Original Paper

IMPLEMENTING TEXTBOOK ONCOLOGIC OUTCOME IN THE DEPARTMENT OF SURGICAL ONCOLOGY OF IPO-PORTO: PRELIMINARY RESULTS

IMPLEMENTAÇÃO DO TEXTBOOK ONCOLOGIC OUTCOME NO DEPARTAMENTO DE ONCOLOGIA CIRÚRGICA DO IPO-PORTO: RESULTADOS PRELIMINARES

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ABSTRACT

Background: Textbook Oncologic Outcome (TOO) serves as a comprehensive quality metric, representing the optimal outcome for oncological patients undergoing therapeutic surgery and, consequently, indicating the quality of healthcare provided. **Methods:** The TOO variables were applied to the entire cohort of adult patients (≥18 years of age) diagnosed with esophagus, stomach, pancreas, colon, rectum, urinary bladder, or ovarian cancer at the Portuguese Institute of Oncology of Porto (IPO-Porto) between January 1st, 2022, and June 30th, 2022. This evaluation specifically included patients who underwent surgery with curative intent. **Results:** A thorough assessment was conducted on 288 patients. Among the 143 patients with colon cancer, 69.9% achieved the TOO benchmark; for the 46 rectum cancer patients, TOO was attained by 57.1%; 40.0% of the 15 patients with esophageal cancer met the TOO criteria; 59.7% of the 67 patients with stomach cancer achieved TOO; 40% of the 5 patients with pancreatic cancer met the TOO standard; 45.5% of the 12 patients with urinary bladder cancer achieved TOO, while 66.7% of the 9 women with ovarian cancer reached the TOO benchmark. These results are comparable to those of the best comprehensive cancer centers. **Conclusions:** Achieving optimal TOO not only signifies the quality of patient care but also reflects positively on the institution. Subsequently, despite obtaining relevant results, there is potential for improving outcomes for patients at IPO-Porto, particularly concerning the evaluated cancers.

Keywords: *cancer, patient outcome assessmen, textbook oncological outcome.*

RESUMO

Introdução: O *Textbook Oncologic Outcome* (TOO) é uma métrica de qualidade composta que representa o desfecho ideal para doentes oncológicos submetidos a cirurgia com intuito curativo, assumindo-se que representa a qualidade

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dos serviços de saúde prestados. **Métodos**: As variáveis do TOO foram aplicadas a todos os doentes adultos do Instituto Português de Oncologia do Porto (IPO-Porto) (≥18 anos de idade) com diagnóstico de cancro do esófago, estômago, pâncreas, cólon, reto, bexiga e ovário, entre 1 de janeiro e 30 de junho de 2022, submetidos a cirurgia com intuito curativo. **Resultados**: Foram avaliados no total 288 pacientes. Dos 143 pacientes com cancro do colon, 69,9% atingiram o TOO; 57,1% dos 46 pacientes com cancro do reto atingiram o TOO; 40,0% dos 15 pacientes com cancro do esófago atingiram o TOO; 59,7% dos 67 pacientes com cancro do estômago atingiram o TOO; 40% dos 5 pacientes com cancro do pâncreas atingiram TOO; 45,4% dos 12 pacientes com cancro da bexiga atingiram o TOO; 66,7% das 9 mulheres com cancro do ovário atingiram o TOO. Estes resultados são comparáveis aos obtidos pelos melhores centros oncológicos. **Conclusões**: Um TOO ótimo atesta a qualidade dos cuidados prestados ao doente, bem como da instituição. Apesar dos resultados obtidos serem relevantes, existe possibilidade, no IPO-Porto, para os melhorar particularmente no que diz respeito aos cancros avaliados.

***Palavras-chave**: cancro, cuidados prestados ao doente, textbook oncological outcome.*

INTRODUCTION

The Portuguese's National Health Service (SNS) expenses with health have been increasing throughout the years, reaching 12.4 billion euros in 2021, which accounts for 5,9% of the country's gross national income[1]. The overall expenses with health have also been increasing, accompanying the growing of the Portuguese population's health necessities[1].

