CIPN (201) (2b). A systematic review and meta-analysis addressed the question of risk factors. None of the suggested risk factors including baseline neuropathy, smoking, and decreased creatinine clearance were verified in new population-based datasets. Even so, sensory changes during oxaliplatin treatment, including cold allodynia and cold hyperalgesia, have previously been documented as predictors of CIPN (205) (3a).

Monitoring and evaluation

A systematic review and Delphi survey published in 2017 concluded that a consensus 'gold standard' clinical assessment including PRO and clinician input has yet to be established (206) (2a). However, several PRO screening tools, with different objectives, have been investigated and validated (207-213) (2b).

One of the widely used clinical tools for detecting neuropathy during chemotherapy is the National Cancer Institute – Common Terminology Criteria for Adverse Events (NCICTCAE), but several studies have found that this instrument is not sensitive to change and has significant inter-rater variability (214, 215) (3a).

In the case of painful CIPN, the standard approach to neuropathic pain, the NeuPSIG guidelines for assessment and diagnosis of neuropathic pain may be applied. These guidelines recommend both using screening questionnaires to identify potential patients and using clinical examination as an important part of the assessment. The clinical examinations will typically consist of nerve conduction studies, quantitative sensory testing, and examination of intraepidermal nerve fiber density (IENFD). This is challenging in a non-specialist setting, particularly when using more detailed sensory profiling for the definitive diagnosis, and referral to a specialist is therefore recommended (216) (5).

Treatment options

In 2020, The American Society of Clinical Oncology (ASCO) published a guideline update on the prevention and management of chemotherapy-induced peripheral neuropathy (7) (1a). No agents were found to be effective in the prevention of chemotherapy-induced neuropathy (7) (1a). Instead, clinicians are recommended to assess the appropriateness of dose delaying, dose reduction, substitutions, or discontinuation of chemotherapy in patients who develop intolerable neuropathy.

In patients with chronic CIPN, distinguishing between painful and non-painful CIPN is important. No agents have been found to be effective in non-painful CIPN. Duloxetine is one of the few agents for which a positive

RCT exists for painful CIPN (210) (1b). Therefore, duloxetine is the only agent recommended in the ASCO guidelines. However, it is important to notice that NNT's are high for serotonin-noradrenaline reuptake inhibitors and treatment can induce significant side-effects, with cognitive and gastrointestinal side effects being the most frequent (220, Velasco et al 2021).

A lack of good quality clinical trials exists focusing on treatment of established painful CIPN. A review published in 2017 found that only seven published RCTs tested the efficacy of treatments for CIPN. Moreover, the trials that evaluated the efficacy of neuropathic pain treatments typically did not evaluate pain but general peripheral neuropathy symptoms, including dysesthesias and paresthesia (218) (2a). Based on efficacy in other neuropathic pain syndromes, and the fact that sensory phenotypes in patients with CIPN is very similar to those seen in patients with HIV and mixed polyneuropathy, other agents recommended for the treatment of neuropathic pain in the (NeuPSIG) treatment guidelines, i.e., amitriptyline, pregabalin, gabapentin, and nortriptyline, may be trialed (219, 220, Ventzel et al. 2018) (1a).

Pelvic insufficiency fractures (PIF)

PIF is a well-known late side effect after pelvic CRT that may cause pain and decreased mobility (221) (3a). PIFs are described in 3.1-33% of RC patients after CRT or RT (221-228) (1b) but are best documented after radiation for gynecological cancers (229) (2a). Studies on PIFs after RT or CRT in RC have mainly been retrospective and characterized by heterogeneity with respect to definition, timing, imaging methods, RT techniques, and follow-up (221) (3a). Imaging method is important as MRI is estimated to have a sensitivity of 99-100% and a specificity of 85% for stress fractures in general and was found to be superior to CT (sensitivity 69%) in the pelvic/femoral area (230, 231) (3b). In RC survivors, no systematic reviews or meta-analyses exist on PIF. In gynecological cancer, two large studies (systematic reviews and meta-analyses) on PIF after RT (n = 3,929 and n = 6,488) found PIF incidences of 9.4% and 14% detected a median of 8-39 and 7.1-19 months after RT, respectively (229, 232) (2a). The most frequently found risk factors across the included studies were advanced age, postmenopausal status, low BMI and osteoporosis, older RT treatment techniques, and higher RT doses (229) (2a). The most frequent localization was the sacral body/near the sacroiliac joint (60-73.6%) followed by the pubic bones (12-13%). The ratio of symptomatic patients differs but was generally around 50-60% (229) (2a). These data are not directly applicable to the field of RC as the radiation dose, techniques, and chemotherapy are different. However, fracture sites predominantly in weight bearing areas, relation to higher radiation doses, association with increasing age and postmenopausal status were also found in RC (221, 227, 228, 233) (2b).

Studies on treatment and preventive measures for PIFs are lacking. The ESMO 2020 guidelines on bone health in cancer do not specifically address CRT- or RT-induced PIFs. However, the guidelines state that "all patients receiving treatments that are known to adversely affect bone health should be advised to consume a calcium enriched diet (or supplement), exercise moderately, and take 1,000-2,000 IU vitamin D3 every day" (234) (5).

In a 2020 systematic review on gynecological patients, information on treatment of PIFs was available for 456 patients. Conservative treatment was applied in 84.6% of cases (analgesics, bed rest, and observation), hospitalization, or surgery in 9.4%, and bone-directed therapies were used in 6% of cases (bisphosphonates, calcium, vitamin D, and hormone replacement therapy) (229) (2a). A Cochrane review on pharmacological interventions for the prevention of PIF associated with pelvic RT has been conducted (235) (1a). Two RCTs

were included, both in men undergoing pelvic RT and hormone replacement therapy for prostate cancer. The review concluded that evidence is insufficient to support that zoledronic acid and other medicines are sufficient to prevent radiation-induced bone complications.

Cancer-related Fatigue

Recommendations

- 22. Survivors should be offered routine screening for cancer-related fatigue as this is a common symptom, which is rated the most severe by patients (Grade B).**

Management strategies

- **Relevant laboratory assessment for differential diagnostics of fatigue is recommended (Grade D).**
- **Physical activity may improve cancer-related fatigue, but conclusive evidence is lacking (Grade B).**
- **A higher intake of vegetables may lower levels of fatigue (Grade C)**

Cancer-related fatigue (CRF) is a potential long-term effect of treatment that is prevalent among cancer survivors and often causes significant disruption in functioning and reduces QoL (2,120) (2a). The European Association for Palliative Care offers a working definition of CRF as “a subjective feeling of tiredness, weakness or lack of energy.” The NCCN defines cancer-related fatigue as “a distressing, persistent, subjective sense of physical, emotional and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and interferes with usual function”.

CRF is a common symptom in CRC survivors, and clinically relevant fatigue is reported among 56-67% of long-term survivors (28,236) (2b). A 2020 systematic review and meta-analysis of the symptom experience in CRC survivors found that among ten post-cancer treatment symptoms analyzed, fatigue was rated the most severe by patients (44) (2a). Greater fatigue was associated with a lower mental QoL and a lower physical QoL (236) (2b).

Monitoring and evaluation

The high prevalence of moderate to severe CRF in survivors warrants routine screening, assessment, and management of patient-reported fatigue. For patients who report moderate to severe fatigue, a comprehensive assessment should be conducted and medical and treatable contributing factors should be addressed (2) (2a).

Tools that are specific to fatigue assessment in patients include the Multidimensional Fatigue Symptom Inventory (MFSI), the Multidimensional Fatigue Inventory (MFI-20), the Piper Fatigue Scale, and Visual Analogue Scale to Evaluate Fatigue Severity (VASF), as well as those that specifically measure at cancer-

related fatigue (the Functional Assessment of Cancer Therapy Fatigue Instrument (FACIT-F) and the Schwartz Cancer Fatigue Scale (237) (5).

Clinical assessment

A detailed laboratory assessment should be performed for differential diagnosis of fatigue, including indicators of anemia, electrolyte dysregulation, organ dysfunction, hypothyroidism, infection, hormone imbalance, and vitamin deficiency (237) (5).

Treatment options

Most patients with fatigue will require symptomatic treatment using a combination of pharmacologic and non-pharmacologic approaches. For example, the following may help reduce fatigue: correcting anemia and electrolyte disturbances; managing comorbidities; alleviating pain, emotional distress, and sleep disturbances; and addressing dehydration (237) (5). Evidence is limited supporting the use of psychostimulants in the management of fatigue among patients who are disease-free after active treatment (2) (2a).

If fatigue seems to arise as a side effect of the therapy provided, physical activity is known to produce numerous beneficial physiologic changes in markers of physical performance, which may help to counter some of the causes of fatigue, such as increasing hemoglobin levels, cardiorespiratory fitness and capacity, muscle mass, and strength (238) (2b). In a 2018 systematic review of the effect of physical activity on fatigue among CRC survivors, a meta-analysis of the RCTs failed to show that physical activity had a significant effect on fatigue. However, reduced levels of fatigue were observed in all studies. A possible explanation that the meta-analysis failed to establish an effect is that none of the included trials were conducted specifically among fatigued survivors (239) (1b).

A cross-sectional analysis by the Associations of the dietary World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) found that a higher vegetable intake (per 50 g) was associated with an improved global QoL, improved physical functioning and lower levels of fatigue in CRC survivors (240) (3b).

Other

Among 51 CRC-specific guidelines, only 13 (25%) comprised recommendations on how to manage some long-term symptoms and functional impairments following CRC treatment. All recommended a healthy lifestyle, diet and body weight control, and physical activity (15)(15). Studies suggested that adhering to the healthy lifestyle recommendations is associated with a higher global health-related QoL (241)(241) (3b).

Literature review and evidence description

Guidelines were searched in 16 databases, and relevant studies were systematically searched in four databases from inception to 2021. The search yielded 13 guidelines and 886 abstracts of which 188 were included for full text review. During the development of the guideline, another 45 articles were included from the reference lists of other included studies. All articles were reviewed, and was evidence graded by a minimum of two of the authors and grading was discussed in case of discrepancies.

Patient values and preferences

Our recommendations were not evaluated by the target population. The chosen complaint/symptom categories were identified based on the available literature and the experience of the participating expert panel. Other treatment-related sequelae that are less specific to CRC survivorship are not covered herein. For generic guidelines regarding cancer survivorship, we refer to the ASCO guidelines.

