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Practice Guidelines

Quality control indices for standardized diagnosis and treatment of esophageal cancer in China (2022 edition)☆

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ABSTRACT

Esophageal cancer (EC) is particularly common in China. With the continuing progress of multi-disciplinary therapy including early screening, minimally invasive techniques, radiotherapy and chemotherapy, the 5-year survival of EC has been improved in China. However, there are considerable disparities in the diagnosis and treatment quality among different regions. The Esophageal Cancer Expert Committee of the National Cancer Quality Control Center (NCQCC) considers a set of authoritative quality control standards as an opportunity to eliminate the disparities and improve the overall survival and quality of life of EC. To further promote the quality control for standardized diagnosis and treatment of EC, the National Cancer Center commissioned the Esophageal Cancer Quality Control Expert Committee to draft and formulate the Chinese Quality Control Indices for Standardized Diagnosis and Treatment of Esophageal Cancer (2022 edition). The Indices includes 21 items that cover all key areas in the diagnosis and treatment of esophageal cancer, such as medical oncology, radiation oncology, endoscopy, and pathology.

Esophageal cancer (EC), ranking the 7th in incidence worldwide in 2021, is one of the most common cancers.[1] Over 50% of incident cases of EC occurred in China, hence EC is particularly common among other cancers with high incidence in this country. According to the annual report of cancer statistics in China in 2020, EC is the 6th malignancy in incidence and the 4th in mortality.[2] With the continuing progress of multi-disciplinary therapy, including early screening, minimally invasive techniques, radiotherapy, and chemotherapy, the 5-year survival of EC has been improved in China. However, there are considerable disparities in the diagnosis and treatment quality among different regions countrywide. In 2012, the National Health Committee of China led the establishment of the National Cancer Quality Control Center (NCQCC) to implement quality control of cancer diagnosis and treatment, aiming to promote the standardization, uniformity, and normalization of cancer diagnosis and treatment across different regions, and to ultimately improve the survival and quality of life of cancer patients. To further promote the quality control for standardized diagnosis and treatment of EC, the National Cancer Center commissioned the Esophageal Cancer Quality Control Expert Committee to draft and formulate the Chinese Quality Control Indices for Standardized Diagnosis and Treatment

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of Esophageal Cancer (2022 edition) based on national guidelines, e.g., Standardization for diagnosis and treatment of esophageal cancer (2022 edition),[3] as well as research evidence and clinical experience, following the principles of being scientific, universal, standard, and feasible. We hope esophageal oncologists could practice the diagnosis and treatment for esophageal carcinoma in accordance with the indices.

Quality control indices for the standardized diagnosis and treatment of EC are described in detail below:

I. **Proportion of complete clinical TNM staging of EC patients before the initial treatment**
1. Index code: EC-01.
2. Definition: the proportion of EC patients who are diagnosed with complete clinical TNM staging before the initial treatment among all the EC patients receiving initial treatment.
3. Formula of calculation: see Fomula (1).

$$\text{Proportion of complete clinical TNM staging of EC patients before the initial treatment} = \frac{\text{Number of EC patients with complete clinical TNM staging before the initial treatment}}{\text{Total number of EC patients receiving initial treatment in the same time period}} \times 100\% \quad (1)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects a comprehensive evaluation of the disease before treatment, which is the basis of standardized cancer treatment.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: patients not receiving anti-tumor treatment.
9. References for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition)[3] and Union for International Cancer Control (UICC) TNM Classification of Malignant Tumors of the Esophagus (8th edition).[4]

II. **Proportion of compliance with evaluation strategies of clinical TNM stage of EC patients before the initial treatment**
1. Index code: EC-02.
2. Definition: the proportion of EC patients for whom the pre-treatment clinical TNM stage is evaluated in compliance with recommended strategies among all the EC patients receiving initial treatment. Evaluation of the clinical TNM stage of an EC patient should follow either of the two following strategies: chest computed tomography (CT) + upper abdominal CT + neck ultrasound/neck CT + endoscopy or positron emission tomography-CT (PET-CT) + endoscopy.
3. Formula of calculation: see Fomula (2).

