# Quality assurance in breast cancer care and breast implant surgery

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# CHAPTER 1

Introduction and outline of this thesis

# INTRODUCTION

This thesis focuses on the efforts made in improving quality and patient safety of breast cancer care and breast implant surgery in the Netherlands.

In the last decades, transparency in the quality of health care has received considerable attention. Rapid innovations, growing medical costs, and patients' increasing expectations require insight into what represents 'quality of care'. Before registry of quality of health care can begin we must decide how the quality of care is to be defined. There are multiple conceptualizations of 'quality of care', based on agreed standards (norms and values) and components (the possibilities). As proposed by the Institute of Medicine (IOM): *"Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge. The identified components of quality care are: quality care is safe, effective, patient-centered, timely, efficient, and equitable"*.[1]

Aiming at measuring quality, Donabedian described health care as a function of three components which are closely related to each other: structure, process, and outcome.[2,3] Ideally, a standardized process makes the quality of care more measurable, enhances the quality of care and improves patient safety, and may eventually reduce costs. To gain insight into the quality of care, collecting data from different sources is fundamental.

Multiple national and international initiatives on quality improvement have been developed to identify a set of priority conditions upon which to focus efforts; to re-evaluate clinical practice, to facilitate benchmarking between hospitals and to ensure patients' safety. With Sweden as a pioneer, several nation-wide clinical quality registries have been initiated in the Western world, leading to demonstrable improvement in clinical outcomes and reduced variation between providers.[4,5] In the current time frame of shared-decision making, patient advocacy groups encourage the professionals to use this data in daily clinical practice. Moreover, clinical quality registries are increasingly appreciated as a source of information for research on evidence-based medicine as they provide 'real world' data on patients often not eligible for clinical trials.[6]

However, funding and sustainability of registries are highly dependent on a collaborative working relationship and culture of transparency between payers, providers, patient advocacy groups and professional medical societies. Where Sweden has succeeded, many others have found it difficult to cultivate an environment in which stakeholders join forces in such harmony. In 2011, the Dutch Institute of Clinical Auditing (DICA) was founded, with the objective to facilitate and organize the start-up of new nation-wide audits in the Netherlands.[7] One of the key factors of success of DICA is the leading role of clinicians and professional medical societies in defining and agreeing on outcome data sets. This approach guarantees clinician commitment and ownership, resulting in high participation rates, high-quality data in the registry, and the completion of quality improvement loops. Funding is achieved by several large stakeholders, aiming for independence, consisting of the Dutch Ministry of Health and Health Insurance Companies.[8]

DICA's primary aim is to drive positive results in both health care outcome and costs. The results of the Dutch Surgical Colorectal Audit (DSCA) showed that substantial clinical improvements can be realized within a short period of time.[4] For example, there was a reduction in surgical complications from 33% to 30% for colon cancer, and 40% to 37% for rectal cancer from 2009 to 2011 (and further continued). Subsequent to the success of the DSCA, at present twenty-two national registries covering a wide range of medical conditions have been established in the Netherlands, including the National Breast Cancer Audit (NBCA) and the Dutch breast implant registration (DBIR).

With the foundation of the NBCA and the DBIR, interesting data became available on breast cancer diagnosis and therapy (NBCA), and on breast implant surgery (DBIR). In **part 1** of this thesis, we discuss some important trends in breast cancer treatment in the Netherlands, e.g. the actual use of neoadjuvant chemotherapy (NAC), breast-conserving therapy and axillary lymph-node management. In **part 2** of this thesis, we illustrate key elements of the DBIR and the first results of two years of registration.

## I. Quality assurance in breast cancer care

Breast cancer is the most common female affecting cancer type worldwide.[9] In the Netherlands over 15.000 women get diagnosed with breast cancer every year.[10] Until recently, the quality of breast cancer care was mainly directed by the National Breast

Cancer Organisation Netherlands (NABON) that defined and distributed guidelines that contained multidisciplinary criteria for providing good breast cancer care.[11] In 2008, the Dutch Health Care Institute published a report regarding the large differences between what is considered standard of care and what people actually received in different hospitals in the Netherlands. For example, there was a large difference between hospitals in their rate of tumor involved margins after breast-conserving therapy. With the purpose to monitor and improve the quality of breast cancer care in the Netherlands, the NABON Breast Cancer Audit (NBCA) was instituted as a nation-wide audit in 2011. All patients who are surgically treated for newly diagnosed breast cancer in the Netherlands are registered (since 2011), and information on diagnostic and treatment modalities are structured. The main purpose of the NBCA was to provide health care providers with reliable, benchmarked information on structure, process and outcome parameters that can be used to improve quality of care and can be used for shared-decision making in clinical practice. A multidisciplinary set of quality indicators was defined as a means of quality assurance.