Rationale

The literature clearly shows that a large proportion of CRC survivors suffer from TRS and that these TRS potentially effect QoL. Managing physicians may not have much experience dealing with these TRS. Therefore, our recommendations are centered around offering the relevant screening, providing options for management strategies and, in case of persisting TRS, referral to specialized units.

4. Reference list

1. International Agency for Research on Cancer. <https://www.iarc.who.int/featured-news/ccam2021/>. 2021.
2. El-Shami K, Oeffinger KC, Erb NL, et al. American Cancer Society Colorectal Cancer Survivorship Care Guidelines. *CA: A Cancer Journal for Clinicians*. 2015 Nov;65(6):427–55.
3. Drury A, Payne S, Brady AM. Colorectal cancer survivors' quality of life: A qualitative study of unmet need. *BMJ Supportive and Palliative Care*. 2020 Jun 29
4. National Comprehensive Cancer Network. Colon cancer, version 2.2019. 2019 August 27, 2019.
5. National Comprehensive Cancer Network. Rectal cancer, version 2.2019. 2019 August 27, 2019.
6. National Comprehensive Cancer Network. Survivorship, version 2.2019. 2019 August 27, 2019.
7. ASCO. ASCO guidelines. (<https://www.asco.org/research-guidelines/quality-guidelines/guidelines>).
8. Drury A, Payne S, Brady AM. Cancer survivorship: Advancing the concept in the context of colorectal cancer. Vol. 29, *European Journal of Oncology Nursing*. Churchill Livingstone; 2017:135–47.
9. Juul T, Bräuner AB, Drewes AM, et al. Systematic screening for sequelae after colorectal cancer—a feasibility study. *Colorectal Disease*. 2021 Feb 1;23(2):345–55.
10. McMullen C, Bulkley J, Corley DA, et al. Health care improvement and survivorship priorities of colorectal cancer survivors: findings from the PORTAL colorectal cancer cohort survey. *Supportive Care in Cancer*. 2019 Jan 1;27(1):147–56.
11. Mullens AB, McCaul KD, Erickson SC, et al. Coping after cancer: Risk perceptions, worry, and health behaviors among colorectal cancer survivors. *Psycho-oncology*. 2004 Jun;13(6):367–76.
12. Drury A, Payne S, Brady AM. The cost of survival: an exploration of colorectal cancer survivors' experiences of pain. *Acta Oncologica*. 2017 Feb 1;56(2):205–11.
13. Haggstrom DA, Arora NK, Helft P, et al. Follow-up Care Delivery Among Colorectal Cancer Survivors Most Often Seen by Primary and Subspecialty Care Physicians. *Journal of General Internal Medicine* 2009;24(2):472–9.
14. Bastiaenen VP, Hovdenak Jakobsen I, Labianca R, et al. Consensus and controversies regarding follow-up after treatment with curative intent of nonmetastatic colorectal cancer: a synopsis of guidelines used in countries represented in the European Society of Coloproctology. Vol. 21, *Colorectal Disease*; 2019:392–416.
15. Wiltink LM, White K, King MT, et al. Systematic review of clinical practice guidelines for colorectal and anal cancer: the extent of recommendations for managing long-term symptoms and functional impairments. Vol. 28, *Supportive Care in Cancer*; 2020:2523–32.
16. Berian JR, Cuddy A, Francescatti AB, et al. A systematic review of patient perspectives on surveillance after colorectal cancer treatment. Vol. 11, *Journal of Cancer Survivorship*; 2017:542–52.
17. Drury A, Payne S, Brady AM. Identifying associations between quality of life outcomes and healthcare-related variables among colorectal cancer survivors: A cross-sectional survey study. *International Journal of Nursing Studies*. 2020 Jan 1;101:103434.
18. Pita-Fernández S, Alhayek-Aí M, González-Martín C, et al. Intensive follow-up strategies improve outcomes in nonmetastatic colorectal cancer patients after curative surgery: A systematic review and meta-analysis. Vol. 26, *Annals of Oncology*; 2015:644–56.
19. Jeffery M, Hickey BE, Hider PN. Follow-up strategies for patients treated for non-metastatic colorectal cancer, *Cochrane Database of Systematic Reviews*. 2019 (9)
20. Wille-Jørgensen P, Syk I, Smedh K, et al. Effect of more vs less frequent follow-up testing on overall and colorectal cancer–Specific mortality in patients with stage II or III colorectal cancer the COLOFOL randomized clinical trial. *JAMA - Journal of the American Medical Association*. 2018;319(20):2095–103.

21. Laurberg S, Juul T, Christensen P, et al. Time for a paradigm shift in the follow-up of colorectal cancer. *Colorectal Disease*. 2021 Feb 1;23(2):341–4.
22. Jefford M, Gough K, Drosowsky A, et al. A Randomized Controlled Trial of a Nurse-Led Supportive Care Package (SurvivorCare) for Survivors of Colorectal Cancer. *The Oncologist*. 2016 Aug;21(8):1014–23.
23. Gordon LG, Patrao T, Kularatna S, et al. A telephone-delivered multiple health behaviour change intervention for colorectal cancer survivors: Making the case for cost-effective healthcare. *European Journal of Cancer Care*. 2015 Nov 1;24(6):854–61.
24. Simard J, Kamath S, Kircher S. Survivorship Guidance for Patients with Colorectal Cancer. *Current Treatment Options in Oncology*. 2019 May 1;20(5).
25. Sprangers MAG, te Velde A, Aaronson NK. The construction and testing of the EORTC colorectal cancer-specific quality of life questionnaire module (QLQ-CR38). *European Journal of Cancer*. 1999 Feb 1;35(2):238–47.
26. Thaysen HV, Jess P, Laurberg S, et al. Validation of the Danish version of the disease specific instrument EORTC QLQ-CR38 to assess health-related quality of life in patients with colorectal cancer. *Health and quality of life outcomes*. 2012 Dec;10(1):1-0.
27. van der Hout A, Neijenhuijs KI, Jansen F, et al. Measuring health-related quality of life in colorectal cancer patients: systematic review of measurement properties of the EORTC QLQ-CR29. *Supportive Care in Cancer*. 2019;27:2395–412.
28. Frick MA, Vachani CC, Hampshire MK, et al. Survivorship after lower gastrointestinal cancer: Patient-reported outcomes and planning for care. *Cancer*. 2017 May 15;123(10):1860–8.
29. Juul T, Bräuner AB, Drewes AM, et al. Systematic screening for late sequelae after colorectal cancer—a feasibility study. *Colorectal Disease*. 2021 Feb 1;23(2):345–55.
30. Mosher CE, Winger JG, Given BA, et al. A systematic review of psychosocial interventions for colorectal cancer patients. *Supportive care in cancer*. 2017 Jul 1;25(7):2349-62.
31. Mols F, Schoormans D, de Hingh I, et al. Symptoms of anxiety and depression among colorectal cancer survivors from the population-based, longitudinal PROFILES Registry: Prevalence, predictors, and impact on quality of life. *Cancer*. 2018;124(12):2621–8.
32. Jansen L, Koch L, Brenner H, Arndt V. Quality of life among long-term (≥5 years) colorectal cancer survivors - Systematic review. *European Journal of Cancer*. 2010 Nov 1;46(16):2879–88.
33. Thong MSY, Doege D, Koch-Gallenkamp L, et al. Age at Diagnosis and Sex Are Associated with Long-term Deficits in Disease-Specific Health-Related Quality of Life of Survivors of Colon and Rectal Cancer: A Population-Based Study. *Diseases of the Colon and Rectum*. 2019;62(11):1294–304.
34. Pate A, Lowery J, Kilbourn K, Blatchford PJ, McNulty M, Risendal B. Quality of life and the negative impact of comorbidities in long-term colorectal cancer survivors: a population-based comparison. *Journal of Cancer Survivorship*. 2020 Oct;14(5):653-9.
35. Cummings A, Grimmett C, Calman L, et al. Comorbidities are associated with poorer quality of life and functioning and worse symptoms in the 5 years following colorectal cancer surgery: Results from the ColoREctal Well-being (CREW) cohort study. *Psycho-Oncology*. 2018;27(10):2427–35.
36. Laghousi D, Jafari E, Nikbakht H, et al. Gender differences in health-related quality of life among patients with colorectal cancer. *Journal of Gastrointestinal Oncology*. 2019;10(3):453–61.
37. Rodriguez JL, Hawkins NA, Berkowitz Z, et al. Factors Associated with Health-Related Quality of Life among Colorectal Cancer Survivors. *American Journal of Preventive Medicine*. 2015 Dec 1;49(6):S518–27.
38. Phelan SM, Griffin JM, Jackson GL, et al. Stigma, perceived blame, self-blame, and depressive symptoms in men with colorectal cancer. *Psycho-oncology*. 2013;22(1):65–73.