Containing and managing the costs of the SNS and the overall expenses with health are extremely important to insure the sustainability of the system and healthcare. However, proper management of resources should be carefully addressed in order to maintain the quality of the services.

Clinical Governance (CG) can be defined as the structure from which health institutions can be accounted for ongoing improvement of the quality of their services, preserving the quality of healthcare[2]. Therefore, incorporating CG (Clinical Governance) and Surgical Department Audits (SDA) as standard practices in healthcare institutions can serve as a dual-purpose strategy. Not only can it help address the issue of escalating health expenses, but it can also play a pivotal role in enhancing clinical practices by acting as a liaison between the clinical approach and the management of service quality[3].

Globally, the incidence of cancer has been increasing and predictive models show that this increase will continue in the next decades[4]. In Portugal, this tendency is also verified, in both sexes[5].

Oncologic surgery is, consensually, the only modality of treatment with healing potential for the majority of solid neoplasia[6]. Throughout the last decades, surgical techniques have been evolving, contributing equally to great progress in research in the oncological field[6].

The measure of the quality of oncologic surgery can be made through numerous variables like morbidity, mortality, length of stay, surgical margins, post-surgical complications and readmission rates[7]. However, these variables, isolated, do not enable proper appraisal and render the comparison between hospitals and services harder to make.

Textbook Oncologic Outcome (TOO) is a composed quality measure that represents the "ideal" outcome to oncological patients submitted to surgery, assuming the ideal outcome to the patient represents the quality of healthcare[8,9]. TOO may allow patients to choose the institution with better outcomes concerning their pathology, and also propel institutions to improve their outcomes[8,9]. Higher values of TOO are associated with increased five-year survival rates[7].

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TOO allows vaster appraisal of surgical quality and in an era where patients want to be more and more part of their therapeutic decisions, TOO represents a useful tool to benchmark institutions[9].

The assessment of Textbook Oncologic Outcome (TOO) relies solely on predefined hospital records, facilitating its attainment. This project was undertaken within the framework of Clinical Governance (CG) and Surgical Department Audits (SDA) at the Portuguese Institute of Oncology of Porto (IPO-Porto). The TOO variables were applied to evaluate the appropriateness of treatments for tumors of the esophagus, stomach, pancreas, colon, rectum, urinary bladder, and ovary. The aim was to infer the quality of healthcare provided to patients at IPO-Porto and, consequently, promote continuous improvement.

METHODS

A preliminary series comprised consecutive adult patients at IPO-Porto (≥18 years of age) diagnosed with esophagus, stomach, pancreas, colon, rectum, urinary bladder, or ovarian cancer between January 1st, 2022, and June 30th, 2022. Specifically, patients who underwent surgery with the intent of achieving a curative outcome were included in the study.

The variables were adapted from the ones described by Aquina *et al* (table 1)[7]. These were extracted from the IPO-Porto's database – Integrated Knowledge Repository (RIC) – and complemented with data from the Department of Planning and Support to Management (SPAG) of IPO-Porto.

All sites and histology codes exhibited in table 2, according to the third edition of the International