$$\text{Proportion of compliance with evaluation strategies of clinical TNM stage of EC patients before initial treatment} = \frac{\text{Number of EC patients whose pre-treatment clinical TNM stage is evaluated following recommended strategies}}{\text{Total number of EC patients receiving initial treatment in the same time period}} \times 100\% \quad (2)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects comprehensive evaluation of the disease before treatment, which is the basis of standardized cancer treatment.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: patients not receiving anti-cancer treatment.
9. References for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition)[3] and UICC TNM Classification of Malignant Tumors of the Esophagus (8th edition).[4]

III. **Proportion of pathological diagnosis of EC patients before the initial anti-tumor treatment**
1. Index code: EC-03.
2. Definition: the proportion of EC patients who received a pathological diagnosis before the initial anti-tumor treatment among all the EC patients receiving initial anti-tumor treatment.
3. Formula of calculation: see Fomula (3).

$$\text{Proportion of pathological diagnosis of EC patients before the initial anti–tumor treatment} = \frac{\text{Number of EC patients with pathological diagnosis before the initial anti–tumor treatment}}{\text{Total number of EC patients receiving initial anti–tumor treatment in the same time period}} \times 100\% \quad (3)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects the degree of standardization of EC diagnosis and treatment, and guides the decision-making in cancer treatment.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: none.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

IV. **Proportion of early-stage EC patients receiving narrow-band imaging (NBI) & magnifying endoscopy/ultrasound endoscopy before endoscopic mucosal resection (EMR) or endoscopic submucosal dissection (ESD)**
1. Index code: EC-04.
2. Definition: the proportion of early-stage EC patients who received NBI plus magnifying endoscopy or NBI plus ultrasound endoscopy examination prior to EMR or ESD among all the early-stage EC patients treated with EMR or ESD.

3. Formula of calculation: see Fomula (4).

$$\text{Proportion of early–stage EC patients receiving NBI \& magnifying endoscopy or ultrasound endoscopy before EMR or ESD} = \frac{\text{Number of early–stage EC patients receiving NBI \& magnifying endoscopy or ultrasound endosocpy before EMR or ESD}}{\text{Total number of early–stage EC patients receiving EMR or ESD in the same time period}} \quad (4)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: NBI+magnifying endoscopy or NBI+ultrasound endoscopy are important examinations before the procedure of EMR or ESD for early-stage EC patients. They are essential in evaluating whether the lesions could be resected with EMR or ESD, and are therefore indispensable before endoscopic therapy.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: none.
9. Reference for this index: Guidelines for Endoscopic Submucosal Dissection and Endoscopic Mucosal Resection for Early Gastric Cancer (second edition)[5] issued by the Japan Gastroenterological Endoscopy Society (JGES) in 2020.

V. **Proportion of gastroesophageal junction (GEJ) adenocarcinoma patients with known Siewert classification**

1. Index code: EC-05.
2. Definition: the proportion of patients with GEJ adenocarcinoma whose Siewert type are classified among all the patients with GEJ adenocarcinoma.
3. Formula of calculation: see Fomula (5).

$$\text{Proportion of GEJ adenocarcinoma patients with known Siewert classification} = \frac{\text{Number of GEJ adenocarcinoma patients with known Siewert classification}}{\text{Total number of GEJ adenocarcinoma patients in the same time period}} \times 100\% \quad (5)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects the degree of standardization of surgery for GEJ adenocarcinoma, and guides the decision-making in surgical strategy selection.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: none.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

VI. **Proportion of complete preoperative staging of EC patients after neoadjuvant therapy**

1. Index code: EC-06.
2. Definition: the proportion of EC patients for whom the tumor stage is evaluated after neoadjuvant therapy and before surgery among all the EC patients receiving neoadjuvant therapy followed by surgical resection.
3. Formula of calculation: see Fomula (6).

$$\text{Proportion of complete preoperative staging of EC patient after neoadjuvant therapy} = \frac{\text{Number of EC patients whose preoperative tumor stage is evaluated after neoadjuvant therapy}}{\text{Total number of EC patients receiving neoadjuvant therapy followed by surgery in the same time period}} \times 100\% \quad (6)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects the degree of standardization of esophagectomy procedure, and guides the decision-making in surgical strategy selection.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: none.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