39. Kunitake H, Russell MM, Zheng P, et al. Quality of life and symptoms in long-term survivors of colorectal cancer: results from NSABP protocol LTS-01. *Journal of Cancer Survivorship*. 2017;11:111–8.
40. Hart TL, Charles ST, Gunaratne M, et al. Symptom severity and quality of life among long-term colorectal cancer survivors compared with matched control subjects: A population-based study. *Diseases of the Colon and Rectum*. 2018;61(3):355–63.
41. Custers JA, Gielissen MF, Janssen SH, de Wilt JH, Prins JB. Fear of cancer recurrence in colorectal cancer survivors. *Supportive Care in Cancer*. 2016 Feb 1;24(2):555-62.
42. Downing A, Morris EJA, Richards M, et al. Health-related quality of life after colorectal cancer in England: A patient-reported outcomes study of individuals 12 to 36 months after diagnosis. *Journal of Clinical Oncology*. 2015 Feb 20;33(6):616–24.
43. Reese JB, Handorf E, Haythornthwaite JA. Sexual quality of life, body image distress, and psychosocial outcomes in colorectal cancer: a longitudinal study. *Supportive Care in Cancer*. 2018 Oct;26(10):3431-40.
44. Han CJ, Yang GS, Syrjala K. Symptom Experiences in Colorectal Cancer Survivors after Cancer Treatments: A Systematic Review and Meta-analysis. Vol. 43, *Cancer Nursing*; 2020:132–58.
45. Benedict C, Rodriguez VM, Carter J, et al. Investigation of body image as a mediator of the effects of bowel and GI symptoms on psychological distress in female survivors of rectal and anal cancer. *Supportive Care in Cancer*. 2016 Apr 1;24(4):1795-802.
46. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*. 1983;67(6):361–70.
47. Hovdenak Jakobsen I, Jeppesen MM, et al. Initial validation of the Danish version of the Fear of Cancer Recurrence Inventory (FCRI) in colorectal cancer patients. *Journal of Cancer Survivorship* 2018;12(6):723–32.
48. Balhareth A, Aldossary MY, McNamara D. Impact of physical activity and diet on colorectal cancer survivors' quality of life: A systematic review. Vol. 17, *World Journal of Surgical Oncology*. 2019;1–12.
49. Ho M, Ho JWC, Fong DYT, et al. Effects of dietary and physical activity interventions on generic and cancer-specific health-related quality of life, anxiety, and depression in colorectal cancer survivors: a randomized controlled trial. *Journal of Cancer Survivorship*. 2020;14(4):424–33.
50. Brown JC, Damjanov N, Courneya KS, et al. A randomized dose-response trial of aerobic exercise and health-related quality of life in colon cancer survivors. *Psycho-Oncology*. 2018; 27(4):1221–8.
51. Kim JY, Lee MK, Lee DH, et al. Effects of a 12-week home-based exercise program on quality of life, psychological health, and the level of physical activity in colorectal cancer survivors: a randomized controlled trial. *Supportive Care in Cancer*. 2019; 27(8):2933–40.
52. Gao R, Yu T, Liu L, et al. Exercise intervention for post-treatment colorectal cancer survivors: a systematic review and meta-analysis. *Journal of Cancer Survivorship*. 2020;14:878–93.
53. Verkuil SJ, Jonker JE, Trzpis M, et al. Functional outcomes of surgery for colon cancer: A systematic review and meta-analysis. Vol. 47, *European Journal of Surgical Oncology*; 2021;960–9.
54. Larsen HM, Elfeki H, Emmertsen KJ, et al. Long-term bowel dysfunction after right-sided hemicolectomy for cancer. *Acta Oncologica*; 2020;(59):1240–5.
55. Elfeki H, Larsen HM, Emmertsen KJ, et al. Bowel dysfunction after sigmoid resection for cancer and its impact on quality of life. *British Journal of Surgery*. 2019;106(1):142–51.
56. Magdeburg J, Glatz N, Post S, et al. Long-term functional outcome of colonic resections: how much does faecal impairment influence quality of life?. *Colorectal Disease*. 2016 Nov;18(11):O405-13.
57. Hope C, Reilly J, Lund J, Andreyev HJ. Systematic review: the effect of right hemicolectomy for cancer on postoperative bowel function. *Supportive Care in Cancer*. 2020 Oct;28:4549-59.
58. Larsen HM, Mekhael M, Juul T, et al. Long-term gastrointestinal sequelae in colon cancer survivors: prospective pilot study on identification, the need for clinical evaluation and effects of treatment.

- Colorectal disease: the official journal of the Association of Coloproctology of Great Britain and Ireland. 2021 Feb 1;23(2):356–66.
59. Jewkes AJ, Windsor CW, Ward RS, Timmins AE. Relationship between bile acid malabsorption using the ⁷⁵Se homocholeic acid taurine scanning method and diarrhoea following right hemicolectomy. *Journal of British Surgery*. 1989 Jul;76(7):707-8.
 60. Yde J, Larsen HM, Laurberg S, et al. Chronic diarrhoea following surgery for colon cancer—frequency, causes and treatment options. *International Journal of Colorectal Disease*.; 2018;(33):683–94.
 61. Van Heinsbergen M, den Haan N, Maaskant-Braat AJ, et al. Functional bowel complaints and quality of life after surgery for colon cancer: prevalence and predictive factors. *Colorectal Disease*. 2020 Feb;22(2):136-45.
 62. Larsen HM, Borre M, Christensen P, et al. Clinical evaluation and treatment of chronic bowel symptoms following cancer in the colon and pelvic organs. *Acta Oncologica*. 2019 May 4;58(5):776–81.
 63. Buchli C, Martling A, Sjövall A. Low anterior resection syndrome after right- and left-sided resections for colonic cancer. *BJS open*. 2019 Jun 1;3(3):387–94.
 64. Gupta A, Muls AC, Lalji A, et al. Outcomes from treating bile acid malabsorption using a multidisciplinary approach. *Supportive Care in Cancer*. 2015 Oct;23(10):2881-90.
 65. Jackson A, Lalji A, Kabir M, et al. The efficacy of a low-fat diet to manage the symptoms of bile acid malabsorption—outcomes in patients previously treated for cancer. *Clinical Medicine*. 2017 Oct;17(5):412.
 66. Wedlake L, Thomas K, Lalji A, et al. Effectiveness and tolerability of colestevam hydrochloride for bile-acid malabsorption in patients with cancer: a retrospective chart review and patient questionnaire. *Clinical therapeutics*. 2009 Nov 1;31(11):2549-58.
 67. Lauritano EC, Gabrielli M, Lupascu A, et al. Rifaximin dose-finding study for the treatment of small intestinal bacterial overgrowth. *Alimentary pharmacology & therapeutics*. 2005 Jul;22(1):31-5.
 68. Krarup AL, Engsbø ALØ, Fassov J, et al. Danish national guideline: Diagnosis and treatment of Irritable Bowel Syndrome. *Dan Med J* 2017;64(6):C5382.
 69. Christensen P, Krogh K, Qvist N, et al. Kronisk obstipation hos voksne: Behandling. Guideline. DSAK. <http://www.cebm.net/?o=1025>.
 70. Christensen P, Krogh K. Transanal irrigation for disordered defecation: A systematic review [Internet]. Vol. 45, *Scandinavian Journal of Gastroenterology*. Scand J Gastroenterol; 2010:517–27.
 71. Dulskas A, Smolskas E, Kildusiene I, et al. Treatment possibilities for low anterior resection syndrome: a review of the literature. *International Journal of Colorectal Disease*. 2018;(33):251–60.
 72. Pales CGC, An S, Cruz JP, et al. Postoperative bowel function after anal sphincter-preserving rectal cancer surgery: Risks factors, diagnostic modalities, and management. *Annals of Coloproctology*. Korean Society of Coloproctology; 2019;(35):160–6.
 73. Keane C, Wells C, O'Grady G, et al. Defining low anterior resection syndrome: a systematic review of the literature. *Colorectal Disease*. 2017;(19):713–22.
 74. Emmertsen KJ, Laurberg S. Low anterior resection syndrome score: Development and validation of a symptom-based scoring system for bowel dysfunction after low anterior resection for rectal cancer. *Annals of Surgery*. 2012 May;255(5):922–8.
 75. Croese AD, Lonie JM, Trollope AF, et al. A meta-analysis of the prevalence of Low Anterior Resection Syndrome and systematic review of risk factors. *International Journal of Surgery*; 2018(56):234–41.
 76. van der Heijden JAG, Thomas G, Caers F, et al. What you should know about the low anterior resection syndrome – Clinical recommendations from a patient perspective. *European Journal of Surgical Oncology*. 2018 Sep 1;44(9):1331–7.
 77. Eid Y, Bouvier V, Menahem B, et al. Digestive and genitourinary sequelae in rectal cancer survivors and their impact on health-related quality of life: Outcome of a high-resolution population-based study. *Surgery (United States)*. 2019 Sep 1;166(3):327–35.

78. Juul T, Ahlberg M, Biondo S, et al. Low anterior resection syndrome and quality of life: An international multicenter study. *Diseases of the Colon and Rectum*. 2014;57(5):585–91.
79. Thomas G, van Heinsbergen M, van der Heijden J, et al. Awareness and management of low anterior resection syndrome: A Dutch national survey among colorectal surgeons and specialized nurses. *European Journal of Surgical Oncology*. 2019 Feb 1;45(2):174–9.
80. Chen TYT, Emmertsen KJ, Laurberg S. What Are the Best Questionnaires To Capture Anorectal Function After Surgery in Rectal Cancer? *Current Colorectal Cancer Reports*. Current Medicine Group. 2015(11):37–43.
81. Sipaviciute A, Sileika E, Burneckis A, et al. Late gastrointestinal toxicity after radiotherapy for rectal cancer: a systematic review. *International Journal of Colorectal Disease*. 2020(35):977–83.
82. Vogel I, Reeves N, Tanis PJ, et al. Impact of a defunctioning ileostomy and time to stoma closure on bowel function after low anterior resection for rectal cancer: a systematic review and meta-analysis. *Techniques in Coloproctology*. 2021(25):751–60.
83. Keane C, O’Grady G, Bissett I, et al. Comparison of bowel dysfunction between colorectal cancer survivors and a non-operative non-cancer control group. *Colorectal Disease*. 2020 Jul 1;22(7):806–13.
84. Alavi M, Wendel CS, Krouse RS, et al. Predictors of Bowel Function in Long-term Rectal Cancer Survivors with Anastomosis. *Annals of Surgical Oncology*. 2017 Nov 1;24(12):3596–603.
85. Son DN, Choi DJ, Woo SU, et al. Relationship between diversion colitis and quality of life in rectal cancer. *World Journal of Gastroenterology*. 2013; 19(4):542–9.
86. Sipaviciute A, Sileika E, Burneckis A, et al. Late gastrointestinal toxicity after radiotherapy for rectal cancer: a systematic review. *International Journal of Colorectal Disease*. 2020 Jun 1;35(6):977–83.
87. Battersby NJ, Bouliotis G, Emmertsen KJ, et al. Development and external validation of a nomogram and online tool to predict bowel dysfunction following restorative rectal cancer resection: The POLARS score. *Gut*. 2018 Apr 1;67(4):688–96.
88. Juul T, Elfeki H, Christensen P, et al. Normative Data for the Low Anterior Resection Syndrome Score (LARS Score). *Annals of Surgery*. 2019 Jun 1;269(6):1124–8.
89. Temple LK, Bacik J, Savatta SG, et al. The development of a validated instrument to evaluate bowel function after sphincter-preserving surgery for rectal cancer. *Diseases of the Colon and Rectum*; 2005(48):1353–65.
90. Quezada-Diaz FF, Elfeki H, Emmertsen KJ, et al. Comparative analysis of the Memorial Sloan Kettering Bowel Function Instrument and the Low Anterior Resection Syndrome Questionnaire for assessment of bowel dysfunction in rectal cancer patients after low anterior resection. *Colorectal Disease*. 2021 Feb 1;23(2):451–60.
91. Christensen P, IM Baeten C, Espín-Basany E, et al. Management guidelines for low anterior resection syndrome – the MANUEL project. *Colorectal Disease*. 2021 Feb 1;23(2):461–75.
92. Juul T, Ahlberg M, Biondo S, et al. International validation of the low anterior resection syndrome score. *Annals of Surgery*. 2014;259(4):728–34.
93. Sun V, Crane TE, Slack SD, et al. Rationale, development, and design of the Altering Intake, Managing Symptoms (AIMS) dietary intervention for bowel dysfunction in rectal cancer survivors. *Contemporary Clinical Trials*. 2018 May 1;68:61–6.
94. Nikolett S, Young J, Levitt M, King M, Chidlow C, Hollingsworth S. Bowel problems, self-care practices, and information needs of colorectal cancer survivors at 6 to 24 months after sphincter-saving surgery. *Cancer Nursing*. 2008 Sep 1;31(5):389–98.
95. Aubrey V, Hon Y, Shaw C, et al. Healthy eating interventions in adults living with and beyond colorectal cancer: a systematic review. *Journal of Human Nutrition and Dietetics*. 2019(32):501–11.
96. Lee JY, Chu SH, Jeon JY, et al. Effects of 12 weeks of probiotic supplementation on quality of life in colorectal cancer survivors: A double-blind, randomized, placebo-controlled trial. *Digestive and Liver Disease*. 2014 Dec 1;46(12):1126–32.