Table 1 – **Variables for TOO assessment, by primary cancer site.**

TOO measure	Definition
Gastric cancer	
Adequate lymph node yeald	≥15 Regional lymph nodes removed and pathologically examined
R0 resection	All margins grossly and microscopically negative
Non-LOS outlier	Postoperative LOS <19 days
No readmission	No unplanned readmission to the same hospital within 30 days after discharge
Appropriate chemotherapy	Receipt of neoadjuvant and/or adjuvant chemotherapy for pT3-T4b and/or pN1-N3b disease
Pancreatic cancer	
Adequate lymph node yeald	≥12 Regional lymph nodes removed and pathologically examined
R0 resection	All margins grossly and microscopically negative
Non-LOS outlier	Postoperative LOS <21 days
No readmission	No unplanned readmission to the same hospital within 30 days after discharge
Appropriate chemotherapy	Receipt of neoadjuvant and/or adjuvant chemotherapy for all patients OR Co-morbidities which impede the previous
Colon cancer	
Adequate lymph node yeald	≥12 Regional lymph nodes removed and pathologically examined
R0 resection	All margins grossly and microscopically negative
Non-LOS outlier	Postoperative LOS <14 days
No readmission	No unplanned readmission to the same hospital within 30 days after discharge
Appropriate chemotherapy	Receipt of adjuvant chemotherapy within 4 months after diagnosis for patients ←80 years old with pathologic stage 3 disease

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Rectal cancer	
Adequate lymph node yeald	≥12 Regional lymph nodes removed and pathologically examined
R0 resection	All margins grossly and microscopically negative
Non-LOS outlier	Postoperative LOS <14 days
No readmission	No unplanned readmission to the same hospital within 30 days after discharge
Appropriate chemotherapy	1. Receipt of neoadjuvant chemotherapy and radiation therapy for clinically locally advanced (cT3-T4b and/or cN1-N2b) disease or receipt of adjuvant chemotherapy and radiation therapy within 180 days after diagnosis for non-clinically locally advanced (cT1-T2 e cN0) with pathologic locally advanced (pT3-T4b and/or pN1-2b) disease for patients <80 years old 2. Receipt of neoadjuvant multi-agent chemotherapy (total neoadjuvant therapy) or both neoadjuvant and adjuvant chemotherapy for clinically locally advanced (cT3-T4b and/or cN1-N2b) disease 3. Receipt of adjuvant chemotherapy for pT1-T2 and Nx disease 4. Cases of disease in the rectosigmoid transition only require adjuvant chemotherapy when pathologic locally advanced (pT3-T4b and/or pN1-2b) disease 5. Short-scheme neoadjuvant radiotherapy exempts implementation of neoadjuvant chemotherapy 6. Patients aged >80 years old and/or comorbidities may not be eligible for radiotherapy and/or chemotherapy
Esophageal cancer	
Adequate lymph node yeald	≥15 Regional lymph nodes removed and pathologically examined
R0 resection	All margins grossly and microscopically negative
Non-LOS outlier	Postoperative LOS <25 days
No readmission	No unplanned readmission to the same hospital within 30 days after discharge
Appropriate chemotherapy	1. Receipt of neoadjuvant chemotherapy and radiation therapy for clinically locally advanced (cT3-T4b and/or cN1-N2b) disease 2. Receipt of adjuvant chemotherapy for pathologic node-positive (pN1-N3) disease in patients who did not receive neoadjuvant chemoradiation 3. Co-morbidities which impede implementation 1 and 2 and/or age ³80 years old 4. Adenocarcinomas: perioperative chemotherapy
Bladder cancer	
Adequate lymph node yeald	≥12 Regional lymph nodes removed and pathologically examined for patients <80 years old
R0 resection	All margins grossly and microscopically negative
Non-LOS outlier	Postoperative LOS <18 days
No readmission	No unplanned readmission to the same hospital within 30 days after discharge
Appropriate chemotherapy	Receipt of neoadjuvant and/or adjuvant chemotherapy for muscle invasive (cT2a-T4 and/or pT2a-T4) disease for patients <80 years old OR Co-morbidities which impede the previous condition
Ovarian cancer	
Appropriate surgical resection	Salpingo-ooforectomy with omentectomy, debulking/cytoreductive surgery, or pelvic exenteration
Adequate lymph node yeald	≥1 Regional lymph nodes removed and pathologically examined for stage 1A-3B disease
R0 resection	All margins grossly negative
Non-LOS outlier	Postoperative LOS <13 days
No readmission	No unplanned readmission to the same hospital within 30 days after discharge
Appropriate chemotherapy	Receipt of neoadjuvant and/or adjuvant chemotherapy for stage 1C-3C disease.

