MEASURING AND IMPROVING QUALITY OF CARE IN SURGICAL ONCOLOGY

Michel W.J.M. Wouters

Chapter 1

Introduction and outline of this thesis

M.W.J.M. Wouters[1,2]

[1] Department of Surgical Oncology, Netherlands Cancer Institute – Antoni van Leeuwenhoek hospital, Amsterdam, The Netherlands
[2] Department of Surgery, Leiden University Medical Center, Leiden, The Netherlands

Ever since the Institute of Medicine released its report 'Crossing the quality chasm: A New Health System for the 21st Century' in March 2001[1], variation in quality of care between providers has been debated by policymakers, purchasers, health care providers, doctors and their patients. Not only in the United States, but also in Europe improving the quality of Health care is high on the political agenda. In the last 20 years medical science and technology is advancing in an unprecedented rate. This has come with a growing complexity of the care process requiring a multidisciplinary infrastructure in which the full complement of services is provided timely and in a safe, effective, efficient but patient-centered way. Simultaneously, the population is aging with an increase in the incidence and prevalence of chronic conditions, which make these patients especially vulnerable for the risks of medical treatments. Reducing risks, ensuring safety, but also continuous quality improvement are needed to face the challenges in our Health care system.

Measuring quality

A basic way of explaining quality healthcare is that it is the right care, for the right person, in the right setting at the right time. An important mechanism to improve quality of care is to reduce variation and to learn from practices that prove to have excellent outcomes. Though variation in the way care is delivered can be legitimate, there is evidence that differences in outcomes between providers are unconscionably large. To gain insight in the mechanisms leading to variation in quality of care, comparative measurement of performance is essential: clinicians may find out what problems they have, and who else may have solved these problems. In the beginning of the century, data to compare the performance of hospitals were hardly available. The first reports on variation in quality of care were mostly based on information derived from administrative databases. For example, in the Netherlands Caspari et al. published on their analysis of production data from medical insurance companies in 1991. A remarkable variation in amount of ENT procedures per 1000 insured persons were found for 11 partnerships of ENT specialists[2]. Though, in general, these kind of administrative data were thought to be less reliable and were often missing essential characteristics of patients treated by different providers, possibly explaining practice variation. Therefore, in several countries clinical registries were designed to provide detailed and meaningful information concerning the quality of care in different hospitals[3]. This thesis describes the use of detailed clinical data to measure and improve quality of care in surgical oncology.

Volume and outcome

The relationship between procedural volume and outcome was one of the first causes of variation in outcome between providers, reported in the literature. From 2000 until now a plethora of studies has been published evaluating variation in outcome between procedures performed in low and high volume hospitals and by low and high volume surgeons[4]. First, an inverse relation between hospital volume and mortality was shown, especially for high-risk low-volume surgical procedures, like esophagectomies and pancreatectomies[4]. Later on other outcome parameters were studied, like postoperative morbidity, quality of

life and survival[5-7]. In **chapter 2** of this thesis a systematic review and meta-analysis of the relationship between hospital and surgeon volume of esophagectomies for cancer on the one hand and postoperative mortality and survival on the other, is reported[5].

High-risk procedures

Esophagectomies for cancer are high-risk surgical procedures, with considerable morbidity and mortality rates [9,10]. Surgery is the primary curative therapy for esophageal cancer patients, though after esophagectomy overall 5-year survival hardly reaches 50%, even in specialized centers[11]. Next to the technical skills needed to perform the operation, careful patient selection with accurate staging and risk assessment is essential[6]. Moreover experience with the detection and management of complications is needed to prevent the patient from dying postoperatively[7]. These do not only appeal to the competence of the individual surgeon, but also to the infrastructure, experience and expertise available in the institution.

Clinical audit

In 2000, considering the growing evidence for a volume-outcome relationship for esophageal cancer surgery, the professional network of surgical oncologists working in hospitals affiliated with the Comprehensive Cancer Centre Leiden[1] decided to perform a region-wide clinical audit. All patients who underwent an esophagectomy for cancer in the period 1990-1999 were included. Retrospectively, detailed clinical data were retrieved from the original patient files, including information on patient demographics, comorbid diseases, diagnostic procedures, tumor and treatment characteristics as well as outcome. None of the eleven hospitals performed more than 7 esophagectomies a year, consequently all had to be considered low-volume hospitals. To put the data in the right perspective, outcomes were compared with the results of the nearest high volume referral center for esophagectomies. Due to the extensive set of clinical data collected in the audit, important casemix-adjustments could be made in the comparison of outcome in high and low volume hospitals. The results of this study are reported in **Chapter 3**[8].