97. Itagaki R, Koda K, Yamazaki M, et al. Serotonin (5-HT₃) receptor antagonists for the reduction of symptoms of low anterior resection syndrome. *Clinical and Experimental Gastroenterology*. 2014;7(1):47–52.
98. Dalsgaard P, Emmertsen KJ, Mekhael M, et al. Nurse-led standardized intervention for low anterior resection syndrome. A population-based pilot study. *Colorectal Disease*. 2021 Feb 1;23(2):434–43.
99. Visser WS, te Riele WW, Boerma D, et al. Pelvic floor rehabilitation to improve functional outcome after a low anterior resection: A systematic review. *Annals of Coloproctology*. Korean Society of Coloproctology; 2014(30):109–14.
100. Chan KYC, Suen M, Coulson S, et al. Efficacy of pelvic floor rehabilitation for bowel dysfunction after anterior resection for colorectal cancer: a systematic review. *Supportive Care in Cancer*. 2021(29):1795–809.
101. Bazzell, MSN, RN, et al. Clinical Management of Bowel Dysfunction After Low Anterior Resection for Rectal Cancer. *Journal of the Advanced Practitioner in Oncology*. 2016 Oct 1;7(6).
102. Martellucci J, Sturiale A, Bergamini C, et al. Role of transanal irrigation in the treatment of anterior resection syndrome. *Techniques in Coloproctology*. 2018 Jul 1;22(7):519–27.
103. Rosen HR, Kneist W, Fürst A, et al. Randomized clinical trial of prophylactic transanal irrigation versus supportive therapy to prevent symptoms of low anterior resection syndrome after rectal resection. *BJS open*. 2019 Aug 1;3(4):461–5.
104. Christensen P, Fearnhead NS, Martellucci J. Transanal irrigation: another hope for patients with LARS. *Techniques in Coloproctology*. 2020(24):1231–2.
105. Huang Y, Koh CE. Sacral nerve stimulation for bowel dysfunction following low anterior resection: a systematic review and meta-analysis. *Colorectal Disease*. 2019(21):1240–8.
106. Rubio-Perez I, Saavedra J, Marijuan JL et al. Optimizing sacral neuromodulation for low anterior resection syndrome: learning from our experience. *Colorectal Disease*. 2020 Dec 1;22(12):2146–54.
107. Marinello FG, Jiménez LM, Talavera E, et al. Percutaneous tibial nerve stimulation in patients with severe low anterior resection syndrome: randomized clinical trial. *British Journal of Surgery*. 2021 Apr 30;108(4):380–7.
108. Altomare DF, Picciariello A, Ferrara C, et al. Short-term outcome of percutaneous tibial nerve stimulation for low anterior resection syndrome: results of a pilot study. *Colorectal Disease*. 2017 Sep 1;19(9):851–6.
109. Vigorita V, Rausei S, Troncoso Pereira P, et al. A pilot study assessing the efficacy of posterior tibial nerve stimulation in the treatment of low anterior resection syndrome. *Techniques in Coloproctology*. 2017 Apr 1;21(4):287–93.
110. Vonk-Klaassen SM, de Vocht HM, den Ouden ME, et al. Ostomy-related problems and their impact on quality of life of colorectal cancer ostomates: a systematic review. *Quality of life research*. 2016 Jan 1;25(1):125–33.
111. Lindgren R, Hallböök O, Rutegård J, et al. What is the risk for a permanent stoma after low anterior resection of the rectum for cancer? A six-year follow-up of a multicenter trial. *Diseases of the Colon and Rectum*. 2011;54(1):41–7.
112. Krouse R, Grant M, Ferrell B, et al. Quality of Life Outcomes in 599 Cancer and Non-Cancer Patients with Colostomies. *Journal of Surgical Research*. 2007 Mar;138(1):79–87.
113. Feddern ML, Emmertsen KJ, Laurberg S. Life with a stoma after curative resection for rectal cancer: A population-based cross-sectional study. *Colorectal Disease*. 2015;17(11):1011–7.
114. Traa MJ, De Vries J, Roukema JA, Den Oudsten BL. Sexual (dys) function and the quality of sexual life in patients with colorectal cancer: a systematic review. *Annals of Oncology*. 2012 Jan 1;23(1):19–27.
115. Lynch BM, Hawkes AL, Steginga SK, et al. Stoma surgery for colorectal cancer: A population-based study of patient concerns. *Journal of Wound, Ostomy and Continence Nursing*. 2008 ;35(4):424–8.

116. Sun V, Bojorquez O, Raza S, et al. Cancer survivors' challenges with ostomy appliances and self-management. *Journal of Clinical Oncology*. 2019 May 20;37(15_suppl):e23091–e23091.
117. Pachler J, Wille-Jørgensen P. Quality of life after rectal resection for cancer, with or without permanent colostomy. *Cochrane Database of Systematic Reviews*. 2012;(12).
118. Mols F, Lemmens V, Bosscha K, et al. Living with the physical and mental consequences of an ostomy: A study among 1-10-year rectal cancer survivors from the population-based PROFILES registry. *Psycho-Oncology*. 2014;23(9):998–1004.
119. Downing A, Glaser AW, Finan PJ, et al. Functional Outcomes and Health-Related Quality of Life After Curative Treatment for Rectal Cancer: A Population-Level Study in England. *International Journal of Radiation Oncology Biology Physics*. 2019;103(5):1132–42.
120. Bours MJL, Linden BWA, Winkels RM, et al. Candidate Predictors of Health-Related Quality of Life of Colorectal Cancer Survivors: A Systematic Review. *The Oncologist*. 2016; 21(4):433–52.
121. Kristensen H, Thyø A, Christensen P. Systematic review of the impact of demographic and socioeconomic factors on quality of life in ostomized colorectal cancer survivors. *Acta Oncologica*. 2019(58):566–72.
122. Elfeki H, Thyø A, Nepogodiev D, et al. Patient and healthcare professional perceptions of colostomy-related problems and their impact on quality of life following rectal cancer surgery. *BJS open*. 2018 Sep;2(5):336–44.
123. Grant M, Ferrell B, Dean G, et al. Revision and psychometric testing of the City of Hope Quality of Life-Ostomy Questionnaire. *Quality of Life Research*. 2004 Oct;13(8):1445–57.
124. Prieto L, Thorsen H, Juul K. Development and validation of a quality of life questionnaire for patients with colostomy of ileostomy. *Health and Quality of Life Outcomes*. 2005 Oct 12;3.
125. Thyø A, Emmertsen KJ, Pinkney TD, et al. The colostomy impact score: development and validation of a patient reported outcome measure for rectal cancer patients with a permanent colostomy. A population-based study. *Colorectal Disease*. 2017;19(1):O25–33.
126. Kristensen HØ, Thyø A, Jøssing Emmertsen K, et al. Translation and international validation of the Colostomy Impact score. *Colorectal Disease*. 2021 Mar 16.
127. Bulkley JE, McMullen CK, Grant M, et al. Ongoing ostomy self-care challenges of long-term rectal cancer survivors. *Supportive Care in Cancer*. 2018;26(11):3933–9.
128. Grant M, McMullen CK, Altschuler A, et al. Irrigation practices in long-term survivors of colorectal cancer with colostomies. *Clinical Journal of Oncology Nursing*. 2012;16(5):514–9.
129. Martinez AC, González E, Holm K, et al. Stoma-related symptoms in patients operated for rectal cancer with abdominoperineal excision. *International Journal of Colorectal Disease*. 2016 Mar 1;31(3):635–41.
130. Herlufsen P, Olsen AG, Carlsen B, et al. Study of peristomal skin disorders in patients with permanent stomas. *British Journal of nursing*. 2006 Sep 14;15(16):854–62.
131. Shabbir J, Britton DC. Stoma complications: a literature overview. Vol. 12, *Colorectal disease : the official journal of the Association of Coloproctology of Great Britain and Ireland*. 2010:958–64.
132. de Miguel Velasco M, Escovar FJ, et al. Current status of the prevention and treatment of stoma complications. A narrative review. *Cirugía Española (English Edition)*. 2014 Mar 1;92(3):149–56.
133. Martinez AC, Bock D, Erestam S, et al. Methods of Colostomy Construction: No Effect on Parastomal Hernia Rate: Results from Stoma-const—A Randomized Controlled Trial. *Annals of surgery*. 2021 Apr 1;273(4):640–7.
134. Krogsgaard M, Thomsen T, Vinther A, et al. Living with a parastomal bulge - patients' experiences of symptoms. *Journal of Clinical Nursing*. 2017;26(23–24):5072–81.
135. Duluklu B, Çelik SŞ. Effects of lavender essential oil for colorectal cancer patients with permanent colostomy on elimination of odor, quality of life, and ostomy adjustment: A randomized controlled trial. *European Journal of Oncology Nursing*. 2019 Oct 1;42:90–6.