LOS, length of stay

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Table 2 – **Codes included for selection.**

Gastric cancer	
ICD-O-3 site codes	C16.3-C16.9, C16.1-C16.2
ICD-O-3 histology codes	Adenocarcinoma: 8140-8141, 8143-8152, 8154-8231, 8255-8481, 8500-8576 Signet ring cell: 8490 Linitis plastica: 8142
Pancreatic cancer	
ICD-O-3 site codes	C25.0-C25.3, C25.7-C25.9
ICD-O-3 histology codes	Adenocarcinoma: 8000, 8010, 8020, 8140-8152, 8154-8231, 8255-8576
Colon cancer	
ICD-O-3 site codes	C18.0, C18.2-C18.9 OUR C19.9 and no radiation therapy received
ICD-O-3 histology codes	Adenocarcinoma: 8140-8221, 8250-8263 Mucinous: 8480-8481 Signet ring cell: 8490
Rectal cancer	
ICD-O-3 site codes	C20.9
ICD-O-3 histology codes	Adenocarcinoma: 8140-8221, 8250-8263 Mucinous: 8480-8481 Signet ring cell: 8490
Esophageal cancer	
ICD-O-3 site codes	C15.0-C16.0
ICD-O-3 histology codes	Adenocarcinoma: 8140-8152, 8154-8231, 8255-8551, 8562-8576 Squamous cell: 8070-8075, 8560
Bladder cancer	
ICD-O-3 site codes	C67.0-C67.6, C67.8-C67.9
ICD-O-3 histology codes	Transitional cell: 8050, 8120, 8130
Ovarian cancer	
ICD-O-3 site codes	C56.9
ICD-O-3 histology codes	Type 1 epithelial: 8005, 8051-8084, 8120-8131, 8310, 8380, 8382-8383, 8443, 8470-8471, 8480-8482, 8490, 8560, 8570 Type 2 epitelial: 8000-8004, 8010-8015, 8020-8046, 8050, 8090-8110, 8140-8231, 8246-8300, 8311-8325, 8336-8337, 8341-8375, 8381, 8384-8441, 8450, 8452-8454, 8460-8461, 8500-8551, 8561-8562, 8571-8576

ICD-O-3, International Classification of Diseases for Oncology 3rd edition

Classification of Diseases for Oncology were considered.

The variables were then extracted and analyzed using R v4.0.5 software. TOO was assessed by the proportion of conformity found in the cases of each pathology.

RESULTS

There was a total of 298 patients: 143 patients with colon cancer, 46 with rectum cancer, 16 with esophageal cancer, 67 with stomach cancer, 5 with pancreatic cancer, 12 with bladder cancer and 9

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Table 3 – **Proportion of conformities/nonconformities by primary cancer site.**

	N	CONFORMITY (%)	NONCONFORMITY (%)
COLON	143	69,9	30,1
RETUM	46	57,1	42,9
ESOPHAGUS	15	40,0	60,0
C15.0 –C15.9	11	27,3	72,7
C16.0	4	75,0	25,0
STOMACH	67	59,7	40,3
PANCREAS	5	40,0	60,0
BLADDER	12	45,5	54,5
OVARY	9	66,7	33,3

C16.0, cardia; C15.0-C15.9.- esophagus

with ovarian cancer. Table 3 summarizes the results of TOO conformities for each cancer site.

Colon

There were 143 cases of colon cancer and an overall conformity of 69,9%. The proportion of conformities in all of the items contemplated in this assessment is above 85% (figure 1).