Centralization

In the audit important variation in outcome between patients operated in different hospitals were revealed. Therefore, the professional network of surgical oncologists decided to concentrate esophageal cancer surgery in three to four hospitals in the region. As none of the hospitals performed more than 7 esophagectomies a year it was agreed on that not differences in procedural volume, but the actual outcome of patients treated in different

1 The **Comprehensive Cancer Centre Leiden** was a network organization of 11 hospitals in the south-west region of the Netherlands, stimulating collaborations between hospitals and health care providers in oncological and palliative care and collecting data for the Netherlands Cancer Registry. In 2010 seven regionally organized comprehensive cancer centres merged into one organization, the comprehensive cancer centre the Netherlands (IKNL).

hospitals in the region, would be leading in the centralization process. From 2000 the audit was continued with prospective data-collection and feedback was given to the professional network every half year. After 5 years of auditing esophagectomies for cancer, these procedures were concentrated in only 4 of 11 hospitals in the region. The effects on patient outcome of this regional centralization project are reported in **Chapter 4**[9].

Volume standards

In 2006 the Netherlands Health Care Inspectorate (IGZ) decided to ban esophageal resections from hospitals with a mean annual volume less than 10. At that time, the number of studies showing a relationship between procedural volume and outcome of high-risk surgical procedures was already extensive. Nevertheless, few changes were seen in referral patterns for esophageal and pancreatic cancer in the other regions in the Netherlands[10]. Therefore we decided to compare the outcome of esophageal resections for cancer before and after the centralization project in the region of the Comprehensive Cancer Centre Leiden, with the outcome in other regions in the Netherlands. For this purpose, the independently collected data of the Dutch National Medical Registry (LMR) were analyzed. In addition, we compared the historic outcome of hospitals which were selected and those that were not selected as future referral center for esophagectomies by the volume cut-off of the Dutch Health Care Inspectorate. The results are reported in **Chapter 5**[11].

Volume or outcome-based referral

The Leapfrog group, a large coalition of private and public purchasers of health insurance in the United States, established minimal volume standards for the contracting of hospitals performing esophagectomies, in the year 2000. In contrast to the results in the region of the Comprehensive Cancer Centre Leiden, no actual improvement in outcome for the Leapfrog patients where reported in the international literature. Therefore, the dramatic improvements in outcome shown in our regional centralization project could not only be based on rising hospital volumes, though also on the feedback given to the surgeons, urging them to improve their performance. The question if concentration of esophageal cancer surgery should be based on a hospitals procedural volume (volume-based referral) or the actual outcome of patients treated (outcome-based referral), was addressed in an editorial published in the Journal of Surgical Oncology (**Chapter 6**)[12].

Quality indicators

The question, which method is more effective in reducing morbidity and mortality after high-risk surgical procedures, like esophagectomies, is still under debate. Many authors state that procedural volume is only a proxy for differences in expertise, processes of care and the subsequent outcome between hospitals and could be a poor predictor of quality of care in individual hospitals. To gain more insight in the variation in quality of care delivered by different institutions, quality indicators are developed in many countries[19,20]. Quality

indicators are measurable aspects of care that discriminate between high and low quality care processes. Adopting the Donebedian paradigm quality indicators are discerned into structure, process and outcome indicators[21,22]. Unfortunately, few quality indicators are supported by solid scientific evidence proving their ability to discriminate high from low quality of care in different institutions. In **Chapter 7** a review of the evidence supporting quality indicators for esophagectomies for cancer available in the literature is reported[23].

Composite measures

In the attempts made to measure the quality of clinical practice, there has been a focus on readily available and easily understandable outcome measures, such as hospital mortality or duration of hospital admission. Another approach has been to use procedural volume as a readily available quality-proxy. However, neither of these simplifying approaches does justice to the multi-dimensional concept of quality. High quality care is safe, effective, patient-centered and cost-efficient, and is the result of high quality (infra)structure, care processes and outcome. Thus, not only at the conceptual but also at a clinical-practical level, quality is a more-dimensional concept and should ideally be measured as such. In **Chapter 8** we present the Exemplary Care and Outcome (ECO) score, that integrates various attributes of quality of care into one overall (composite) measure. Moreover, to obtain a high level of reliability this ECO score is adjusted for differences in case-mix between hospitals and represented graphically in a comprehensive and understandable way, without the loss of information about the quality of different aspects of surgical cancer care.