136. Näsval P, Dahlstrand U, Löwenmark T, et al. Quality of life in patients with a permanent stoma after rectal cancer surgery. *Quality of Life Research*. 2017 Jan 1;26(1):55–64.
137. Edwards CM, George B, Warren B. Diversion colitis--new light through old windows. *Histopathology*. 1999 Jan 1;34(1):1-5.
138. Stephens JH, Hewett PJ. Clinical trial assessing VSL#3 for the treatment of anterior resection syndrome. *ANZ Journal of Surgery*. 2012;82(6):420–7.
139. Gilmore B, Ezekian B, Sun Z, Peterson A, Mantyh C. Urinary Dysfunction in the Rectal Cancer Survivor. *Current Bladder Dysfunction Reports*. Current Medicine Group LLC 1;2016(11):105–12.
140. Lange MM, van de Velde CJH. Urinary and sexual dysfunction after rectal cancer treatment. *Nature Reviews Urology*. 2011(8):51–7.
141. Bregendahl S, Emmertsen KJ, Lindegaard JC, et al. Urinary and sexual dysfunction in women after resection with and without preoperative radiotherapy for rectal cancer: A population-based cross-sectional study. *Colorectal Disease*. 2015;17(1):26–37.
142. Adam JP, Denost Q, Capdepon M, et al. Prospective and Longitudinal Study of Urogenital Dysfunction after Proctectomy for Rectal Cancer. *Diseases of the Colon and Rectum*. 2016 Sep 1;59(9):822–30.
143. Andersson J, Abis G, Gellerstedt M, et al. Patient-reported genitourinary dysfunction after laparoscopic and open rectal cancer surgery in a randomized trial (COLOR II). *British Journal of Surgery*. 2014;101(10):1272–9.
144. del Río C, Sánchez-Santos R, Oreja V, et al. Long-term urinary dysfunction after rectal cancer surgery. *Colorectal Disease*. 2004 May;6(3):198–202.
145. Sinimäki S, Elfeki H, Kristensen MH, et al. Urinary dysfunction after colorectal cancer treatment and its impact on quality of life – a national cross-sectional study in women. *Colorectal Disease*. 2021 Feb 1;23(2):384–93.
146. Kristensen MH, Elfeki H, Sinimäki S, et al. Urinary dysfunction after colorectal cancer treatment and impact on quality of life—a national cross-sectional study in males. *Colorectal Disease*. 2021 Feb;23(2):394–404.
147. Duran E, Tanriseven M, Ersoz N, et al. Urinary and sexual dysfunction rates and risk factors following rectal cancer surgery. *International Journal of Colorectal Disease*. 2015 Aug 13;30(11):1547–55.
148. Eveno C, Lamblin A, Mariette C, et al. Sexual and urinary dysfunction after proctectomy for rectal cancer. *Journal of Visceral Surgery*. 2010 Feb 1;147(1):e21-30.
149. Barry MJ, Fowler FJ, O'Leary MP, et al. The American Urological Association symptom index for benign prostatic hyperplasia. *Journal of Urology*. 1992 Nov 1;148(5 I):1549–57.
150. Donovan JL, Peters TJ, Abrams P, et al. Scoring the short form ICSmaleSF questionnaire. *Journal of Urology*. 2000;164(6):1948–55.
151. Jackson S, Donovan J, Brookes S, et al. The bristol female lower urinary tract symptoms questionnaire: Development and psychometric testing. *British Journal of Urology*. 1996;77(6):805–12.
152. Faithfull S, Lemanska A, Aslet P, et al. Integrative review on the non-invasive management of lower urinary tract symptoms in men following treatments for pelvic malignancies. *International Journal of Clinical Practice*. 2015(69):1184–208.
153. Lobo N, Kulkarni M, Hughes S, et al. Urologic Complications Following Pelvic Radiotherapy. *Urology*. 2018(122):1–9.
154. Kim TB, Kim CH, Kim KT, et al. Urology as rehabilitation medicine: A literature review. *Journal of Exercise Rehabilitation*. Korean Society of Exercise Rehabilitation; 2018(14):322–6.
155. Qaseem A, Dallas P, Forciea MA, et al. Nonsurgical management of urinary incontinence in women: A clinical practice guideline from the American College of Physicians. *Annals of Internal Medicine*. American College of Physicians; 2014(161):429–40.

156. Faithfull S, Lemanska A, Aslet P, et al. Integrative review on the non-invasive management of lower urinary tract symptoms in men following treatments for pelvic malignancies. *International Journal of Clinical Practice*. 2015;69(10):1184–208.
157. Thüroff JW, Abrams P, Andersson K-E, et al. EAU guidelines on urinary incontinence. *Actas Urológicas Españolas (English Edition)*. 2011 Jul 1;35(7):373–88.
158. Biehl C, Plotsker O, Mirkin S. A systematic review of the efficacy and safety of vaginal estrogen products for the treatment of genitourinary syndrome of menopause. *Menopause*. 2019;26(4):431–53.
159. Celentano V, Cohen R, Warusavitarne J, et al. Sexual dysfunction following rectal cancer surgery. *International Journal of Colorectal Disease*. 2017(32):1523–30.
160. Pang JH, Jones Z, Myers OB, et al. Long term sexual function following rectal cancer treatment. *American Journal of Surgery*. 2020 Nov 1;220(5):1258–63.
161. Almont T, Bouhnik AD, ben Charif A, et al, et al. Sexual Health Problems and Discussion in Colorectal Cancer Patients Two Years After Diagnosis: A National Cross-Sectional Study. *Journal of Sexual Medicine*. 2019 Jan 1;16(1):96–110.
162. den Ouden BL, Traa MJ, Thong MSY, et al. Higher prevalence of sexual dysfunction in colon and rectal cancer survivors compared with the normative population: A population-based study. *European Journal of Cancer*. 2012 Nov;48(17):3161–70.
163. Włodarczyk M, Włodarczyk J, Dziki Ł, et al. Sexual dysfunctions following low anterior resection of the rectum in rectal cancer patients. *Polish Journal of Surgery*. 2019 Jun 30;91(3):21–6.
164. Sun V, Grant M, Wendel CS, et al. Sexual Function and Health-Related Quality of Life in Long-Term Rectal Cancer Survivors. *Journal of Sexual Medicine*. 2016 Jul 1;13(7):1071–9.
165. Aoun F, Peltier A, Velthoven R van. Penile rehabilitation after pelvic cancer surgery. *Scientific World Journal*. 2015;2015.
166. Buchli C, Martling A, Arver S, Holm T. Testicular function after radiotherapy for rectal cancer—a review. *The journal of sexual medicine*. 2011 Nov 1;8(11):3220–6.
167. Frankland J, Wheelwright S, Permyakova NV, et al. Prevalence and predictors of poor sexual well-being over 5 years following treatment for colorectal cancer: results from the ColoREctal Wellbeing (CREW) prospective longitudinal study. *BMJ open*. 2020 Nov 1;10(11):e038953.
168. Breukink SO, DKA, J. Physical and psychological effects of treatment on sexual functioning in colorectal cancer survivors. *Journal of Sexual Medicine*. 2013;10:74–83.
169. Ball M, Nelson CJ, Shuk E, et al. Men's experience with sexual dysfunction post-rectal cancer treatment: A qualitative study. *Journal of Cancer Education*. 2013 Sep;28(3):494–502.
170. Ellis R, Smith A, Wilson S, et al. The prevalence of erectile dysfunction in post-treatment colorectal cancer patients and their interests in seeking treatment: A cross-sectional survey in the west-midlands. *Journal of Sexual Medicine*. 2010;7(4 PART 1):1488–96.
171. Laurberg JR, Laurberg VR, Elfeki H, et al. Male erectile function after treatment for colorectal cancer: a population-based cross-sectional study. *Colorectal Disease*. 2021 Feb 1;23(2):367–75.
172. McCabe MP, Sharlip ID, Lewis R, et al. Incidence and Prevalence of Sexual Dysfunction in Women and Men: A Consensus Statement from the Fourth International Consultation on Sexual Medicine 2015. *Journal of Sexual Medicine*. 2016 Feb 1;13(2):144–52.
173. Rosen RC, Riley A, Wagner G, et al. The international index of erectile function (IIEF): A multidimensional scale for assessment of erectile dysfunction. *Urology*. 1997 Jun 1;49(6):822–30.
174. Notarnicola, M., Celentano, V., Gavriliadis, P., et al. PDE-5i Management of Erectile Dysfunction After Rectal Surgery: A Systematic Review Focusing on Treatment Efficacy. *American Journal of Men's Health*, 2020;14(5), p.1557988320969061.
175. Hakky TS, Baumgarten AS, Parker J, et al. Penile rehabilitation: The evolutionary concept in the management of erectile dysfunction. *Current Urology Reports*. 2014;15(4).