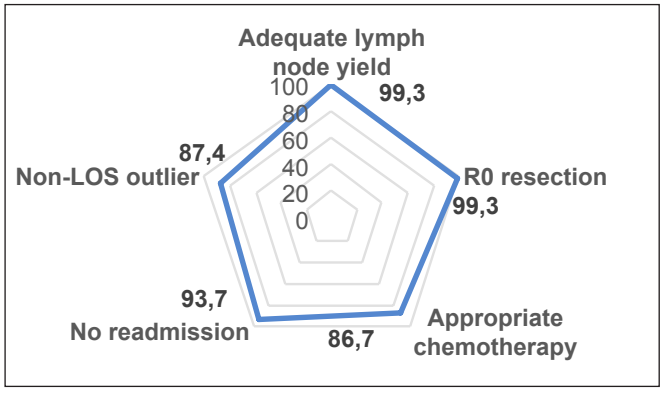

Figure 1 – **Proportion of conformities of colon cancer cases.**

Rectum

There were 46 cases of rectal cancer and an overall conformity of 57,1%. We can see from figure 2 analysis that Length of Stay (LOS) is the only item with proportion of conformities below 85% (69,9%). From the patients who outstayed their hospital stay beyond the 14 days, 70,6% suffered from postoperative complications, 23,5% prolonged their stay due to clinical conditions and 5,9% because of social questions.

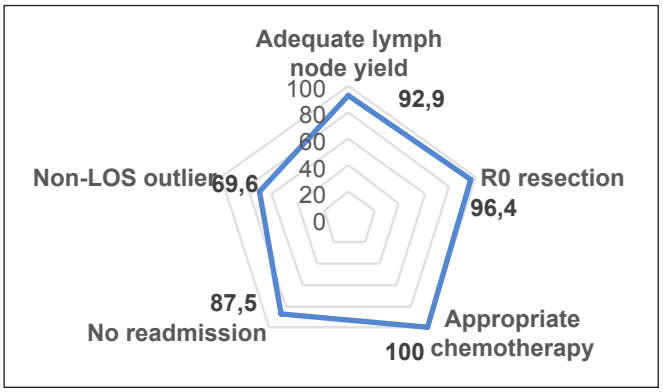

Figure 2 – **Proportion of conformities of rectum cancer cases.**

Esophagus

There were 15 cases of esophageal cancer and an overall conformity of 40,0%. Figure 3 shows that LOS and readmission are the items whose proportion of conformity are below 85%. A total of 8 patients extended their stay over 25 days:

7 of them presented with postsurgical complications and one of them was diagnosed with COVID-19 during the hospital stay. Three patients were readmitted at IPO-Porto within 30 days after discharge, all of them due to postsurgical complications. Two patients were deemed ineligible for appropriate chemotherapy and were not recommended for its administration.

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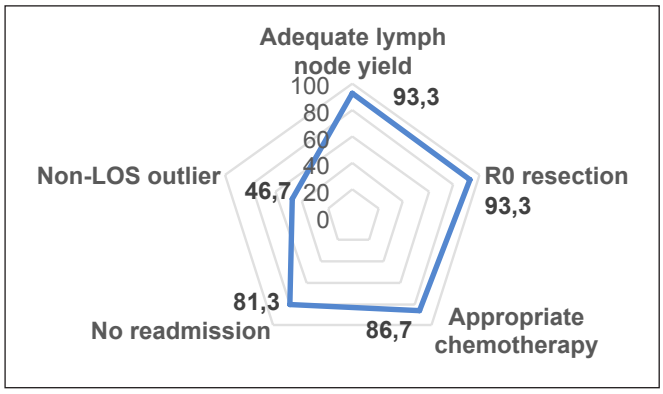

FIGURE 3 – **Proportion of conformities of esophageal cancer cases.**

Unfolding the esophagus tumor by tumor site, cardia (C16.0) and all the other sites (C15.-), and analyzing the same parameters, we verify that the TOO is very distinct: the TOO of the cardia (C16.0) is 75% (n=4) and the TOO of the other sites of the esophagus (C15.-) is 27,3% (n=11). Figures 4 and 1-E show the proportion of each parameter for each tumor site. Tumors of the cardia (C16.0) only show proportions different from 100% in readmission and appropriate chemotherapy (figure 5). Considering all other tumor sites of the esophagus, only length of stay falls under 85% of conformity (figure 4).