Variation in quality of care

In cancer care future developments force us to re-evaluate the way care is provided for our patients. The number of cancer patients is increasing and the relative part of elderly cancer patients, with an increased risk of treatment related morbidity and mortality will raise. Moreover, care processes, including diagnostic procedures, multidisciplinary decision making and combined modality treatments, are becoming more and more complex, demanding more specific knowledge, expertise and infrastructure in institutions providing cancer care. This does not only apply to tumors with a low incidence and high treatment-related risk, like esophageal cancer, but also for higher incidence tumors like Non Small Cell Lung Cancer (NSCLC) and Colon cancer care processes become more demanding. In the Netherlands, under the supervision of the Signaling Committee of the Dutch Cancer Society a 'Quality of Cancer Care' taskforce was formed in 2007, which was charged with the evaluation of quality of cancer care in the Netherlands and the development of strategies for improvement. Using the hospital specific data from the Netherlands Cancer Registry, the taskforce investigated variation in quality of care between hospitals in the Netherlands for bladder, non-small cell lung, colorectal and breast cancer and its relationship with a hospitals volume, infrastructure and academic or training status. The results for NSCLC and Colon cancer are reported in **Chapter 9 and 10** respectively[24,25]

Improving quality of care

The 'Quality of Cancer Care report' became available in the summer of 2010 [13]. The taskforce concluded that on a population level, there was significant potential for improvement of outcome for cancer patients in the Netherlands. Especially the concentration of complex high-risk cancer procedures in specialized centres, with the right infrastructure, sufficient volume and adequate expertise, could lead to substantial improvement in outcome. These conclusions are supported by our study in which outcome was compared of patients who underwent esophagectomy or gastrectomy for cancer in the Netherlands, from 1989 tot 2009 (**Chapter 11**) [14]. In this time period, due to regionalisation projects and actions taken by the Dutch Healthcare Inspectorate, esophagectomies were increasingly concentrated in higher volume hospitals. In contrast, the percentage of gastrectomy patients treated in high-volume hospitals decreased. As a result outcome for esophagectomy patients improved to a much greater extent than for gastrectomy patients, indicating an urgent need for improvement in quality of surgery and perioperative care for gastric cancer patients in the Netherlands. Recently, these findings have urged the Dutch Association of Surgical Oncologists to establish quality standards, not only for esophageal but also for gastric cancer surgery, including a minimal hospital volume standard of 20 resections a year. In addition, a nation-wide clinical audit program has been initiated to measure and improve quality of care for gastric and esophageal cancer patients continuously, the Dutch UpperGI Cancer Audit (DUCA).

REFERENCES

1. Institute of Medicine committee on Quality of Health Care in America. Crossing the Quality Chasm: A New Health System for the 21st Century. 2001. National Academy Press, Washington, D.C.
2. Casparie AF, Geschiere R, Post D et al. [Differences in health care provision between 11 ENT partnership practices in 2 health insurance catchment areas]. Ned Tijdschr Geneeskd 1991; 135:754-758.
3. van Gijn W, Wouters MW, Peeters KC et al. Nationwide outcome registrations to improve quality of care in rectal surgery. An initiative of the European society of surgical oncology. J Surg Oncol 2009; 99:491-496.
4. Chowdhury MM Dagash H, Pierro A. A systematic review of the impact of volume of surgery and specialization on patient outcome. Br J Surg. 2007 Feb;94(2):145-61.
5. Wouters MW, Gooiker GA, van Sandick JW, et al. The volume-outcome relation in the surgical treatment of esophageal cancer: A systematic review and meta-analysis. Cancer. 2012 Apr 1; 118(7):1754-63.
6. Grotenhuis BA, Wijnhoven BP, Grune F et al. Preoperative risk assessment and prevention of complications in patients with esophageal cancer. J Surg Oncol 2010; 101:270-278.
7. Ghaferi AA, Birkmeyer JD, Dimick JB. Hospital volume and failure to rescue with high-risk surgery. Med Care 2011; 49:1076-1081.
8. Wouters MW, Wijnhoven BP, Karim-Kos HE, et al. High-volume versus low-volume for esophageal resections for cancer: the essential role of case-mix adjustments based on clinical data. Ann Surg Oncol. 2008 Jan;15(1):80-7.
9. Wouters MW, Karim-Kos HE, le Cessie S, et al. Centralization of esophageal cancer surgery: does it improve clinical outcome?Ann Surg Oncol. 2009 Jul;16(7):1789-98.
10. van Heek NT, Kuhlmann KF, Scholten RJ et al. Hospital volume and mortality after pancreatic resection: a systematic review and an evaluation of intervention in the Netherlands. Ann Surg 2005; 242:781-8, discussion.
11. Wouters MW, Krijnen P, Le Cessie S et al. Volume- or outcome-based referral to improve quality of care for esophageal cancer surgery in The Netherlands. J Surg Oncol 2009; 99:481-487.
12. Wouters M. Outcome-based referral to improve quality of care in upper GI surgery.J Surg Oncol. 2008 Oct 1;98(5):307-8.
13. Wouters MW, Jansen-Landheer ML, van de Velde CJ. The Quality of Cancer Care initiative in the Netherlands. Eur J Surg Oncol 2010; 36 Suppl 1:S3-S13.
14. Dikken JL, Dassen AE, Lemmens VE et al. Effect of hospital volume on postoperative mortality and survival after oesophageal and gastric cancer surgery in the Netherlands between 1989 and 2009. Eur J Cancer 2012; 48:1004-1013.