Review Article

A narrative review of prognostic indices in the evaluation of gastrointestinal cancers

Daniel Knewitz[1], Tariq Almerey[1], Emmanuel Gabriel[1,2]

[1]Mayo Clinic, Jacksonville, FL, USA; [2]Department of Surgical Oncology, Mayo Clinic, Jacksonville, FL, USA

Contributions: (I) Conception and design: All authors; (II) Administrative support: T Almerey, E Gabriel; (III) Provision of study materials or patients: T Almerey, E Gabriel; (IV) Collection and assembly of data: All authors; (V) Data analysis and interpretation: All authors; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Daniel Knewitz, MD. Mayo Clinic, 3551 San Pablo Rd., Jacksonville, FL 32224, USA. Email: Knewitz.Daniel@mayo.edu.

Background and Objective: Accurate cancer prognostication allows for conscious decision-making. There is a need for precise indices, along with predictive biomarkers, which aid cancer prognostication. We sought to conduct an overview of the current state of prognostic indices and biomarkers in the evaluation of gastrointestinal (GI) cancers, specifically esophageal, colon and rectal.

Methods: We conducted a comprehensive review of articles in the PubMed database between September 2001 and February 2022. Only articles written in English were included. We reviewed retrospective analyses and prospective observational studies.

Key Content and Findings: Nomograms are well-described tools that provide estimates of specific cancer-related events, such as overall survival (OS). They are also useful in unroofing specific patient-related variables, which may be associated with cancer survival. Certain prognostic indices have been tested against each other with the goal of discerning superiority. Finally, specific biomarkers have emerged as promising prognostic indicators.

Conclusions: Nomograms play a significant role in the prognostication of GI cancer. The identification of specific biomarkers in cancer prognostication is evolving. As we embark on the era of precision medicine, further investigation of reliable prognostic indices and biomarkers is needed.

Keywords: Indices; cancer prognostication; gastrointestinal (GI); biomarkers; nomograms

Submitted Feb 23, 2023. Accepted for publication Jun 26, 2023. Published online Jul 05, 2023.
doi: 10.21037/jgo-23-159
View this article at: https://dx.doi.org/10.21037/jgo-23-159

Introduction

The value of accurate cancer prognostication cannot be overstated as it allows for conscious decision making for both patients and their families (1). An accurate prognosis may lead to recommendations more fitting for each individual patient, which can have a big impact on treatment plan, such as less aggressive treatment or end-of-life care (2). Despite this, disease prognostication tends to garner less recognition than disease treatment within clinical practice (3). Additionally, providers are often hesitant to provide patients with prognostic estimations (4,5), which is at odds with the findings that many patients prefer to have these discussions (6,7).

It is reasonable to postulate that this reluctance is, at least in part, due to the lack of a single quintessential calculator for accurately predicting the course of a patient's malignancy. Establishing specific demographic factors, laboratory values and genetic biomarkers as reliable prognostic indicators is a highly investigated topic. We sought to conduct an overview of the current state of prognostic indices in gastrointestinal (GI) cancers. Given the extensive number of studies available for review, we limited our search to esophageal, colon and rectal cancer. Our review highlights studies in which novel calculators have been produced and/or tested against already established calculators. Additionally, we

Table 1 The search strategy summary

Items	Description
Date of search	Between 22nd August, 2022 and 15th January, 2023
Databases and other sources searched	PubMed
Search terms used	Prognosis, Neoplasms/Mortality, Decision Making, Gastrointestinal, Neoplasms/diagnosis, Nomograms, Esophageal neoplasms, Rectal neoplasms, Colonic Neoplasms, Tumor Biomarkers, Biomarkers
Timeframe	Articles were between 7th September, 2001 and 25th February, 2022
Inclusion, and exclusion criteria	Inclusion criteria: only articles written in English were included. Retrospective analysis and prospective observational studies were included. Exclusion criteria: not applicable
Selection process	Authors DK, TA, and EG conducted the selection of articles. Consensus was reached with discussion among all authors

aim to discuss the prognostic variables utilized within these published indices, specifically the ones found to be associated with survival, including specific biomarkers. We present this article in accordance with the Narrative Review reporting checklist (available at https://jgo.amegroups.com/article/view/10.21037/jgo-23-159/rc).

