



The value of analyzing textbook outcomes after laparoscopic hepatectomy – a narrative review

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Background and Objective: Guidelines are required because of the wide variability in care provided to patients with similar characteristics and similar medical conditions. Quality indicators were developed many years ago to assess the quality of care provided by hospitals. Since then, it has become evident that a composite set of factors can better characterize the patient's quality of care. The objectives of this review were to analyze the textbook outcomes (TO) applied in surgery, focusing on laparoscopic hepatectomy.

Methods: Data pertaining to quality indicators used in hospitals and their surgical applications were retrieved from medical literature by searching PubMed and Google Scholar for articles published between 1912 and 2022. Search terms included quality indicators, outcome indicators, TOs, TOs after surgery, TOs after hepatectomy, and clinical indicators.

Key Content and Findings: Since their inception, TO have been applied to various procedures and their impacts on patients have been assessed. TO and their implications have been studied for a variety of surgical procedures and were recently extended to laparoscopic hepatectomy. TO of laparoscopic left lateral sectionectomy and right hemihepatectomy were recently assessed, and benchmark values have been defined. TO are useful tools for assessing hospital performance and for optimizing the outcomes of patients undergoing laparoscopic hepatectomy.

Conclusions: At present, TO only consider surgeon-related factors. However, it is important to include the patient's perspective when defining TO. Although TO were recently applied to laparoscopic hepatectomy, there is still a need to further evaluate their application in this setting. Achieving TO was shown to have a positive impact on long-term outcomes and this needs to be studied for different liver resection procedures.

Keywords: Textbook outcomes; laparoscopic liver resection; quality indicators; outcome indicators

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Introduction

History of quality indicators

Clinical practice guidelines were initially defined in 1990 by the Institute of Medicine in the United States of America as “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances” (1). Guidelines are required because of the wide variability in care provided to patients with similar characteristics and similar medical conditions. Guidelines have the potential to help not only the physicians but also the patients and healthcare systems (2). However, reluctance to adhere to guidelines persists for many reasons, such as lack of agreement, lack of familiarity, reluctance to change private practice, and constant changes in technologies and management practices (3). One major challenge involves obtaining evidence for a particular clinical condition because mismatch between evidence and usual clinical practice can be an issue (4).

Quality indicators were developed many years ago to assess the quality of care provided by hospitals (5). Over time, many different metrics have been developed to measure surgical quality (6). The most commonly used outcome indicators were mortality and postoperative complication rates. Mortality was considered a gold standard outcome measure because it is easily ascertained and understood. However, mortality rates decline with increasing experience, and this factor alone now seems impractical (7). It has also become evident that a composite set of factors can better characterize a patient's quality of care (8).

Variations in the definition of textbook outcomes

Since the term textbook outcomes (TO) was first proposed, no consensus or guidelines on the exact definition of TO have been developed. The definition of TO not only varies with the disease of interest but also within individual diseases and procedures between institutions (9,10). While some institutes may focus on a certain set of factors to achieve TO, other institutes may consider different sets of factors. This makes it difficult to compare TO between institutions.

Some of the factors commonly used to determine TO that are standard across definitions include early mortality and major complications defined as a Clavien–Dindo grade of 3 or higher. However, other factors are not standardized across institutes, such as negative margins, blood

transfusion, length of hospital stay, hospital readmission, or reoperation. One particularly debatable factor is the length of stay (LOS), as this is not an objective method of measuring the outcome. Many factors can contribute to the patient's LOS, one of which is health insurance, which applies in many countries.

The objective of this review was to analyze the application of TO in surgery, focusing on laparoscopic hepatectomy. We present this article in accordance with the Narrative Review reporting checklist (available at <https://tcr.amegroups.com/article/view/10.21037/tcr-22-2122/rc>).

Methods

The literature review was performed between 1 April and 17 May 2022. All data pertaining to quality indicators used in hospitals and their surgical applications, as well as the concept of TO, were retrieved from literature databases. Articles published in English between 1912 and 2022 were retrieved by searching PubMed and Google Scholar. Search terms included quality indicators, outcome indicators, textbook outcomes, textbook outcomes after surgery, textbook outcomes after hepatectomy, and clinical indicators (*Table 1*). Previous publications at our center were used as part of this review. Metrics for achieving TO were negative margin, no transfusion, no postoperative major complications, no 30-day readmission, no 30-day mortality, and length of stay (LOS) $\leq 50^{\text{th}}$ percentile (11).