176. Canty J, Stabile C, Milli L, et al. Sexual Function in Women with Colorectal/Anal Cancer. *Sexual Medicine Reviews*. 2019 (7): 202–22.
177. Attaallah W, Ertekin SC, Yegen C. Prospective study of sexual dysfunction after proctectomy for rectal cancer. *Asian Journal of Surgery*. 2018 Sep 1;41(5):454–61.
178. Philip EJ, Nelson C, Temple L, et al. Psychological Correlates of Sexual Dysfunction in Female Rectal and Anal Cancer Survivors: Analysis of Baseline Intervention Data. *Journal of Sexual Medicine*. 2013;10(10):2539–48.
179. Thyø A, Emmertsen KJ, Laurberg S. The rectal cancer female sexuality score: Development and validation of a scoring system for female sexual function after rectal cancer surgery. *Diseases of the Colon and Rectum*. 2018;61(6):656–66.
180. Thyø A, Elfeki H, Laurberg S, et al. Female sexual problems after treatment for colorectal cancer – a population-based study. *Colorectal Disease*. 2019 Oct 1;21(10):1130–9.
181. Jensen PT, Froeding LP. Pelvic radiotherapy and sexual function in women. *Translational Andrology and Urology*. 2015(4):186–205.
182. Canty J, Stabile C, Milli L, et al. Sexual Function in Women with Colorectal/Anal Cancer. *Sexual Medicine Reviews*. 2019(7):202–22.
183. Graziottin A, Serafini A. Medical Treatments for Sexual Problems in Women. *Cancer and Sexual Health*. 2011;627–41.
184. Rosen R, Brown C, Heiman J, et al. The female sexual function index (Fsfi): A multidimensional self-report instrument for the assessment of female sexual function. *Journal of Sex and Marital Therapy*. 2000;26(2):191–205.
185. Jensen PT, Klee MC, Thranov I, et al. Validation of a questionnaire for self-assessment of sexual function and vaginal changes after gynaecological cancer. *Psycho-Oncology*. 2004;13(8):577–92.
186. Arthur EK, Wills CE, Menon U. A systematic review of interventions for sexual well-being in women with gynecologic, anal, or rectal cancer. *Oncology Nursing Forum*. 2018 Jul 1;45(4):469–82.
187. DuHamel K, Schuler T, Nelson C, et al. The sexual health of female rectal and anal cancer survivors: results of a pilot randomized psycho-educational intervention trial. *Journal of Cancer Survivorship*. 2016 Jun 1;10(3):553–63.
188. White ID. Sexual Difficulties after Pelvic Radiotherapy: Improving Clinical Management. *Clinical Oncology*. 2015 Nov 1;27(11):647–55.
189. Denton AS, Maher J. Interventions for the physical aspects of sexual dysfunction in women following pelvic radiotherapy. *Cochrane Database of Systematic Reviews*. 2003(1).
190. Law E, Kelvin JF, Thom B, et al. Prospective study of vaginal dilator use adherence and efficacy following radiotherapy. *Radiotherapy and Oncology*. 2015 Jul 1;116(1):149–55.
191. ACOG Committee on Practice Bulletins--Gynecology. ACOG practice bulletin No. 51. Chronic pelvic pain. *Obstet Gynecol*. 2004;103(3):589-605.
192. Chen L, Chubak J, Yu O, et al. Changes in use of opioid therapy after colon cancer diagnosis: a population-based study. *Cancer Causes and Control*. 2019 Dec 1;30(12):1341–50.
193. Feddern ML, Jensen TS, Laurberg S. Chronic pain in the pelvic area or lower extremities after rectal cancer treatment and its impact on quality of life: A population-based cross-sectional study. *Pain*. 2015;156(9):1765–71.
194. Lowery AE, Starr T, Dhingra LK, et al. Frequency, characteristics, and correlates of pain in a pilot study of colorectal cancer survivors 1–10 years post-treatment. *Pain Medicine*. 2013 Nov 1;14(11):1673-80.
195. Kenzik K, Pisu M, Johns SA, et al. Unresolved pain interference among colorectal cancer survivors: Implications for patient care and outcomes. *Pain Medicine*. 2015 Jul 1;16(7):1410-25.
196. Mortensen AR, Thyø A, Emmertsen KJ, et al. Chronic pain after rectal cancer surgery—development and validation of a scoring system. *Colorectal Disease*. 2019 Jan;21(1):90-9.

197. Padman S, Lee J, Kumar R, et al. Late effects of oxaliplatin-induced peripheral neuropathy (LEON)—cross-sectional cohort study of patients with colorectal cancer surviving at least 2 years. *Supportive Care in Cancer*. 2015 Mar 1;23(3):861–9.
198. Beijers AJ, Mols F, Tjan-Heijnen VC, et al. Peripheral neuropathy in colorectal cancer survivors: the influence of oxaliplatin administration. Results from the population-based PROFILES registry. *Acta Oncologica*. 2015 Apr 21;54(4):463–9.
199. Ventzel L, Madsen CS, Karlsson P, et al. Chronic pain and neuropathy following adjuvant chemotherapy. *Pain medicine*. 2018 Sep 1;19(9):1813–24.
200. Mols F, Beijers T, Lemmens V, van den Hurk CJ, et al. Chemotherapy-induced neuropathy and its association with quality of life among 2-to 11-year colorectal cancer survivors: results from the population-based PROFILES registry. *Journal of Clinical Oncology*. 2013 Jul 20;31(21):2699–707.
201. Selvy M, Pereira B, Kerckhove N, et al. Long-term prevalence of sensory chemotherapy-induced peripheral neuropathy for 5 years after adjuvant FOLFOX chemotherapy to treat colorectal cancer: a Multicenter cross-sectional study. *Journal of Clinical Medicine*. 2020 Aug;9(8):2400.
202. Bennedsgaard K, Ventzel L, Themistocleous AC, et al. Long-term symptoms of polyneuropathy in breast and colorectal cancer patients treated with and without adjuvant chemotherapy. *Cancer Medicine*. 2020 Jul;9(14):5114–23.
203. Bonhof CS, van de Poll-Franse L v., Vissers PAJ, et al. Anxiety and depression mediate the association between chemotherapy-induced peripheral neuropathy and fatigue: Results from the population-based PROFILES registry. *Psycho-oncology*. 2019;28(9):1926–33.
204. Raphael MJ, Fischer HD, Fung K, et al. Neurotoxicity outcomes in a population-based cohort of elderly patients treated with adjuvant oxaliplatin for colorectal cancer. *Clinical Colorectal Cancer*. 2017 Dec 1;16(4):397–404.
205. Seretny M, Currie GL, Sena ES, et al. Incidence, prevalence, and predictors of chemotherapy-induced peripheral neuropathy: a systematic review and meta-analysis. *Pain*. 2014 Dec 1;155(12):2461–70.
206. McCrary JM, Goldstein D, Boyle F, et al. Optimal clinical assessment strategies for chemotherapy-induced peripheral neuropathy (CIPN): a systematic review and Delphi survey. *Supportive Care in Cancer*. 2017 Nov 1;25(11):3485–93.
207. Postma TJ, Aaronson NK, Heimans JJ, et al. The development of an EORTC quality of life questionnaire to assess chemotherapy-induced peripheral neuropathy: the QLQ-CIPN20. *European journal of cancer*. 2005 May 1;41(8):1135–9.
208. Smith EM, Knoerl R, Yang JJ, et al. In search of a gold standard patient-reported outcome measure for use in chemotherapy-induced peripheral neuropathy clinical trials. *Cancer Control*. 2018 Feb 23;25(1):1073274818756608.
209. Calhoun EA, Welshman EE, Chang CH, et al. Psychometric evaluation of the Functional Assessment of Cancer Therapy/Gynecologic Oncology Group - Neurotoxicity (Fact/GOG-Ntx) questionnaire for patients receiving systemic chemotherapy. *International Journal of Gynecological Cancer*. 2003 Nov;13(6):741–8.
210. Shimozuma K, Ohashi Y, Takeuchi A, et al. Feasibility and validity of the Patient Neurotoxicity Questionnaire during taxane chemotherapy in a phase III randomized trial in patients with breast cancer: N-SAS BC 02. *Supportive Care in Cancer*. 2009 Dec;17(12):1483–91.
211. Tofthagen CS, McMillan SC, Kip KE. Development and psychometric evaluation of the chemotherapy-induced peripheral neuropathy assessment tool. *Cancer Nursing*. 2011 Jul 1;34(4):E10–20.
212. Kanda K, Fujimoto K, Mochizuki R, et al. Development and validation of the comprehensive assessment scale for chemotherapy-induced peripheral neuropathy in survivors of cancer. *BMC Cancer*. 2019 Sep 10;19(1).

213. Cavaletti G, Frigeni B, Lanzani F, et al. The Total Neuropathy Score as an assessment tool for grading the course of chemotherapy-induced peripheral neurotoxicity: Comparison with the National Cancer Institute-Common Toxicity Scale. *Journal of the Peripheral Nervous System*. 2007 Sep;12(3):210–5.
214. Park SB, Alberti P, Kolb NA, et al. Overview and critical revision of clinical assessment tools in chemotherapy-induced peripheral neurotoxicity. *Journal of the Peripheral Nervous System*. 2019 Oct;24:S13-25.
215. Bennett BK, Park SB, Lin CSY, et al. Impact of oxaliplatin-induced neuropathy: A patient perspective. *Supportive Care in Cancer*. 2012 Nov;20(11):2959–67.
216. Haanpää M, Attal N, Backonja M, et al. NeuPSIG guidelines on neuropathic pain assessment. *PAIN®*. 2011 Jan 1;152(1):14-27.
217. Smith EM, Pang H, Cirrincione C, et al. Effect of duloxetine on pain, function, and quality of life among patients with chemotherapy-induced painful peripheral neuropathy: a randomized clinical trial. *Jama*. 2013 Apr 3;309(13):1359-67.
218. Gewandter JS, Dworkin RH, Finnerup NB, et al. Painful chemotherapy-induced peripheral neuropathy: lack of treatment efficacy or the wrong clinical trial methodology?. *Pain*. 2017 Jan;158(1):30.
219. Finnerup NB, Sindrup SH, Jensen TS. The evidence for pharmacological treatment of neuropathic pain. *Pain*. 2010 Sep 1;150(3):573-81.
220. Finnerup NB, Attal N, Haroutounian S, et al. Pharmacotherapy for neuropathic pain in adults: a systematic review and meta-analysis. *Lancet Neurology*. 2015 Feb 1;14(2):162-73.
221. Higham CE, Faithfull S. Bone Health and Pelvic Radiotherapy. *Clinical Oncology*. 2015;27(11):668–78.
222. Holm T, Singnomklao T, Rutqvist LE, et al. Adjuvant preoperative radiotherapy in patients with rectal carcinoma: Adverse effects during long term follow-up of two randomized trials. *Cancer: Interdisciplinary International Journal of the American Cancer Society*. 1996 Sep 1;78(5):968-76.
223. Baxter NN, Habermann EB, Tepper JE, et al. Risk of pelvic fractures in older women following pelvic irradiation. *Journal of the American Medical Association*. 2005; 294(20):2587–93.
224. Herman MP, Kopetz S, Bhosale PR, et al. Sacral insufficiency fractures after preoperative chemoradiation for rectal cancer: incidence, risk factors, and clinical course. *International Journal of Radiation Oncology* Biology* Physics*. 2009 Jul 1;74(3):818-23.
225. Kim HJ, Boland PJ, Meredith DS, et al. Fractures of the sacrum after chemoradiation for rectal carcinoma: incidence, risk factors, and radiographic evaluation. *International Journal of Radiation Oncology* Biology* Physics*. 2012 Nov 1;84(3):694-9.
226. Ugurluer G, Akbas T, Arpacı T, et al. Bone complications after pelvic radiation therapy: evaluation with MRI. *Journal of medical imaging and radiation oncology*. 2014 Jun;58(3):334-40.
227. Jørgensen JB, Bondeven P, Iversen LH, et al. Pelvic insufficiency fractures frequently occur following preoperative chemo-radiotherapy for rectal cancer—a nationwide MRI study. *Colorectal Disease*. 2018 Oct;20(10):873-80.
228. Kang YM, Chao TF, Wang TH, et al. Increased risk of pelvic fracture after radiotherapy in rectal cancer survivors: A propensity matched study. *Cancer Medicine*. 2019 Jul;8(8):3639-47.
229. Razavian N, Laucis A, Sun Y, et al. Radiation-induced insufficiency fractures after pelvic irradiation for gynecologic malignancies: a systematic review. *International Journal of Radiation Oncology* Biology* Physics*. 2020 Nov 1;108(3):620-34.
230. Cabarrus MC, Ambekar A, Lu Y, et al. MRI and CT of Insufficiency Fractures of the Pelvis and the Proximal Femur. *American Journal of Roentgenology*. 2008;191(4):995–1001.
231. Matcuk GR, Mahanty SR, Skalski MR, et al. Stress fractures: pathophysiology, clinical presentation, imaging features, and treatment options. *Emergency Radiology*. 2016(23):365–75.
232. Sapienza LG, Salcedo MP, Ning MS, et al. Pelvic Insufficiency Fractures After External Beam Radiation Therapy for Gynecologic Cancers: A Meta-analysis and Meta-regression of 3929 Patients. *International Journal of Radiation Oncology Biology Physics*. 2020 Mar 1;106(3):475–84.