Methods

To review the current state of indices utilized in the prognostication of esophageal, colon and rectal cancer, a comprehensive electronic search was undertaken of articles in the PubMed database, from 7 September 2001 to 25 February 2022. We reviewed studies that either featured novel nomograms, highlighted specific prognostic variables associated with cancer survival, or sought to compare existing indices. A subset of our search focused on articles reviewing the role of biomarkers in cancer prognostication. Articles were identified using keywords, "prognosis", "neoplasms/mortality", "decision making", "gastrointestinal," "neoplasms/diagnosis", "nomograms", "esophageal neoplasms", "rectal neoplasms", "colonic neoplasms", "tumor biomarkers" and "biomarkers". We reviewed retrospective analyses and prospective observational studies. We utilized articles written in English only. The texts of the articles were reviewed in entirety. Methods are summarized in *Table 1*.

Discussion

Nomograms: *predictive power*

Nomograms are commonly utilized to prognose a patient's cancer. Assisted by their user-friendly graphical interfaces, they can provide individual predictive estimates of specific cancer related events (8). Overall survival (OS) is one example and is a common point of emphasis in published nomograms. For example, Deng *et al.* developed a nomogram that was effective in predicting OS in patients with thoracic esophageal squamous cell carcinoma (ESCC) following radical esophagectomy (9). Jin *et al.* established nomograms which predicted 3- and 5-year OS in patients with early onset colorectal cancer (10). Diao *et al.* constructed a nomogram for predicting OS in patients with rectal squamous cell carcinoma (11).

In addition to OS, other cancer related events are predicted using nomograms. Chao *et al.* demonstrated a novel nomogram which showed good performance for predicting pathological complete response after neoadjuvant chemoradiotherapy in patients with ESCC (12). In patients with colorectal carcinoma, a nomogram was developed to estimate recurrence following curative surgery (13). In patients with rectal cancer, Hoshino *et al.* created a nomogram useful in predicting anastomotic leakage following low anterior resection (14). Nomograms play a considerable role in cancer prognostication.

Nomograms: *prognostic variables*

Nomograms are also utilized to unroof patient-related variables, which may associate with cancer survival. Sex, age, and tumor-node-metastasis (TNM) classification have been described in multiple published nomograms as measures linked to OS amongst patients with esophageal cancer (9,15,16). The number of chemotherapy cycles was

selected in building nomograms aimed to predict survival in patients with ESCC following radical esophagectomy and adjuvant chemotherapy (17). In patients with ESCC treated by surgery alone, body mass index (BMI) was utilized to construct a nomogram predicting long term survival (18). In patients with early onset esophageal cancer, race, and marital status were specific variables found to effect OS (19).

Like esophageal cancer, age was shown to be associated with OS in patients with colon cancer (20). In patients with colon cancer and associated liver metastasis, it was suggested that a nomogram incorporating histological type of both mucinous adenocarcinoma and signet ring cell carcinoma, along with whether the patient had either bone or lung metastasis, could effectively prognose this specific subset of patients (21). Li *et al.* demonstrated that T stage contributed to prognosis, followed by N stage, in patients with early onset locally advanced colon cancer (22). In addition to age, tumor size, and lung metastasis, Jin *et al.* showed that perineural invasion was correlated with OS in patients with early onset colorectal cancer (10).

In patients with locally advanced rectal cancer, Li *et al.* demonstrated how age, marital status, race, tumor size, and carcinoembryonic antigen (CEA) were significantly associated with OS and cancer-specific survival within their created nomograms (23). Wei *et al.* established seven features which were associated with OS, including BMI and nerve aggression, in patients with locally advanced rectal cancer treated with neoadjuvant therapy (24). Whereas Wei *et al.* demonstrated an association between post-operative CEA and OS, Wang *et al.* developed a nomogram identifying pretreatment CEA as independently associated with cancer specific mortality (25). Lastly, tumor deposits as an independent risk factor for OS in patients with stage III–IV rectal cancer were highlighted by Zhong *et al.* (26).

Evaluation of existing models

Studies aiming to provide external validation of published prognostic indices are present within the literature. Lemini *et al.* compared the performance of the Roswell Park Comprehensive Cancer Center (RPCCC) calculator, Oregon Health & Science University (OHSU) calculator, along with two nomograms published by Shapiro *et al.*, and Sun *et al.* in the prognostication of esophageal cancer (27-29). Although the nomogram published by Shapiro *et al.* attained the greatest performance, no model achieved a high performance.