Discussion

TO applied to different surgical procedures (Table 2)

Since their inception, TO have been applied to various surgical procedures and their impacts on patients have been assessed. Surgical applications include orthopedic, vascular, pediatric, and gastrointestinal procedures (12-15). The term TO was first defined by Kolfshoten *et al.* for colon carcinoma (16), and comprised hospital survival, radical resection, no reintervention, no ostomy, no adverse outcomes, and a hospital stay of <14 days.

When TO were applied to bariatric surgery, the factors assessed included minor complications and readmission (17). TO were also applied to retroperitoneal sarcomas and sarcomas in extremities (18,19). TO are increasingly being recognized as a benchmark for assessing the quality of care provided to patients. Significantly more patients achieved TO at high-volume centers than at low-volume centers.

Table 1 The search strategy summary

Items	Specification
Date of search	17 May 2022
Databases and other sources searched	PubMed, Google Scholar
Search terms used	Quality indicators, outcome indicators, textbook outcomes, textbook outcomes after surgery, textbook outcomes after hepatectomy, clinical indicators
Timeframe	1912–2022
Inclusion and exclusion criteria	Inclusion: English Language; Original articles, RCTs, Review
Selection process	Selection was conducted independently

RCT, randomized control trials.

Table 2 Textbook outcome definitions applied to different surgeries

Factors in assessing textbook outcomes	Colo-rectal (12)	Gastrectomy (13)	Esophageal (9)	Bariatric (14)	Sarcoma (15,16)	Vascular (17)	Paediatric Liver (18)	Lung (19)
Negative margins	✓	✓	✓	✗	✓	✗	✗	✓
No 30-day mortality	✓	✓	✓	✓	✓ (90days)	✓	✓	✓
No major complications	✓	✗	✗	✓	✗	✓	✓	✓
No minor complications	✗	✗	✗	✓	✗	✗	✗	✗
No readmission (30 days)	✗	✗	✓	✓	✓	✓	✓ (90 days)	✓ (ICU)
No reoperation	✓	✗	✗	✗	✗	✓	✗	✓
No prolonged LOS	✓	✓	✓	✓	✓	✓	✓	✓
No of nodes	✗	≥16	✓	✗	✗	✗	✗	✓
Stage appropriate chemotherapy	✗	✓	✓	✗	✗	✗	✗	✗
No stoma	✓		✗	✗	✗	✗	✗	✗

LOS, length of stay; ICU, intensive care unit.

It was found that the likelihood of achieving TO increases over time (20), the learning curve is a contributing factor.

Patients’ priorities may differ from those of physicians, so the TO perceived by patients also varies from those of physicians. Some of the factors responsible for this include patients’ optimism regarding outcomes, the fact that cancer patients exhibit bias towards tumor removal, patients give more importance to major than to minor complications, and the benefit to patients of preoperative counselling. Patients place lower priority on prolonged LOS and blood transfusion. Thus, standard definitions for TO should be more patient-centric and become a focus of future investigations (21). Studies analysing patient factors including days of return to normal activity, days with reduced pain, etc. can be used while assessing textbook

outcomes. Another interesting factor is social vulnerability, which was also found to influence TO because the TO among patients with high social vulnerability were worse at low-quality hospitals than at high-quality hospitals (22). The achievement of TO also had a positive impact on survival, with a lower mortality rate among patients who achieved TO (20,23). Furthermore, disease-free survival and overall survival rates were better in patients with esophageal carcinoma who achieved TO (24).

TO after hepatectomy

A recent study undertook a comprehensive assessment of the changes in hepatobiliary practices based on the trends of TO over time. The authors reported that, while TO