VII. **Proportion of locally advanced EC patients receiving neoadjuvant therapy**

1. Index code: EC-07.
2. Definition: the proportion of patients with locally advanced EC treated with neoadjuvant therapy before surgery among all the locally advanced EC patients receiving radical esophagectomy. Locally advanced EC refers to stages T3N0M0 and T1-4aN+M0 EC.
3. Formula of calculation: see Fomula (7).

$$\text{Proportion of locally advanced EC patients receiving neoadjuvant therapy} = \frac{\text{Number of locally advanced EC patients treated with neoadjuvant therapy before surgery}}{\text{Total number of locally advanced EC patients treated with radical esophagectomy in the same time period}} \times 100\% \quad (7)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: neoadjuvant therapy before esophagectomy constitutes an essential part in standardized multi-disciplinary therapy (MDT) for EC, and is therefore an important index in evaluating the quality of standardized treatment for this disease.
6. Index type: quality control of results.

7. Improvement indices: proportion increased.
8. Excluded cases: none.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

VIII. **Proportion of sufficient lymph node dissection in radial esophagectomy of EC patients**

1. Index code: EC-08.
2. Definition: the proportion of EC patients with ≥15 lymph nodes dissected in radical esophagectomy among all the EC patients treated with radical surgical resection.
3. Formula of calculation: see Fomula (8).

$$\text{Proportion of sufficient lymph node dissection in radical esophagectomy of EC patients} = \frac{\text{Number of EC patients with} \geq 15 \text{ lymph nodes dissected in radical esophagectomy}}{\text{Total number of EC patients receiving radical esophagectomy in the same time period}} \times 100\% \quad (8)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: lymph node dissection is a major aspect of esophagectomy, which ensures both accurate postoperative pathological staging and radical resection of the tumor. It is therefore an important index in evaluating the standardization of esophagectomy.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: the patients receiving palliative or exploratory surgery.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

IX. **Proportion of lymph node station dissection score >18 in radical esophagectomy of EC patients**

1. Index code: EC-09.
2. Definition: the proportion of EC patients with a lymph node station dissection score >18 in radical esophagectomy among all the EC patients treated with radical surgical resection.
3. Formula of calculation: see Fomula (9).

$$\text{Proportion of EC patients with a lymph node station dissection score} > 18 \text{ in radical esophagectomy} = \frac{\text{Number of EC patients with a lymph node station dissection score} > 18 \text{ in radical esophagectomy}}{\text{Total number of EC patients receiving radical esophagectomy in the same time period}} \times 100\% \quad (9)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: lymph node dissection is a major aspect of esophagectomy, which ensures both accurate postoperative pathological staging and radical resection of the tumor. It is therefore an important index in evaluating the standardization of esophagectomy. Based on the common pattern of lymph node metastasis of thoracic EC, the probability of involvement and effectiveness of dissection vary across different lymph node stations, which are used to assign a score to each lymph node station. The sum of the scores of dissected lymph node stations is evaluated for quality control of lymphadenectomy.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: the patients receiving palliative or exploratory surgery.
9. References for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition)[3] in China and Japanese Classification of Esophageal Cancer (11th edition).[6,7]

X. **Proportion of complete postoperative pathological report of EC patients**

1. Index code: EC-10.
2. Definition: the proportion of EC patients with complete postoperative pathological reports among all the EC patients having postoperative pathological reports. A complete pathological report includes (but is not restricted to) the following sections: histological subtype of the tumor,[8] degree of differentiation, maximum diameter of the tumor, depth of invasion, extent of invasion (e.g., pleural invasion), high-risk factors (e.g., lymphovascular invasion,[9] neural invasion, etc.), number of metastatic and total dissected lymph nodes, resection margin (proximal, distal, and circumferential resection margins[10]) and pTNM stage.[11] For EC patients treated with neoadjuvant therapy before surgery, their postoperative pathological reports should include tumor regression grade and ypTNM stage. Immunohistological and special staining is required if necessary.
3. Formula of calculation: see Fomula (10).

$$\text{Proportion of complete postoperative pathological report of EC patients} = \frac{\text{Number of EC patients with complete postoperative pathological report}}{\text{Total number of EC patients with postoperative pathological report}} \times 100\% \quad (10)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects the degree of standardization of pathological diagnosis and reporting, and guides postoperative therapy for EC.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: EC patients receiving palliative or exploratory surgery.