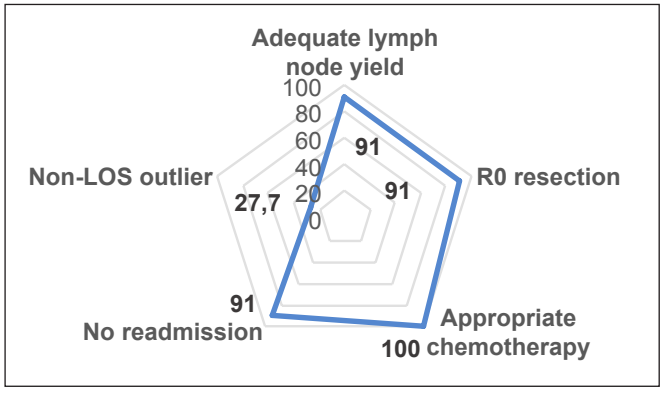

FIGURE 4 – **Proportion of conformities of C15.- (esophageal).**

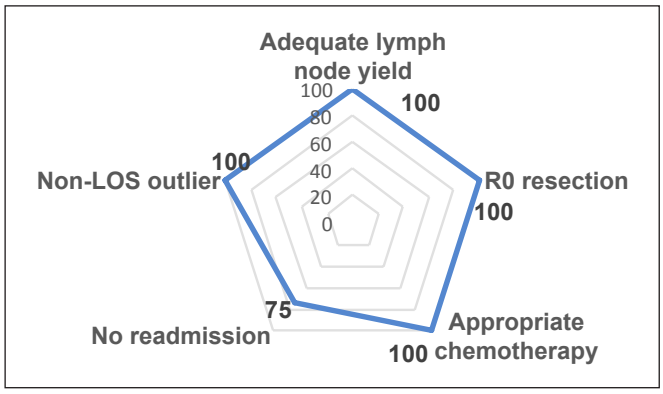

FIGURE 5 – **Proportion of conformities of C16.0 (cardia).**

Stomach

There were 67 cases of stomach cancer and an overall conformity of 59,7%. This cancer demonstrated a proportion of conformities above 85% for all the evaluated items (figure 6).

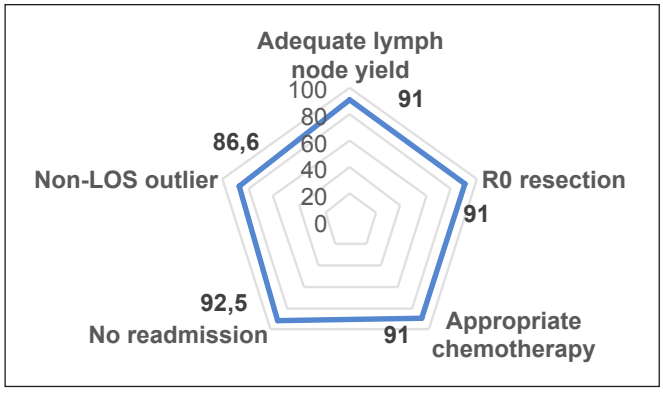

FIGURE 6 – **Proportion of conformities of stomach cancer cases.**

Pancreas

There were 5 cases of pancreatic cancer and an overall conformity of 40,0%. Despite the low number of cases, only the lymph node yield falled under 80% of conformity (figure 7). However, the number of lymph nodes resected were higher than 12 in every case and the triangle operation was performed in all duodenopancreatectomy surgeries.