In patients with stage II–III colon cancer, Lemini *et al.* estimated patient survival rates using the RPCCC, Memorial Sloan Kettering Cancer Center (MSKCC), and MD Anderson Cancer Center (MDACC) calculators (30). These indices demonstrated similar predictive capability, with the RPCCC calculator displaying the best performance followed by MSKCC and MDACC. In patients with stage II–III colon cancer, who received 5-fluorouracil (5-FU), Gill *et al.* compared Numeracy and Adjuvant, which are two web-based calculators utilized to predict the benefit of adjuvant 5-FU (31). Bardia *et al.* also compared both Numeracy and Adjuvant in their capabilities to estimate benefits in disease free survival (DFS) and OS when comparing three different post-surgical therapy choices, specifically observation, 5-FU and folinic acid/fluorouracil/oxaliplatin (FOLFOX) (32).

The MSKCC and MDACC are two readily available online calculators. To demonstrate the clinical utility of these tools, we compared the predicted 5-year survival rates of both calculators in 8 randomly identified patients with history of colon cancer, the majority of which were stage IIA (n=5), who were treated at Mayo Clinic Florida 5 years ago. All patients with stage IIA disease were alive at 5 years follow up. In each of these patients, the MDACC calculator predicted higher 5-year OS. Interestingly, in patients with stage III disease (n=2), the MSKCC performed better at predicting OS. One patient with stage 4 disease in our cohort had a 14% and 87–90% predicted 5-year OS, when utilizing the MSACC and MSKCC calculators, respectively. This patient was still alive at 5 years. This difference may be explained by the incorporation of lymph node staging in the MSKCC calculator, but it demonstrates that there are also limitations of using these calculators in real world prognostication. Nonetheless, these tools are overall accurate, and can help give patients some reassurance when discussing treatment plans and expected outcomes.

Authors have also attempted to validate their own developed calculators against already established indices. For example, Duan *et al.* reported that their nomogram better predicted OS when compared to the TNM staging system in patients with ESCC following radical esophagectomy and adjuvant chemotherapy (17). The indicators utilized in the construction of this nomogram were gender, tumor length, T stage, N stage, and number of chemotherapy cycles. Three hundred and twenty-eight and 76 patient internal and external validation cohorts were designed, respectively. Similarly, Shao *et al.* showed how their prognostic nomogram displayed superior predictive capability when compared to the 6th and 7th American Joint

Committee on Cancer (AJCC) TNM classifications when predicting survival in patients with resectable thoracic ESCC (33). Grade, T Stage, Modified N Stage, C-Reactive protein/albumin (CRP/Alb) ratio and neutrophil-lymphocyte ratio (NLR) were variables used in this nomogram. Primary and validation cohorts consisted of 633 and 283 patients, respectively. Weiser *et al.* compared their developed calculator versus both the AJCC or neoadjuvant rectal (NAR) score, reporting more individualized estimates of recurrence free survival (RFS) and OS by the calculator produced by the authors after evaluating 1,400 patients with stage II and III rectal cancer treated with chemoradiation, surgery and adjuvant chemotherapy (34). Specific to RFS, the prognostic variables utilized were AJCC postoperative pathologic tumor (ypT) category, number of positive nodes, distance from the anal verge (or DTAV, in cm), and whether venous invasion or perineural invasion were present. The nomogram created for OS differed only by the addition of age as a variable. Diao *et al.* developed a novel calculator which demonstrated to have better discriminative power over both the Surveillance, Epidemiology, and End Results (SEER) stage and 8th AJCC TNM staging classification when predicting OS in patients with rectal squamous cell carcinoma (11). This nomogram utilized age, marital status, T stage, M stage, surgery (local excision/partial proctectomy *vs.* total proctectomy *vs.* no surgery), and both history of concurrent chemotherapy and radiation therapy as variables. Five hundred and thirty-four and 272 patients made up their training and validation set, respectively. It is important to note that due to the retrospective nature of these predictive tools, no specific power calculation was used to identify the number of patients needed to construct these tools. However, this was a common approach among each study and was a generally accepted limitation.