In one of the first reports based on NBCA data, van Bommel et al. described the results of 4 years of auditing.[12] The use of quality indicators, embedded in a national audit providing benchmark information, has led to significant improvements on hospital level. Hospitals recognized themselves as being an 'outlier' on certain indicators, evaluated their processes and found keystones for improvement (e.g. adjustments in reporting results, other ways of organizing Multidisciplinary Team Meetings (MDTs) and new partnerships between hospitals were initiated). Apart from the actions of the individual hospitals, work has been established to synthesize, implement and monitor 'best practice'. The comprehensive audit outcomes enabled research into hospital variation associated with the adoption of several monitor and treatment modalities.[13,14,15,16]

### *Neoadjuvant chemotherapy*

Breast cancer (BC) care consists of a multidisciplinary approach of surgery, radiation, and systemic therapy including chemotherapy.[11] Chemotherapy can be timed either prior to or following surgery; so-called neoadjuvant (NAC) or adjuvant (AC) chemotherapy. Initially, NAC was used exclusively in the treatment of inoperable breast cancer in order to reduce the tumor burden and allow resection with mastectomy.[17] The role of preoperative therapy broadened when the National Surgical Adjuvant Breast and

Bowel (NSABP) project B-18 trial demonstrated that patients who underwent NAC were significantly more likely to receive breast-conservation therapy than patients who were treated with AC.[18,19,20] Other potential advantages of NAC include the opportunity to investigate tumor biology, to monitor response to systemic therapy and to adapt to suboptimal response.[21] Moreover, NAC may improve survival in triple-negative and HER2 positive BC subtypes when a pathologic complete response (pCR) is achieved.[22]

In **chapter 2**, we examine the use of NAC in patients with stage III breast cancer in the Netherlands and assessed which patient, tumor and hospital-related factors influenced clinical practice. Locally advanced (or stage III breast cancer) is defined as a bulky tumor of the breast and/or extensive nodal disease. The prognosis of stage III breast cancer is still poor with a ten-year overall survival of only 56%.[10] The Dutch national breast cancer guideline recommends NAC for all patients with stage III breast cancer aged <70 years, in accordance with international guidelines.[23,24]

Because patient and disease characteristics determine possible treatment options for a specific condition, demand factors contribute to variation in care on an individual level. However, several national and international studies have shown that after case-mix adjustment considerable unexplained variation in the use of NAC remains between hospitals[13,16,25,26,27], as was indeed shown in results from chapter 2.

The preferences of both patient and clinician and the level of shared decision-making may be important factors in the decision for certain use of health care. Moreover, 'physician supply-side factors', such as clinicians' preferences, style of practice and incentives, may be even more important factors in explaining inter-hospital variations than patient demand.[28]

To gain insight in the reasons for the observed considerable variation in the use of NAC in patients with breast cancer, we have deployed further research to examine the role of patient- and specialist preferences in shared-decision making on NAC in patients with breast cancer. In **chapter 3**, we evaluate the current opinion of surgical and medical oncologists in the Netherlands on the use of NAC and their decisions towards NAC in early breast cancer. **Chapter 4** displays patients' experiences with decisions on the timing of chemotherapy for stage II and III BC.

### *Breast-conserving therapy*

As systemic therapy becomes more effective, the use of NAC has increased, enabling more patients to potentially undergo breast-conserving therapy (BCT). There are many questions, however, that remain unanswered. While NAC has been shown to increase the rate of BCT in clinical trials[29], it is unknown how NAC is being used to improve the use of BCT in general community practice and what the surgical outcomes (including margins and re-excision rates) are for BCS after NAC compared to primary BCS. In **chapter 5** we, therefore, analyzed national trends in the use of BCS after NAC in early breast cancer and the surgical outcomes after NAC in the Netherlands.