9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

XI. **Human epidermal growth factor receptor 2 (HER-2) positive rate before HER-2 targeting therapy in advanced-stage esophageal adenocarcinoma (EAC) patients**

1. Index code: EC-11.
2. Definition: the proportion of advanced-stage EAC patients tested HER-2 positive before receiving HER-2 targeting therapy among all the advanced-stage EAC patients treated with HER-2 targeting therapy. Advanced-stage EAC refers to adenocarcinoma diagnosed at clinical stage IVB.
3. Formula of calculation: see Fomula (11).

$$\text{HER–2 positive rate before HER–2 targeting therapy in advanced–stage EAC patients} = \frac{\text{Number of advanced–stage EAC patients tested HER–2 positive before HER–2 targeting therapy}}{\text{Total number of advanced–stage EAC patients receiving HER–2 targeting therapy}} \times 100\% \quad (11)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects the degree of standardization of HER-2 targeting therapy for advanced-stage EAC patients.
6. Index type: quality control of process.
7. Improvement indices: proportion increased.
8. Excluded cases: none.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

XII. **Proportion of precision radiotherapy for EC**

1. Index code: EC-12.
2. Definition: the proportion of EC patients receiving precision radiotherapy among all the EC patients treated with radiation.
3. Formula of calculation: see Fomula (12).

$$\text{Proportion of precision radiotherapy for EC} = \frac{\text{Number of EC patients receiving precision radiotherapy}}{\text{Total number of EC patients receiving radiotherapy in the same time period}} \times 100\% \quad (12)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects the quality control of radiotherapy for EC.
6. Type of index: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: EC patients receiving postoperative or preoperative radiation, or those receiving palliative radiation for metastatic lesions.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

XIII. **Proportion of standard-dose definitive radiotherapy for EC**

1. Index code: EC-13.
2. Definition: the proportion of EC patients receiving ≥50 Gy in definitive radiotherapy among all the EC patients treated with definitive radiotherapy.
3. Formula of calculation: see Fomula (13).

$$\text{Proportion of standard–dose definitive radiotherapy for EC} = \frac{\text{Number of EC patients receiving} \geq 50\ \text{Gy in definitive radiotherapy}}{\text{Total number of EC patients receiving definitive radiotherapy in the same time period}} \times 100\% \quad (13)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects the quality control of radiotherapy for EC.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: EC patients receiving postoperative or preoperative radiation, or those receiving palliative radiation for metastatic lesions.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

XIV. **Proportion of adverse effects evaluation after anti-tumor drug treatment for EC**

1. Index code: EC-14.
2. Definition: the proportion of person-times of adverse effects evaluation for EC patients receiving anti-tumor drug treatment over the total person-times of anti-tumor drug treatment among all EC patients.
3. Formula of calculation: see Fomula (14).

$$\text{Proportion of adverse effects evaluation after anti–tumor drug treatment for EC} = \frac{\text{person–times of adverse effects evaluation for EC patients receiving anti–tumor drug treatment}}{\text{Total person–times of anti–tumor drug treatmnet among EC patients}} \times 100\% \quad (14)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects the management of adverse effects following anti-tumor drug treatment for EC patients.
6. Index type: quality control of process.
7. Improvement indices: proportion increased.
8. Excluded cases: none.
9. Reference for this index: none.