Biomarkers as independent prognostic indicators

The emphasis on establishing biomarkers in cancer prognostication has grown in recent years. Specific to esophageal cancer, overexpression of microRNA (miRNA) signatures, such as hsa-miR-186-5p and has-let-7d-5p were shown to be independently associated with a poor prognosis in patients with esophageal adenocarcinoma and ESCC, respectively (35). Additionally, it has been demonstrated that specific methylation markers could accurately estimate prognosis in patients with esophageal cancer (36). Yang *et al.* completed a review of the recent advances in prognostic biomarkers, which highlighted both how liquid biopsies have shown high accuracy and specificity, and the importance of epigenetic markers in the prognostication of esophageal carcinoma (37).

As it pertains to colon cancer, mismatch repair (MMR) status is a well-discussed biomarker for prognostication. Zaanan *et al.* reported that MMR status remains a significant variable for prognosing DFS in patients with stage III colon cancer who are treated with adjuvant FOLFOX chemotherapy (38,39). In contrast, Kim *et al.* demonstrated that MMR status, in addition to p53 positivity were not significantly associated with outcomes in patients with stage II, III and IV colon cancer with R0 resection following adjuvant FOLFOX therapy (40). In addition to MMR status, tumor associated macrophages have been investigated as prognostic biomarkers in colon cancer. Feng *et al.* demonstrated that high cluster of differentiate 206/cluster of differentiate 68 (CD206/CD68) ratio was significantly associated with poor DFS and OS (41).

Regarding rectal cancer, lymphocyte count × albumin concentration (LA) was shown to be significantly associated with both OS and RFS in patients with stage II and III disease (42). In patients with mid to lower rectal cancer, mesorectal fat area (MFA) greater than or equal to 10 cm^2 was demonstrated to be an independent biomarker for predicting DFS in patients who underwent curative intent surgery when compared to patients with MFA less than 10 cm^2 (43). Platelet to lymphocyte and lymphocyte to monocyte ratio have also been shown to be independent prognostic factors for OS in patients with locally advanced rectal cancer following neoadjuvant chemoradiation therapy (44).

Conclusions

In conclusion, our review provides a focused overview of indices utilized in the prognostication of patients with GI cancer. Nomograms play a key role in predicting patient outcomes, along with unroofing specific patient-related variables which may be associated with survival. Additionally, our review highlights comparisons made between existing prognostic indices. Lastly, we shed light on recently investigated biomarkers with proven potential as independent prognostic indicators. Despite the tremendous effort in developing predictive indices and establishing biomarkers reliable in evaluating patients with GI cancers highlighted in this report, none were considered faultless, and thus should not be expected to produce perfect and consistent results when applied to all patients presenting

with a specific GI malignancy. As the rate of molecular profiling of patient cancer cells increases, we advocate for the combination of biomarkers with demographic and pathological data into nomograms, with the long-term goal of greater precision and reliability for each individual patient. As we embark on the era of precision medicine, further investigation of reliable prognostic indices and biomarkers is needed.

Acknowledgments

Funding: None.

Footnote

Reporting Checklist: The authors have completed the Narrative Review reporting checklist. Available at https://jgo.amegroups.com/article/view/10.21037/jgo-23-159/rc

Peer Review File: Available at https://jgo.amegroups.com/article/view/10.21037/jgo-23-159/prf

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://jgo.amegroups.com/article/view/10.21037/jgo-23-159/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work were appropriately investigated and resolved.