233. Kronborg CJ, Jørgensen JB, Petersen JB, et al. Pelvic insufficiency fractures, dose volume parameters and plan optimization after radiotherapy for rectal cancer. *Clinical and Translational Radiation Oncology*. 2019 Nov 1;19:72-6.
234. Coleman R, Hadji P, Body JJ, et al. Bone health in cancer: ESMO clinical practice guidelines. *Annals of Oncology*. 2020 Dec 1;31(12):1650-63.
235. van den Blink QU, Garcez K, Henson CC, et al. Pharmacological interventions for the prevention of insufficiency fractures and avascular necrosis associated with pelvic radiotherapy in adults. *Cochrane Database of Systematic Reviews*. 2018 (4).
236. Faury S, Rullier E, Denost Q, et al. Quality of life and fatigue among colorectal cancer survivors according to stoma status - the national VICAN survey. *Journal of Psychosocial Oncology*. 2020;38(1):89–102.
237. Aapro M, Scotte F, Bouillet T, et al. A Practical Approach to Fatigue Management in Colorectal Cancer. *Clinical Colorectal Cancer*. 2017(16):275–85.
238. Eyl RE, Thong MS, Carr PR, et al. Physical activity and long-term fatigue among colorectal cancer survivors—a population-based prospective study. *BMC cancer*. 2020 Dec;20:1-1.
239. Brandenburg D, Korsten JHWM, Berger MY, et al. The effect of physical activity on fatigue among survivors of colorectal cancer: a systematic review and meta-analysis. *Supportive Care in Cancer*. 2018(26):393–403.
240. Kenkhuis MF, van der Linden BW, Breedveld-Peters JJ, et al. Associations of the dietary World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) recommendations with patient-reported outcomes in colorectal cancer survivors 2–10 years post-diagnosis: a cross-sectional analysis. *British Journal of Nutrition*. 2021 May;125(10):1188-200.
241. Schlesinger S, Walter J, Hampe J, et al. Lifestyle factors and health-related quality of life in colorectal cancer survivors. *Cancer Causes and Control*. 201;25(1):99–110.

5. Methods

Literature search

A systematic search of the electronic databases Pubmed Central, CINAHL and Embase was conducted using the Medical Subject Headings (MeSH) rectal neoplasms or colonic neoplasms or colorectal neoplasms with relevant subheadings* and by specifying the following limits: *species* (human), *languages* (English). The search included studies from the date of inception to February 2021. Further, a search in the Cochrane Library was conducted. *The word concepts used for the search were: survivorship, late adverse effect, late toxicity, late effect and bowel dysfunction, urinary dysfunction, sexual dysfunction, psychosocial, quality of life, pain, and neuropathy. All the synonyms and associated sub-terms were combined using the “OR” operator and, subsequently these were combined along with the other concepts by the “AND” operator. One reviewer (SH) independently screened the titles and the abstracts of each reference. A total of 188 articles were retained for full-text review and then screened by a minimum of two reviewers to assess their quality and determine with evidence level. Further searches for relevant reference literature from related fields provided an additional 45 articles that were also included in the guideline.

Evidence assessment

A minimum of two panel members were assigned to each of the symptom categories. These members individually extracted data and graded the quality of evidence and the strength of the recommendation into a shared internet-based platform. These data were then merged and discussed in plenum (in case of discrepancies) before the final wording of recommendations and management strategies was prepared.

Articulation of the recommendations

Relevant data in each symptom category were extracted from each article by the assigned members of the panel and shared on the internet-based platform. A draft of each symptom category was produced by author SH, apart from bowel dysfunction in colon cancer patients (drafted by JF) and pain/neuropathy (drafted by CJSK and LV). Panel members assigned to the relevant symptom categories reviewed the drafts and the approved versions were then compiled into the guideline, which was finalized by the entire group of panel members.

Stakeholder involvement

The group behind these guidelines comprised two oncologists (CJSK and LV), several surgical gastroenterologists (KJE, PC, BTO, PMF, RAH, NAF and SH), a medical gastroenterologist (JF), a stoma nurse specialist (MK), a sexologist (AHM), and a urologist (CHG). No patients were involved in the development of these guidelines.

External review and guideline approval

The guideline has not been reviewed externally. The guideline is approved by the DCCG.

Need for further research

There is a good amount of literature describing the extent of these problems. However, a striking lack of evidence exist to support management options, and further research in the area is warranted.

Authors

- Susanne Haas (MD, PhD), Danish Cancer Society National Research Center for Survivorship and Late Adverse Effects Following Pelvic Organ Cancer, Department of Surgery, Aarhus University Hospital, Denmark, and Department of Surgery, Randers Regional Hospital, Denmark.
- Anette Højer Mikkelsen, Clinical Sexology, Specialist in Sexological Counseling (authorized by the Nordic Association of Clinical Sexology) (RN, MSc), Sexological Center, Aalborg University Hospital, Denmark.
- Camilla Jensenius Skovhus Kronborg (MD, PhD), Danish Centre for Particle Therapy, Aarhus University Hospital, Denmark.
- Birthe Thing Oggensen (MD), General Surgeon, Herlev Hospital, Denmark
- Pia Faaborg Møller (MD, PhD), Colorectal Surgeon, Department of Surgery, Vejle Hospital, Denmark
- Janne Fassov (MD, PhD), Danish Cancer Society National Research Center for survivorship and late adverse effects following pelvic organ cancer, Department of Gastroenterology and Hepatology, Aarhus University Hospital, Denmark.
- Nina Abild Frederiksen (MD), General Surgeon, Surgical Department Zealand University Hospital, Denmark.
- Marianne Krogsgaard, Clinical Nurse Specialist (RN, MHS, PhD), Department of Surgery, Zealand University Hospital, Koege, Denmark.
- Charlotte Grauaard-Jensen (MD, PhD), Department of Urology, Aarhus University Hospital, Denmark.
- Lise Ventzel (MD, PhD), Department of Clinical medicine - Experimental Clinical Oncology, Aarhus University Hospital, Denmark.
- Peter Christensen (MD, DMSci, PhD), Professor, Consultant Colorectal Surgeon, Danish Cancer Society National Research Center for Survivorship and Late Adverse Effects Following Pelvic Organ Cancer, Department of Surgery, Aarhus University Hospital, Denmark.
- Katrine Jøssing Emmertsen (MD, PhD) Danish Cancer Society National Research Center for Survivorship and Late Adverse Effects Following Pelvic Organ Cancer, Department of Surgery, Aarhus University Hospital, Denmark and Department of Surgery, Randers Regional Hospital, Denmark

6. Monitoring

Standards and indicators

No national quality assurance database was established for monitoring the management of TRS in CRC survivors.

Plan for audit and feedback

The contents of the guideline will be updated and re-evaluated bi-annually by the group of authors.

7. Appendix

Appendix 1 – Search strategy (In Danish language)

| Afgrænsning af emne | |
|--|---|
| Baggrund | <i>Der ønskes udarbejdet en vejledning til behandling af senfølger efter behandling for kolorektal cancer</i> |
| Inklusions- og eksklusionskriterier | Publikationsdato (periode): 1968 - Sprog: Alle Publikationstype(-r): Alle undtagen conference abstracts |

| Emneord | Populationen ¹ | Intervention ¹ | Sammenligningsintervention ¹ | Outcomes ¹ |
|---|---|---------------------------|--|--|
| Dansk <i>Alle tænkelige søgeord bør indsættes.</i> | Tyktarmskræft Endetarmskræft Tarmkræft | Indsæt søgeord | senfølger | Tarmdysfunktion Urinvejsdysfunktion Sexuel dysfunktion Psykosocial Smerte Lymfødem |
| Engelsk <i>Alle tænkelige søgeord bør indsættes.</i> | Colorectal Colorectal cancer Colon cancer Cancer of the colon Rectal cancer Cancer of the rectum | Indsæt søgeord | Late effects Late adverse effects Late toxicity Survivorship Cancer survivor | Bowel dysfunction Urinary dysfunction Screening Diagnosing Monitoring Pain Neuropathy Sexual dysfunction Pelvic radiation disease Psycho-social |

¹ Se vejledning for Valg af tema for yderligere eksempler og beskrivelse af 'Population', 'Intervention', 'Sammenligningsintervention' og 'Outcome'.

| | | | | |
|--|--|--|--|---|
| | | | | <i>Quality of life</i> <i>Lymphedema</i> <i>Treatment models</i> <i>Rehabilitaion</i> <i>Care</i> |
|--|--|--|--|---|

Inspiration til søgeord kan findes i andre studier på samme område, som man har kendskab til. Man søger *ikke* efter outcomes.