XV. **Proportion of effect evaluation after anti-tumor drug treatment for EC**

1. Index code: EC-15.
2. Definition: the proportion of EC patients for whom treatment effect evaluation is completed following anti-tumor drug treatment among all the EC patients treated with anti-tumor drugs.
3. Formula of calculation: see Fomula (15).

$$\text{Proportion of effect evaluation after anti–tumor drug treatment for EC} = \frac{\text{Number of EC patients having complete treatement effect evaluation after anti–tumor drug treatment}}{\text{Total number of EC patients receiving anti–tumor drug treatment in the same time period}} \times 100\% \quad (15)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: treatment effect evaluation is a major step in anti-tumor drug treatment, which guides decision-making for ensuing treatment strategy. Timely and accurate treatment effect evaluation reflects standardization of anti-tumor drug treatment.
6. Index type: quality control of process.
7. Improvement indices: proportion increased.
8. Excluded cases: adjuvant anti-tumor drug treatment after surgery.
9. Reference for this index: none.

XVI. **Proportion of TNM staging in discharge diagnosis of EC**

1. Index code: EC-16.
2. Definition: the person-times with complete pathological and/or clinical TNM stage in discharge diagnosis of EC patients over the total person-times of EC discharge.
3. Formula of calculation: see Fomula (16).

$$\text{Proportion of TNM staging in discharge diagnosis of EC} = \frac{\text{Person–times of EC discharge with complete pathological and/or clinical TNM stage}}{\text{Total person–times of EC discharge in the same time period}} \times 100\% \quad (16)$$

4. Patient population: hospitalized patients.
5. Rationale: this index reflects comprehensive evaluation of the disease status of the patient, and therefore is fundamental for standardized cancer treatment.
6. Expression: increased proportion.
7. Improvement indices: proportion increased.
8. Excluded cases: none.
9. References for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition)[3] and UICC TNM Classification of Malignant Tumors of the Esophagus (8th edition).[4]

XVII. **Proportion of standardized use of preoperative prophylactic antibiotics for EC**

1. Index code: EC-17.
2. Definition: the proportion of EC patients receiving prophylactic antibiotics before surgery among all the EC patients receiving esophagectomy.
3. Formula of calculation: see Fomula (17).

$$\text{Proportion of standardized use of preoperative prophylactic antibiotics for EC} = \frac{\text{Number of EC patients receiving preoperative prophylactic antibiotics}}{\text{Total number of EC patients receiving esophagectomy in the same time period}} \times 100\% \quad (17)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects the degree of standardized medication in EC surgical wards.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: none.
9. Reference for this index: Notice of General Office of National Health Committee of the People's Republic of China on Continuing Management of Clinical Application of Antibiotics.[12]

XVIII. **Proportion of unplanned re-surgery of EC**

1. Index code: EC-18.
2. Definition: the proportion of EC patients receiving unplanned re-surgery after esophagectomy among all the EC patients treated with esophagectomy.

3. Formula of calculation: see Fomula (18).

$$\text{Proportion of unplanned re–surgery of EC} = \frac{\text{Number of EC patients receiving unplanned re–surgery}}{\text{Total number of EC patients receiving esophagectomy}} \times 100\% \quad (18)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: this index reflects the quality control of surgical safety for EC, which is fundamental in EC surgery.
6. Index type: quality control of results.
7. Improvement indices: proportion decreased.
8. Excluded cases: none.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

XIX. **30-d mortality after surgery for EC**

1. Index code: EC-19.
2. Definition: the proportion of EC patients died within 30 days after surgical treatment among all the EC patients receiving surgical resection.
3. Formula of calculation: see Fomula (19).

$$\text{30–d mortality after surgery for EC} = \frac{\text{Number of deaths within 30 days after surgery for EC}}{\text{Total number of EC patients receiving esophagectomy in the same time period}} \times 100\% \quad (19)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: 30-d mortality after esophagectomy is an essential index for evaluating the quality of the surgical procedure.
6. Index type: quality control of results.
7. Improvement indices: proportion decreased.
8. Excluded cases: EC patients receiving exploratory surgery.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

XX. **90-d mortality after surgery for EC**

1. Index code: EC-20.
2. Definition: the proportion of EC patients died within 90 days after surgical treatment among all the EC patients receiving surgical resection.
3. Formula of calculation: see Fomula (20).

$$\text{90–d mortality after surgery for EC} = \frac{\text{Number of deaths within 90 days after surgery for EC}}{\text{Total number of EC patients receiving esophagectomy in the same time period}} \times 100\% \quad (20)$$