References

1. LeBlanc TW, Marron JM, Ganai S, et al. Prognostication and Communication in Oncology. J Oncol Pract 2019;15:208-15.
2. Sborov K, Giaretta S, Koong A, et al. Impact of Accuracy of Survival Predictions on Quality of End-of-Life Care Among Patients With Metastatic Cancer Who Receive Radiation Therapy. J Oncol Pract 2019;15:e262-70.
3. Gill TM. The central role of prognosis in clinical decision making. JAMA 2012;307:199-200.
4. Koedoot CG, Oort FJ, de Haan RJ, et al. The content and amount of information given by medical oncologists when telling patients with advanced cancer what their treatment options are. palliative chemotherapy and watchful-waiting. Eur J Cancer 2004;40:225-35.
5. Butow PN, Dowsett S, Hagerty R, et al. Communicating prognosis to patients with metastatic disease: what do they really want to know? Support Care Cancer 2002;10:161-8.
6. El-Jawahri A, Traeger L, Park ER, et al. Associations among prognostic understanding, quality of life, and mood in patients with advanced cancer. Cancer 2014;120:278-85.
7. Enzinger AC, Zhang B, Schrag D, et al. Outcomes of Prognostic Disclosure: Associations With Prognostic Understanding, Distress, and Relationship With Physician Among Patients With Advanced Cancer. J Clin Oncol 2015;33:3809-16.
8. Iasonos A, Schrag D, Raj GV, et al. How to build and interpret a nomogram for cancer prognosis. J Clin Oncol 2008;26:1364-70.
9. Deng W, Zhang W, Yang J, et al. Nomogram to Predict Overall Survival for Thoracic Esophageal Squamous Cell Carcinoma Patients After Radical Esophagectomy. Ann Surg Oncol 2019;26:2890-8.
10. Jin H, Feng Y, Guo K, et al. Prognostic Nomograms for Predicting Overall Survival and Cancer-Specific Survival of Patients With Early Onset Colon Adenocarcinoma. Front Oncol 2020;10:595354.
11. Diao JD, Wu CJ, Cui HX, et al. Nomogram predicting overall survival of rectal squamous cell carcinomas patients based on the SEER database: A population-based STROBE cohort study. Medicine (Baltimore) 2019;98:e17916.
12. Chao YK, Chang HK, Tseng CK, et al. Development of a nomogram for the prediction of pathological complete response after neoadjuvant chemoradiotherapy in patients with esophageal squamous cell carcinoma. Dis Esophagus 2017;30:1-8.
13. Weiser MR, Landmann RG, Kattan MW, et al. Individualized prediction of colon cancer recurrence using a nomogram. J Clin Oncol 2008;26:380-5.
14. Hoshino N, Hida K, Sakai Y, et al. Nomogram for predicting anastomotic leakage after low anterior resection for rectal cancer. Int J Colorectal Dis 2018;33:411-8.