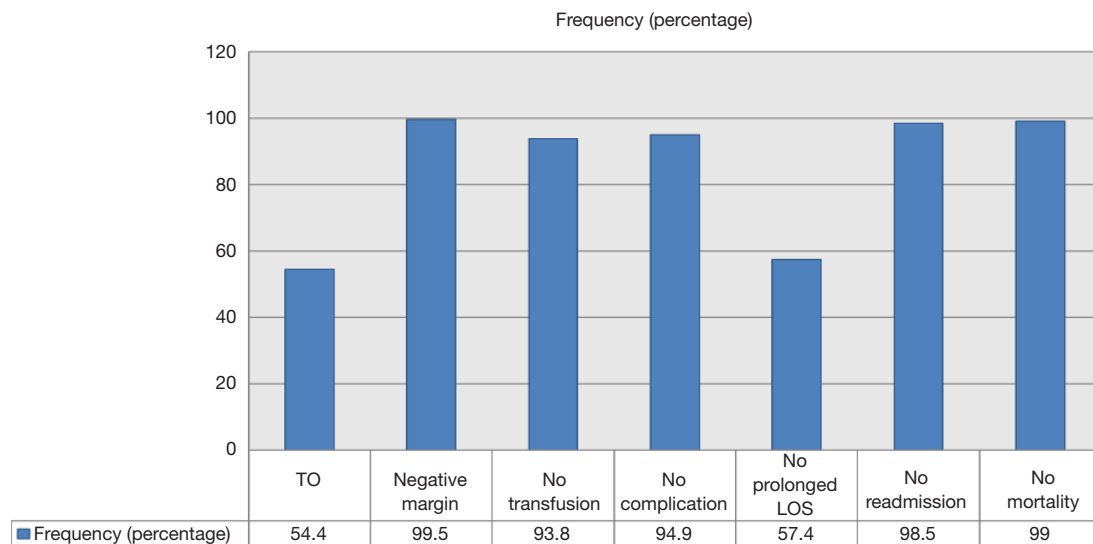


Figure 1 Percentage of patients achieving textbook outcomes according to clinical factors (31). TO, textbook outcomes; LOS, length of stay.

were achieved in 6 out of 10 patients undergoing surgery for primary liver tumors, the TO rates did not increase over time and were associated with better long-term outcomes in patients with hepatocellular carcinoma and intrahepatic cholangiocarcinoma (IHC) (25). In a multicenter study, TO were achieved in 26% of patients who underwent resection for IHC. The authors concluded that TO may be useful to report patient-level performance and hospital variation leading to a quality improvement for IHC resection (26). Another study compared TO between dedicated and non-dedicated cancer centers, and revealed that patients undergoing hepatobiliary surgery at dedicated cancer institutes had a higher chance of achieving TO even though the patients had worse comorbidities (27). Left hepatectomy was identified as an independent factor that was positively associated with the TO of major hepatectomy (28).

TO after laparoscopic hepatectomy

TO and their implications have been studied for various surgical procedures, including laparoscopic hepatectomy. One of the earliest studies was conducted by Hobeika *et al.*, who analyzed the TO after laparoscopic left lateral sectionectomy and right hemihepatectomy, and defined benchmark values for other centers to follow (29). Another study by the Italian Group of Minimal Invasive Surgeons calculated benchmarks in performing LLR using the Achievable Benchmark of Care (ABCTM). Their overall morbidity benchmarks were between 7.8–26.4% and for

major morbidity were between 1.4–5.7%, depending on complexity (30). Since ours is a high-volume center and one of the first to perform laparoscopic liver resection, we compared our outcomes with those benchmark values and found that our criteria met all of the benchmark values, except for transfusion rate. The following factors were independently associated with failure to achieve TO (31): year of surgery, American Society of Anesthesiologists score, inflow clamping for >40 minutes, and operation time (*Figures 1,2*). Furthermore, a study of the TO of HCC in the anterolateral segment of the liver revealed a significant difference in the 5-year recurrence-free survival and overall survival rates in patients who achieved TO compared with those who did not, for all patients and in a subgroup of patients with cirrhosis (11) (*Figure 3*). Further studies have shown that TO are useful tools for assessing hospital performance and for optimizing the outcomes of patients undergoing laparoscopic hepatectomy (32). This review has some limitations. Laparoscopic hepatectomy is only performed at a few expert centers with large volumes, hence articles from relatively less experienced centers were not included. Liver resections, especially when done laparoscopically, vary in terms of the target liver segment and technical difficulty, it is imperative to study the TO for each liver segment separately. These aspects are limited in this review. Further studies, focusing on this aspect are needed, including prospective multicenter studies assessing the TO for each type of liver resection. This will enable us to set benchmarks for laparoscopic hepatectomy and enable