4. Patient population: hospitalized patients and outpatients.
5. Rationale: 90-d mortality after esophagectomy is an essential index for evaluating the quality of the surgical procedure.
6. Index type: quality control of results.
7. Improvement indices: proportion decreased.
8. Excluded cases: EC patients receiving exploratory surgery.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

XXI. **Follow-up rate after treatment for EC**

1. Index code: EC-21.
2. Definition: the proportion of EC patients with complete follow-up within 5 years after anti-tumor treatment in hospitals among all the EC patients receiving anti-tumor treatment in hospitals.
3. Formula of calculation: see Fomula (21).

$$\text{Follow–up rate after treatment for EC} = \frac{\text{Number of hospitalized EC patients with complete follow–up within 5 years after treatment}}{\text{Total number of hospitalized EC patients in the same time period}} \times 100\% \quad (21)$$

4. Patient population: hospitalized patients.
5. Rationale: this index reflects long-term management for EC, and provides evidence for further evaluation of quality control indices of results for EC.
6. Index type: quality control of results.
7. Improvement indices: proportion increased.
8. Excluded cases: none.
9. Reference for this index: Standardization for diagnosis and treatment of esophageal cancer (2022 edition).[3]

Declaration of competing interest

The authors declare that they have no conflict of interests.

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Author contributions

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Supplementary materials

Supplementary materials associated with this article can be found, in the online version, at doi:10.1016/j.jncc.2023.07.005.

References

1. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer*. 2021;71(3):209–249. doi:10.3322/caac.21660.
2. Zheng RS, Zhang SW, Zeng HM, et al. Cancer incidence and mortality in China, 2016. *J Natl Cancer Cent*. 2022;2(1):1–9. doi:10.1016/j.jncc.2022.02.002.
3. Bureau of Medical Administration, National Health Commission of the People's Republic of ChinaStandardization for diagnosis and treatment of esophageal cancer (2022 edition). Article in Chinese. *Chin J of Dig Surg*. 2022;21(10):1247–1268. doi:10.3760/cma.j.cn115610-20220726-00433.
4. Rice TW, Gress DM, Patil DT, et al. Cancer of the esophagus and esophagogastric junction-Major changes in the American Joint Committee on Cancer eighth edition cancer staging manual. *CA Cancer J Clin*. 2017;67(4):304–317. doi:10.3322/caac.21399.
5. Ono H, Yao KS, Fujishiro M, et al. Guidelines for endoscopic submucosal dissection and endoscopic mucosal resection for early gastric cancer (second edition). *Dig Endosc*. 2021;33(1):4–20. doi:10.1111/den.13883.
6. Japan Esophageal SocietyJapanese classification of esophageal cancer, 11th edition: part I. *Esophagus*. 2017;14(1):1–36. doi:10.1007/s10388-016-0551-7.
7. Japan Esophageal SocietyJapanese classification of esophageal cancer, 11th edition: part II and III. *Esophagus*. 2017;14(1):37–65. doi:10.1007/s10388-016-0556-2.
8. Arends MJ, Fukayama M, Klimstra DS, et al. *WHO Classification of Tumors of the Digestive System*. 5th ed. IARC Press; 2019.
9. Yang ZY, Lin H, Wang Z, et al. The prognostic significance of the circumferential resection margin in esophageal squamous cell carcinoma patients without neoadjuvant treatment. *BMC Cancer*. 2022;22(1):1180. doi:10.1186/s12885-022-10276-1.
10. Liu LX, Lin H, Shen GH, et al. Prognostic significance of lymphovascular invasion in patients with pT1b esophageal squamous cell carcinoma. *BMC Cancer*. 2023;23(1):370. doi:10.1186/s12885-023-10858-7.
11. Amin MB, Edge SB, Greene FL, et al., eds. *AJCC Cancer Staging Manual*. 8th ed. Springer; 2017.
12. General Office of National Health Committee of the People's Republic of China. Notice of General Office of National Health Committee of the People's Republic of China on Continuing Management of Clinical Application of Antibiotics. July 20, 2020. Accessed August 6, 2023. https://www.gov.cn/zhengce/zhengceku/2020-07/24/content_5529693.htm.