15. Eil R, Diggs BS, Wang SJ, et al. Nomogram for predicting the benefit of neoadjuvant chemoradiotherapy for patients with esophageal cancer: a SEER-Medicare analysis. Cancer 2014;120:492-8.
16. Shao CY, Liu XL, Yao S, et al. Development and validation of a new clinical staging system to predict survival for esophageal squamous cell carcinoma patients: Application of the nomogram. Eur J Surg Oncol 2021;47:1473-80.
17. Duan J, Deng T, Ying G, et al. Prognostic nomogram for previously untreated patients with esophageal squamous cell carcinoma after esophagectomy followed by adjuvant chemotherapy. Jpn J Clin Oncol 2016;46:336-43.
18. Zheng Y, Fu S, He T, et al. Predicting prognosis in resected esophageal squamous cell carcinoma using a clinical nomogram and recursive partitioning analysis. Eur J Surg Oncol 2018;44:1199-204.
19. Shi M, Tang JW, Cao ZR. Nomograms for predicting survival in early-onset esophageal cancer. Expert Rev Gastroenterol Hepatol 2021;15:437-46.
20. Li X, Yu W, Liang C, et al. INHBA is a prognostic predictor for patients with colon adenocarcinoma. BMC Cancer 2020;20:305.
21. Liu C, Hu C, Huang J, et al. A Prognostic Nomogram of Colon Cancer With Liver Metastasis: A Study of the US SEER Database and a Chinese Cohort. Front Oncol 2021;11:591009.
22. Li Y, Liu W, Zhou Z, et al. Development and validation of prognostic nomograms for early-onset locally advanced colon cancer. Aging (Albany NY) 2020;13:477-92.
23. Li Y, Liu D, Zhao L, et al. Accurate nomograms with excellent clinical value for locally advanced rectal cancer. Ann Transl Med 2021;9:296.
24. Wei FZ, Mei SW, Chen JN, et al. Nomograms and risk score models for predicting survival in rectal cancer patients with neoadjuvant therapy. World J Gastroenterol 2020;26:6638-57.
25. Wang Y, Wu J, He H, et al. Nomogram predicting cancer-specific mortality in early-onset rectal cancer: a competing risk analysis. Int J Colorectal Dis 2020;35:795-804.
26. Zhong X, Wang L, Shao L, et al. Prognostic Nomogram for Rectal Cancer Patients With Tumor Deposits. Front Oncol 2022;12:808557.
27. Lemini R, Díaz Vico T, Trumbull DA, et al. Prognostic models for stage I-III esophageal cancer: a comparison between existing calculators. J Gastrointest Oncol 2021;12:1963-72.
28. Shapiro J, van Klaveren D, Lagarde SM, et al. Prediction of survival in patients with oesophageal or junctional cancer receiving neoadjuvant chemoradiotherapy and surgery. Br J Surg 2016;103:1039-47.
29. Sun Y, Wang J, Li Y, et al. Nomograms to predict survival rates for esophageal cancer patients with malignant behaviors based on ICD-0-3. Future Oncol 2019;15:121-32.
30. Lemini R, Attwood K, Pecenka S, et al. Stage II-III colon cancer: a comparison of survival calculators. J Gastrointest Oncol 2018;9:1091-8.
31. Gill S, Loprinzi C, Kennecke H, et al. Prognostic web-based models for stage II and III colon cancer: A population and clinical trials-based validation of numeracy and adjuvant! online. Cancer 2011;117:4155-65.
32. Bardia A, Loprinzi C, Grothey A, et al. Adjuvant chemotherapy for resected stage II and III colon cancer: comparison of two widely used prognostic calculators. Semin Oncol 2010;37:39-46.
33. Shao Y, Ning Z, Chen J, et al. Prognostic nomogram integrated systemic inflammation score for patients with esophageal squamous cell carcinoma undergoing radical esophagectomy. Sci Rep 2015;5:18811.
34. Weiser MR, Chou JF, Keshinro A, et al. Development and Assessment of a Clinical Calculator for Estimating the Likelihood of Recurrence and Survival Among Patients With Locally Advanced Rectal Cancer Treated With Chemotherapy, Radiotherapy, and Surgery. JAMA Netw Open 2021;4:e2133457. Erratum in: JAMA Netw Open 2022;5:e2147251.
35. Xue J, Jia E, Ren N, et al. Identification of prognostic miRNA biomarkers for esophageal cancer based on The Cancer Genome Atlas and Gene Expression Omnibus. Medicine (Baltimore) 2021;100:e24832.
36. Li D, Zhang L, Liu Y, et al. Specific DNA methylation markers in the diagnosis and prognosis of esophageal cancer. Aging (Albany NY) 2019;11:11640-58.
37. Yang W, Han Y, Zhao X, et al. Advances in prognostic biomarkers for esophageal cancer. Expert Rev Mol Diagn 2019;19:109-19.
38. Zaanan A, Fléjou JF, Emile JF, et al. Defective mismatch repair status as a prognostic biomarker of disease-free survival in stage III colon cancer patients treated with adjuvant FOLFOX chemotherapy. Clin Cancer Res 2011;17:7470-8.
39. Zaanan A, Shi Q, Taieb J, et al. Role of Deficient DNA Mismatch Repair Status in Patients With Stage III Colon Cancer Treated With FOLFOX Adjuvant Chemotherapy: A Pooled Analysis From 2 Randomized Clinical Trials. JAMA Oncol 2018;4:379-83.

40. Kim ST, Lee J, Park SH, et al. Clinical impact of microsatellite instability in colon cancer following adjuvant FOLFOX therapy. Cancer Chemother Pharmacol 2010;66:659-67.
41. Feng Q, Chang W, Mao Y, et al. Tumor-associated Macrophages as Prognostic and Predictive Biomarkers for Postoperative Adjuvant Chemotherapy in Patients with Stage II Colon Cancer. Clin Cancer Res 2019;25:3896-907.
42. Yamamoto T, Kawada K, Hida K, et al. Combination of lymphocyte count and albumin concentration as a new prognostic biomarker for rectal cancer. Sci Rep 2021;11:5027.
43. Yoon J, Chung YE, Lim JS, et al. Quantitative assessment of mesorectal fat: new prognostic biomarker in patients with mid-to-lower rectal cancer. Eur Radiol 2019;29:1240-7.
44. Wang P, Wang Z, Liu Y, et al. Prognostic value of platelet-associated biomarkers in rectal cancer patients received neoadjuvant chemoradiation: A retrospective study. Cancer Radiother 2021;25:147-54.

Cite this article as: Knewitz D, Almerey T, Gabriel E. A narrative review of prognostic indices in the evaluation of gastrointestinal cancers. J Gastrointest Oncol 2023;14(4):1849-1855. doi: 10.21037/jgo-23-159