Søgning efter guidelines

| Databaser (Guidelines) | Dato for søgning | Ansvarlig for søgningen |
|--|------------------|-------------------------|
| G-I-N International http://www.g-i-n.net/library/international-guidelines-library | (29/01/2021) | Susanne Haas |
| NICE (UK) https://www.nice.org.uk/guidance/published?type=apg.csg.cg.mpg.p.h.sg.sc | (29/01/2021) | Susanne Haas |
| Scottish Intercollegiate Guidelines Network (SIGN) http://www.sign.ac.uk/our-guidelines.html | (29/01/2021) | Susanne Haas |
| | | |

Søgning efter systematiske reviews

| Databaser (systematiske reviews) | Dato for søgning | Ansvarlig for søgningen |
|----------------------------------|------------------|--------------------------------|
| Medline | 12-02-2021 | Helene Sognstrup/ Susanne Haas |
| EMBASE | 12-02-2021 | Helene Sognstrup/ Susanne Haas |

| | | |
|----------|------------|--------------------------------|
| CINAHL | 12-02-2021 | Helene Sognstrup/ Susanne Haas |
| PSYCINFO | | |
| | | |

Søgning efter primærlitteratur (fx randomiserede kontrollerede forsøg)

| Databaser (primær litteratur) | Dato for søgning (dd/mm/åååå) | Ansvarlig for søgningen (navn(e)) |
|-------------------------------|-------------------------------|-----------------------------------|
| Medline | 12-02-2021 | Helene Sognstrup/ Susanne Haas |
| EMBASE | 12-02-2021 | Helene Sognstrup/ Susanne Haas |
| THE COCHRANE LIBRARY | (dd/mm/åååå) | |
| CINAHL | 12-02-2021 | Helene Sognstrup/ Susanne Haas |
| PSYCINFO | | |
| | | |

Søgestrategier (kopieret ind)

For hver anvendt database kopieres selve søgningen ind herunder.

(((((("Rectal Neoplasms"[Mesh]) OR "Colonic Neoplasms"[Mesh]) OR "Colorectal Neoplasms"[Mesh:NoExp]) OR ("Rectal Neoplasms"[Title/Abstract] OR "Colonic Neoplasms"[Title/Abstract] OR "Colorectal Neoplasms"[Title/Abstract])) AND (survivorship[Text Word] OR "late adverse effect"[Text Word] OR "late toxicit"[Text Word] OR "late effect"[Text Word])) AND ("bowel dysfunction"[Text Word] OR "urinary dysfunction"[Text Word] OR "sexual dysfunction"[Text Word] OR "psychosocial"[Text Word] OR quality of life[Text Word] OR pain[Text Word] OR "neuropathy"[Text Word]))

(((((("Rectal Neoplasms"[Mesh]) OR "Colonic Neoplasms"[Mesh]) OR "Colorectal Neoplasms"[Mesh:NoExp]) OR ("Rectal Neoplasms"[Title/Abstract] OR "Colonic Neoplasms"[Title/Abstract] OR "Colorectal Neoplasms"[Title/Abstract])) AND ("low anterior resection syndrome"[Text Word] OR "LARS"[Text Word]))

((((((("Rectal Neoplasms"[Mesh]) OR "Colonic Neoplasms"[Mesh]) OR "Colorectal Neoplasms"[Mesh:NoExp]) OR ("Rectal Neoplasms"[Title/Abstract] OR "Colonic Neoplasms"[Title/Abstract] OR "Colorectal Neoplasms"[Title/Abstract])) AND ("urogenital dysfunction"[Text Word] OR "urinary dysfunction"[Text Word])))

((((((("Rectal Neoplasms"[Mesh]) OR "Colonic Neoplasms"[Mesh]) OR "Colorectal Neoplasms"[Mesh:NoExp]) OR ("Rectal Neoplasms"[Title/Abstract] OR "Colonic Neoplasms"[Title/Abstract] OR "Colorectal Neoplasms"[Title/Abstract])) AND ("pain"[Text Word] OR "neuropathy"[Text Word]))

((((((("Rectal Neoplasms"[Mesh]) OR "Colonic Neoplasms"[Mesh]) OR "Colorectal Neoplasms"[Mesh:NoExp]) OR ("Rectal Neoplasms"[Title/Abstract] OR "Colonic Neoplasms"[Title/Abstract] OR "Colorectal Neoplasms"[Title/Abstract])) AND ("sexual dysfunction"[Text Word] OR "sexual function"[Text Word] OR "sexual health"[Text Word] OR "erectile dysfunction"[Text Word] OR "sexual rehabilitaiton"[Text Word]))



Search Queries

| No. | Query | Results | Date |
|-----|--|---------|-------------|
| #10 | ('rectum cancer'/exp AND ('survivorship'/exp OR 'cancer survivor'/exp OR ('late adverse effect*' OR 'late effect*' OR 'late toxicity')) AND ('bowel dysfunction*' OR 'urinary dysfunction*' OR 'sexual dysfunction*' OR 'psychosocial' OR 'quality of life' OR pain OR 'neuropathy')) AND ('article'/it OR 'article in press'/it OR 'review'/it) | 637 | 12 Feb 2021 |
| #9 | ('rectum cancer'/exp AND ('survivorship'/exp OR 'cancer survivor'/exp OR ('late adverse effect*' OR 'late effect*' OR 'late toxicity')) AND ('bowel dysfunction*' OR 'urinary dysfunction*' OR 'sexual dysfunction*' OR 'psychosocial' OR 'quality of life' OR pain OR 'neuropathy')) | 1053 | 12 Feb 2021 |
| #8 | ('rectum cancer'/exp AND ('survivorship'/exp OR 'cancer survivor'/exp OR ('late adverse effect*' OR 'late effect*' OR 'late toxicity')) AND ('bowel dysfunction*' OR 'urinary dysfunction*' OR 'sexual dysfunction*' OR | 1053 | 12 Feb 2021 |

| | | |
|----|--|---------------------|
| | 'psychosocial' OR 'quality of life' OR pain OR 'neuropathy') | |
| #7 | 'bowel dysfunction*' OR 'urinary dysfunction*' OR 'sexual dysfunction*' OR 'psychosocial' OR 'quality of life' OR pain OR 'neuropathy' | 2226604 12 Feb 2021 |
| #6 | 'rectum cancer'/exp AND ('survivorship'/exp OR 'cancer survivor'/exp OR ('late adverse effect*' OR 'late effect*' OR 'late toxicity')) | 2345 12 Feb 2021 |
| #5 | 'survivorship'/exp OR 'cancer survivor'/exp OR ('late adverse effect*' OR 'late effect*' OR 'late toxicity') | 44669 12 Feb 2021 |
| #4 | 'late adverse effect*' OR 'late effect*' OR 'late toxicity' | 17785 12 Feb 2021 |
| #3 | 'cancer survivor'/exp | 25751 12 Feb 2021 |
| #2 | 'survivorship'/exp | 4223 12 Feb 2021 |
| #1 | 'rectum cancer'/exp | 232163 12 Feb 2021 |

Friday, February 12, 2021 5:05:18 AM

| # | Query | Limiters/Expanders | Last Run Via | Results |
|----|--|--|---|---------|
| S6 | S4 AND S5 | Expanders - Apply equivalent subjects Search modes - Boolean/Phrase | Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL with Full Text | 272 |
| S5 | 'bowel dysfunction*' OR 'urinary dysfunction*' OR 'sexual dysfunction*' OR 'psychosocial' OR 'quality of life' OR pain OR 'neuropathy' | Expanders - Apply equivalent subjects Search modes - Boolean/Phrase | Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL with Full Text | 983,695 |
| S4 | S1 AND S3 | Expanders - Apply equivalent subjects Search modes - Boolean/Phrase | Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL with Full Text | 545 |
| S3 | (MH "Cancer Survivors") OR survivorship OR ("late adverse effect" OR "late effect" OR "late toxicity") | Expanders - Apply equivalent subjects Search modes - Boolean/Phrase | Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL with Full Text | 17,407 |
| S2 | (MH "Cancer Survivors") | Expanders - Apply equivalent subjects Search modes - Boolean/Phrase | Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL with Full Text | 11,307 |
| S1 | (MH "Rectal Neoplasms*") OR (MH "Colonic Neoplasms*") OR (MH "Colorectal Neoplasms") | Expanders - Apply equivalent subjects Search modes - Boolean/Phrase | Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL with Full Text | 40,768 |

8. Background

This clinical practice guideline is developed in as a collaborative effort of the Danish Multidisciplinary Cancer Groups (DMCG.dk) and the Danish Clinical Registries (RKKP). This work is part of an intensified guideline effort launched in relation to the Danish National Cancer Plan IV. Its aim is to support high-quality cancer care throughout Danish healthcare. The contents of the guideline have been approved by the disease-specific multidisciplinary cancer group, and the format has been approved by the Center for Clinical Practice Guidelines | Cancer. Further information about clinical practice guidelines on cancer treatment in Denmark is available here (in Danish language): www.dmcg.dk/kliniske-retningslinjer.

The target users of this guideline are healthcare professionals working in Danish healthcare. The guideline consists of systematically prepared statements that may be used for decision-making support by healthcare professionals and patients when deciding on appropriate and correct care in a specific clinical situation.

Clinical guidelines concerning Danish cancer care constitute professional advice. Thus, the guidelines are not legally binding, and professional judgement in each specific clinical context will always determine what constitutes appropriate and correct medical care. Furthermore, adherence to guideline recommendations is no guarantee of a successful outcome. Occasionally care reflecting a lower level of evidence may therefore be preferred given the individual patient's situation.

The clinical guideline contains essential recommendations and management strategies (Chapter 1) and describes relevant scientific evidence (Chapters 3+4). Recommendations and management strategies marked Grade A are the strongest, whereas Grade D marks the weakest recommendation level. For further information about strength of evidence, please see “The Oxford Centre for Evidence-Based Medicine Levels of Evidence and Grades of Recommendations”. The panel has listed both recommendations and management strategies as the former are of a more general character and the latter provide more practical advice suited for initiation on site before referral to specialized units.

Information about the target population (Chapter 2) and the method of development (Chapter 5) are also included in the guideline. Please see the table of contents for page references. Information about the national Danish integrated cancer pathways – descriptions of the patient journey through Danish healthcare – are available at the website of the Danish Health Authority: <https://www.sst.dk/en/disease-and-treatment/cancer/cancer-pathways>.

The development of this clinical practice guideline was funded by the Danish Cancer Society.