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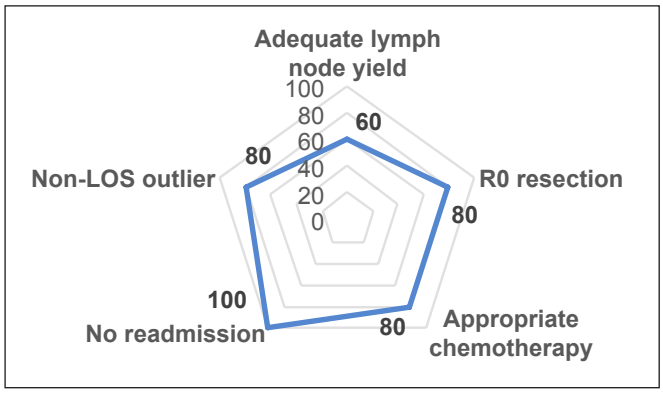

FIGURE 7 – **Proportion of conformities of pancreatic cancer cases.**

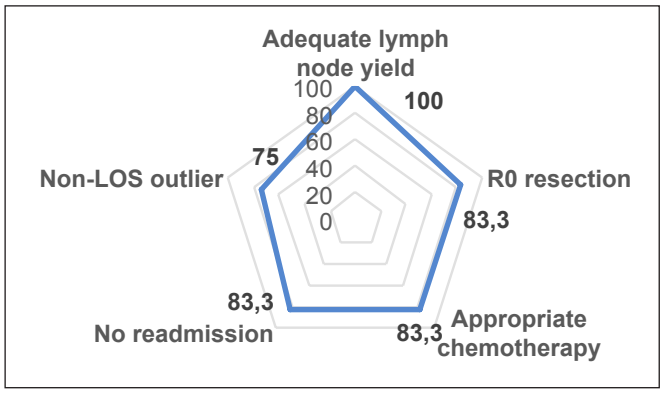

FIGURE 8 – **Proportion of conformities of bladder cancer cases.**

Bladder

There were 12 cases of bladder cancer and an overall conformity of 45,5%. As figure 8 shows, only the lymph node yield demonstrated a proportion of conformities of 100%. All other items have proportions of conformities under 85% (figure 8). Regarding chemotherapy, two patients were classified as frail elderly, and as a result, they were not recommended to undergo chemotherapy. Three patients were categorized as LOS outliers: 2 of them extended their hospital stay due to postoperative complications; and 1 did not have clinical conditions to be discharged. Two patients were readmitted at IPO-Porto within 30 days of discharge due to pyelonephritis. Concerning surgical margins, two patients did not present R0 resection; one of them had margins grossly positive as the tumor involved the internal iliac artery; the other showed microscopically positive margins.

Ovary

There were 9 cases of ovarian cancer and an overall conformity of 66,7%. As we can verify from figure 9, all of the assessed items showed proportions of conformity above 85%.

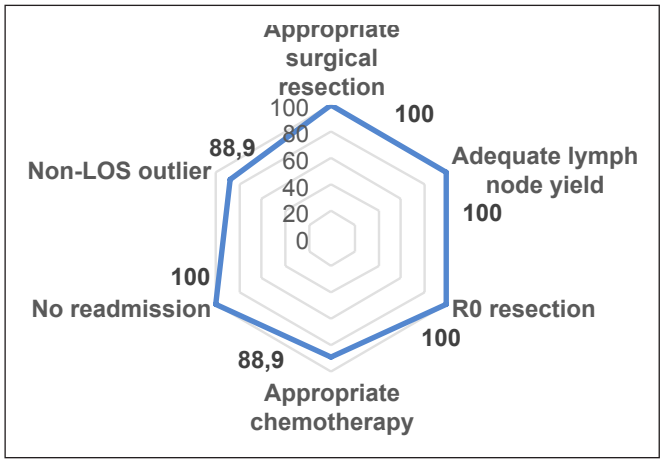

FIGURE 9 – **Proportion of conformities of ovarian cancer cases.**

DISCUSSION AND CONCLUSIONS

Quality of care is widely recognized nowadays as a priority, as it impacts patients' safety as well as institutions' costs[9]. Internal and external review systems encourage institution's constant improvement in order to excel its quality standards[10]. TOO scores are relevant to encourage institutions to review their procedures and protocols in order to provide patients the best medical care. TOO represents a benchmark to track quality and several other studies demonstrated that patients treated in institutions who achieved better TOO had better long-term survival[7,11]. Munir et al. highlighted a substantial increase in overall survival for patients