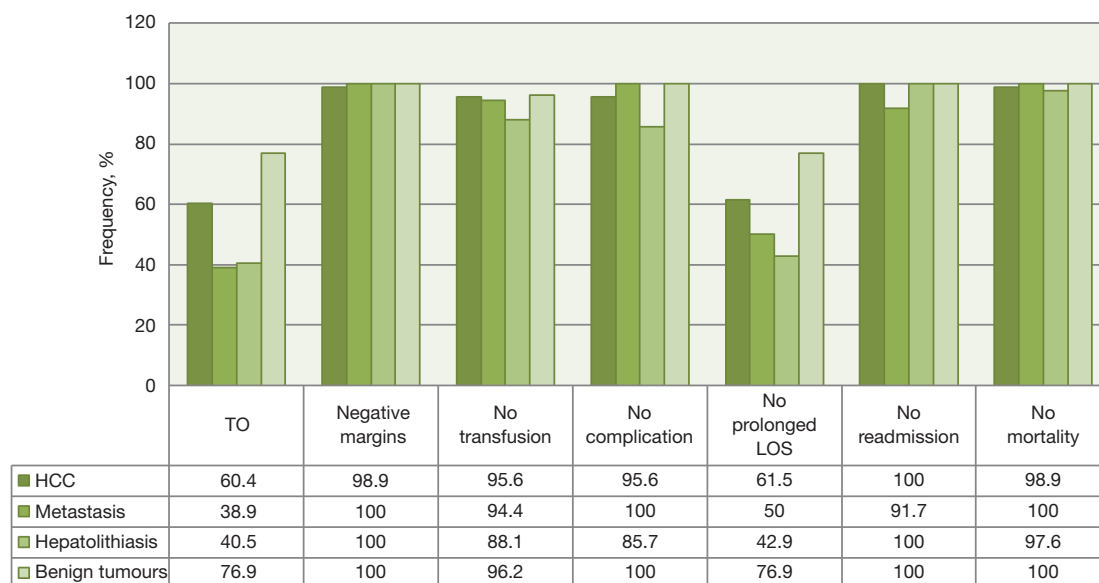


Figure 2 Textbook outcomes according to the indication for laparoscopic liver resection (31). HCC, hepatocellular carcinoma; TO, textbook outcomes; LOS, length of stay.

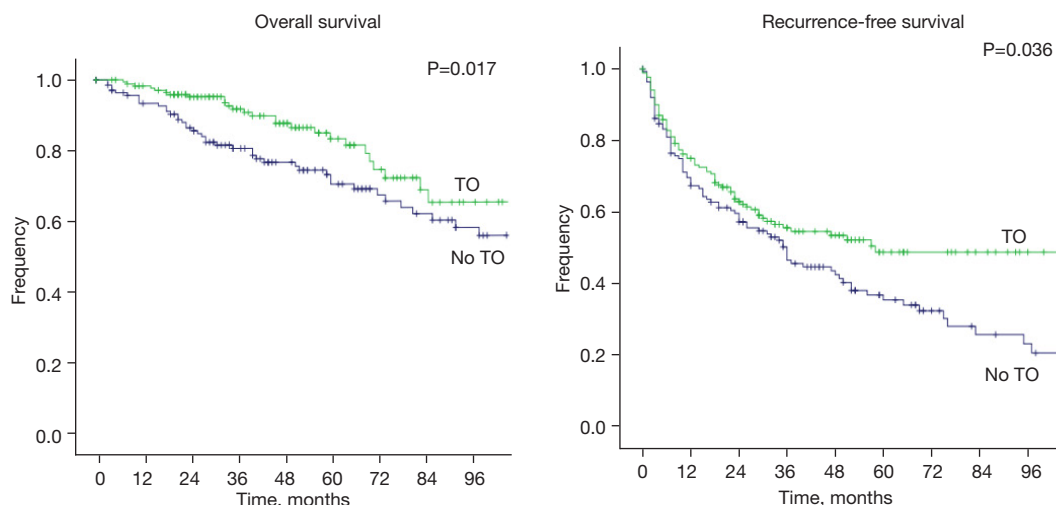


Figure 3 Overall survival and recurrence-free survival curves according to the achievement of textbook outcomes (11). TO, textbook outcomes.

surgeons and hospitals to assess the safety of performing this procedure.

Conclusions

TO are increasingly being recognized as quality indicators for surgical care. When applied to various surgical procedures over the years, there has been marked variability

in the definitions used with no consensus on a fixed definition. At present, TO only take into account surgeon-related factors, but it is important to include the patient’s perspective when defining TO. TO were recently applied to laparoscopic hepatectomy, and further evaluation of the TO for individual types of liver resection is needed. Further studies aimed at refining and applying TO, including multicenter prospective studies, could help to improve the

safety of laparoscopic hepatectomy.

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Footnote

Reporting Checklist: The authors have completed the Narrative Review reporting checklist. Available at <https://tcr.amegroups.com/article/view/10.21037/tcr-22-2122/rc>

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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 are appropriately investigated and resolved.

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