### *Axillary lymph-node management*

In **chapter 6**, we investigate the implementation process in the Netherlands of omitting ALND in cT1-2N0M0 sentinel node-positive breast cancer patients after the publication of the ACOSOG-Z0011 and AMAROS trial. Previously, performing an axillary lymph node dissection (ALND) was the standard of care for all non-metastatic breast cancer patients. However, this treatment is associated with significant long-term problems such as pain, arm swelling (lymphedema), restricted shoulder movement, and sensory changes in the arm and hand.[30,31] In the early nineties, sentinel lymph node biopsy (SLNB) was introduced as an accurate and less invasive axillary staging procedure, omitting the need for an axillary lymph node dissection in cT1-2N0M0 sentinel node-negative breast cancer patients.[32,33] The additional value of ALND in cT1-2N0M0 breast cancer patients with 1-2 detected *positive* sentinel lymph nodes was further questioned in two important randomized controlled trials; the ACOSOG-Z0011 trial and the AMAROS trial. The main objective of ACOSOG Z0011 was to compare locoregional recurrence-free survival for these patient population managed with or without ALND and no axillary irradiation.[34] The AMAROS trial evaluated whether regional control was comparable between ALND and axillary radiation therapy in cT1-2N0M0 breast cancer patients with a positive sentinel lymph node.[35] The results of these trials indicate that in case of a positive sentinel node, both ALND and axillary radiotherapy provide excellent and comparable axillary control in terms of disease-free and overall survival. This is illustrated by the 2012 Dutch breast cancer guideline, suggesting omission of ALND in cT1-2N0 breast cancer patients with a maximum of two positive sentinel nodes treated with breast-conserving treatment and adjuvant systemic therapy.

## II. Quality assurance in breast implant surgery

Breast implants are used routinely for purposes of breast reconstruction and breast augmentation. Since the introduction five decades ago, problems with a variety of breast implants have emerged with direct consequences for the patients' health. Plastic surgeons worldwide reacted through campaigning for auditing on long-term implant quality, surgeon performance and institutional outcomes in implant registries. Especially, the Poly Implant Prothèse (PIP) crisis[36,37] and more recent reports on breast implant-associated anaplastic large cell lymphoma[38,39] have raised awareness of the need for long-term follow-up and clinical registries for long-term safety reasons. Various reports e.g. by the European Union, the FDA and other stakeholders, stress the importance of a well-organized clinical registry including epidemiological data to assess the appropriateness and effectiveness of a specified clinical issue, whether it is an implantable device or care pathway.[40]

### *The Dutch Breast Implant Registry (DBIR)*

In the Netherlands, an estimated 30.000 implants are inserted annually. As an initiative of the Association of Plastic Surgeons of the Netherlands (NVPC), the Dutch Breast Implants Registry (DBIR) was instituted in April 2015, as a nation-wide audit to monitor breast implant quality and complications, independently from the industry. The main purpose of the DBIR is to enable benchmarking between hospitals and surgeons and to develop a 'track-and-trace system' with the implants and patients. Since the start of the DBIR in April 2015, all board-certified plastic surgeons are required to register their implants in the system and thousands of implants have been registered. Since 2016 registry of all sorts of medical implants is being required by the Dutch Health Inspectorate.

The dataset of the DBIR is based on the dataset constructed by the international Collaboration of Breast Registry Activities (ICOBRA).[41] Patient data including indication for surgery, unique and descriptional implant data, operation details and data regarding surgical technique. Also, the reasons for revision or explantations are collected. **Chapter 7** gives an overview of which numbers and types of implants, patients and interventions have been registered in the Netherlands since April 2015.

### *The International Collaboration of Breast Registry Activities (ICOBRA)*

In 2012, the International Collaboration of Breast Registry Activities (ICOBRA) was founded by the Australian Society of Plastic Surgeons to improve breast device registries by sharing datasets and connecting organizations from various countries all over the world.[41] The members of ICOBRA include national plastic surgery societies or multidisciplinary breast implant registries of several countries, including Australia, Austria, Canada, France, Germany, Ireland, Italy, the Netherlands, New Zealand, South Africa, the United Kingdom, and the United States. Each country has an independent registry, but all are using largely similar datasets. Harmonization of data points and data definitions is key in order to compare and pool data from registries. Pooling is crucial to amplify the data and reduce the time needed to identify implants performing well and those associated with higher rates of adverse events, such as anaplastic lymphoma or capsular contraction. We, therefore, set out to identify and define an internationally agreed minimum core set of data points to be used by all breast device registries globally (**chapter 8**).

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