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with cholangiocarcinoma who underwent hepatic resection with a TOO, demonstrating an increase in median survival by 17.6 months[11]. Sweigert et al. also established that a higher TOO for colon adenocarcinoma was associated with increased overall survival and reduced odds of long-term adjusted mortality[12].

These results reinforce that it is in IPO-Porto's best interest to assess and improve its TOO in as many surgical oncologic pathologies as possible which had not been done until now.

In this preliminary study, we assessed the TOO scores in patients with esophagus, stomach, pancreas, colon, rectum, urinary bladder or ovary cancer, diagnosed between January 1st 2022 and June 30th 2022, and submitted to surgery with curative intent.

In relation to the Textbook Oncologic Outcome (TOO) score for rectal cancer, the Length of Stay (LOS) emerged as the primary contributing factor to the lower proportion. Our analysis led to the conclusion that patients who extended their stay at the institution experienced postsurgical complications. A hypothesis was formulated suggesting that these patients may present more challenging clinical conditions, which subsequently influenced their overall outcome.

The cohort of bladder cancer patients under evaluation was relatively small (n=12), potentially limiting the significance of the findings However, it is noteworthy that all parameters, with the exception of lymph node yield, registered values below 85%. This observation suggests that bladder cancer patients may present greater clinical challenges.

Overall stomach cancer TOO score was 59,7%, which is a promising result once European Gastrodata presented a TOO of 22,8% on their recent assessment of TOO for locally advanced gastric cancer patients[13].

Esophageal cancer showed to have particular details. Almost 100% of these patients extended their hospital stay due to postsurgical complications, were readmitted less than 30 days after discharge for the same reason. Although, when looked at cancer site, we find that cardia cancer had substantially better results when compared to cancer of other sites of the esophagus. This could be due to the degree of complexity of the surgery which culminates in different outcomes.

Based on these conclusions, this project demonstrated its utility by prompting changes in the esophageal clinical pathway and enhancing our dedicated team. The goal of these changes is to improve the Textbook Oncologic Outcome (TOO) for esophageal cases, ultimately leading to better patient outcomes and contributing to the overall quality of care provided by the institution. Colon and ovary TOO scores are the ones who present higher values but still present margin to improve.

In comparison with the data from the Aquina et al. cohort, which evaluated the same types of cancer as in this assessment, IPO-Porto exhibited similar results for colon and bladder cancer, and superior results for rectum, esophageal, stomach, pancreas, and ovary cancer (see table 4). It is essential to note that in the Aquina cohort, the conformity values were weighted by risk factors such as age and the Chalson Index. In our series, this evaluation was not conducted using the same methodology. Therefore, our series may not be directly comparable; however, it provides valuable indications for areas of relevance and areas that require improvement.

Table 4 – **Comparison of the results with the ones from Aquina et al[7]., by cancer site.**

	IPO-PORTO (% CONFORMITY)	REFERENCE[2] (% CONFORMITY)
COLON	69,9	66,9
RETUM	57,1	33,6
ESOPHAGUS	40,0	31,2
STOMACH	59,7	31,8
PANCREAS	40,0	25,0
BLADDER	45,5	43,0
OVARY	66,7	44,7

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It is anticipated that these results will serve as a catalyst for additional changes within the Surgical Department and other services involved in this assessment, despite the overall promising outcomes that have been revealed. Achieving an optimal Textbook Oncologic Outcome (TOO) not only leads to improved patient outcomes but also elevates the institution's reputation, positioning it as a preferred choice for patients seeking treatment.

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