Nationale Krebsregistrierungsstelle
Organe national d'enregistrement du cancer
Servizio nazionale di registrazione dei tumori
National Agency for Cancer Registration

Diagnosis and treatment of breast cancer in Switzerland

Definitions of indicators based on cancer registry data 2020-2022

Version 1.1

In collaboration with the Swiss Society of Senology

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Table of contents

Introduction

Based on the Cancer Registration Act (CRA), cancer cases and information on the diagnosis and treatment of cancer have been comprehensively recorded throughout Switzerland since 2020. These data enable nationwide analyses of cancer burden, prevention, early detection and cancer care, as defined in Art. 2 CRA.

In this document, the National Agency for Cancer Registration (NACR) presents the definition of indicators for the diagnosis and treatment of breast cancer in Switzerland based on population-based cancer registry data from 2020 to 2022. The indicators are defined in collaboration with the Swiss Society of Senology.

The defined indicators serve as measuring instruments for assessing cancer burden, prevention and care in Switzerland. The indicators are, where possible, defined on the basis of nationally and internationally established indicators in the fields of epidemiology, quality assurance, certification and research. This approach allows for the comparison of data from Swiss cancer registries with findings from other countries, hospitals or tumour centres.

The current selection of indicators should not be regarded as definitive, but rather as evolving based on the international treatment guidelines and the needs and development of cancer care and research. The year of incidence of the tumour and the validity of the guidelines must be considered in the evaluations. This document is therefore updated on a regular basis.

Results of analyses using these indicators are published on the NACR website.
https://nkrs.ch/en/statistics-and-reports/indicators-on-diagnosis-and-treatment

Purpose of the indicators

Firstly, the indicators make it possible to objectively monitor the burden and development of cancer in adults in Switzerland. By analysing and publishing these indicators, patients, healthcare providers and political decision-makers can observe and assess cancer development in Switzerland. This promotes transparency in the healthcare system and creates a basis for well-founded decisions.

Secondly, medical care can be evaluated with a population-based approach and thus provide a basis for evidence-based quality assurance in the area of diagnosis and treatment. The indicators help to identify deviations from established treatment standards. This is particularly important in the field of oncology, where a high quality of treatment is directly linked to patients' chances of survival and quality of life.

Thirdly, indicators contribute to research and further development in oncology. They provide valuable data that can be used for scientific studies and health policy issues, for example. They enable evaluations of prevention and screening measures, analyses for care planning and research. Progress in cancer diagnosis and cancer treatment as well as preventive measures for cancer are thus promoted.

Definition of the indicators

Indicators for specific cancers (e.g. breast cancer) as well as general indicators applicable to various cancer types are defined. The indicators are based on the national cancer data set, which consists of data collected in the cantonal cancer registries for adult cancer cases and data collected in the national childhood cancer registry for children and adolescent cancer cases. The indicators are defined in a step-

by-step process. A pre-selection of certain indicators is made through a comprehensive literature review, including national and international guidelines for clinical decisions, such as ESMO (European Society for Medical Oncology) or German S3-Guidelines. Existing indicators from other countries, particularly Germany, and indicators used for certifying tumour centres (e.g. Deutsche Krebsgesellschaft (DKG)) are also reviewed. Furthermore, indicators are shared with the cantonal cancer registries and the childhood cancer registry for comment. Indicators for specific cancers are discussed with experts from the relevant medical societies.

The orientation towards already internationally and nationally established similar indicators offers the possibility of being able to compare the results provided by cancer registration data with data collected in hospitals or of other countries. With the help of a precise comparison of the variables available in the national cancer data dictionary and the variables required for calculating the indicators, practicable indicators were identified.

Use of the indicators

Some indicators such as incidence or mortality are already calculated for the annual national cancer statistics. Other indicators have not yet been analysed at national level.
The indicators can be used for various analyses and publications:

- The national cancer monitoring and statistics of the Federal Statistical Office (e.g. stage distribution)
- The Swiss Cancer Report of the Federal Statistical Office
- Detailed standardised national analyses with publication on the NACR website (e.g. several indicators to certain cancer types)
- The triennial health report on cancer with detailed analyses on relevant health policy questions (e.g. evaluation of the treatment quality)
- Research projects (e.g. evaluation of screening programs)
- Comparison of national results with analyses of other data (e.g. cantonal cancer registry data, hospital data or international data).

For further information about analyses and publications of cancer registry data, please see:
https://nkrs.ch/en/statistics-and-reports

General

1A Incidence (invasive breast cancer)

Objective	To show the incidence of invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1)
Calculation	Number, crude- and age-standardized rate per 100,000 person-years per incidence year/period. Using European Standard Population 1976.
Stratification	- By sex (female/male) - By sex (female/male) and age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By sex (female/male) and UICC stage (Stage I, Stage II, Stage III, Stage IV, NA*) *For cases with missing TNM stage information or where TNM staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Incidence is published in the "Swiss Cancer Report" (2), by the NACR (3) and the Federal Statistical Office (FSO) (4). - Statistical methods for survival, incidence, prevalence, mortality according to report "Statistical Methods for Cancer Reporting in Switzerland" (5).
Remarks	

1B Incidence (in situ breast cancer)

Objective	To show the incidence of in situ breast cancer
In-/Exclusion criteria	- ICD code = D05 - Only primary in situ tumours (D05) diagnosed without or before a diagnosis of an invasive breast cancer
Calculation	Number, crude- and age-standardized rate per 100,000 person-years per incidence year/period. Using European Standard Population 1976.
Stratification	- By sex (female/male) - By sex (female/male) and age category (0-49, 50-69, 70-79, 80+ years old at diagnosis)
Literature	- Statistical methods for survival, incidence, prevalence, mortality according to report "Statistical Methods for Cancer Reporting in Switzerland" (5).
Remarks	

2 Mortality

Objective	To show the mortality of invasive breast cancer
In-/Exclusion criteria	- ICD code = C50
Calculation	Number, crude and age-standardized rate per 100,000 person-years per incidence year/period. Using European Standard Population 1976.
Stratification	- By sex (female/male) - By sex (female/male) and age at death (0-49, 50-69, 70-79, 80+ years old at death)
Literature	- Mortality is published in the "Swiss Cancer Report" (2), by the NACR (6) and the Federal Statistical Office (FSO) (4). - Statistical methods for survival, incidence, prevalence, mortality according to report “Statistical Methods for Cancer Reporting in Switzerland” (5).
Remarks	Data source: FSO cause of death statistics data.

3 Survival

Objective	To show the observed and relative survival of invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary tumours (C50) according to ENCR rules for multiple primaries (1)
Calculation	Number of deaths, observed and relative one- and two-year survival proportions.
Stratification	- By sex (female/male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Survival is published by the NACR (7) and in the "Swiss Cancer Report" (2) - Statistical methods for survival, incidence, prevalence, mortality according to report "Statistical Methods for Cancer Reporting in Switzerland"(5)
Remarks	

4 Prevalence

Objective	To show the prevalence of invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1)
Calculation	Estimated prevalence counts and proportions per 100,000 population for limited-duration periods (cases diagnosed in 2020–2022, 2021–2022, 2022 and alive on 31 December 2022).
Stratification	- By sex (female/male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Prevalence is published in the "Swiss Cancer Report" (2), by the NACR(8) and the Federal Statistical Office (FSO) (4) - Statistical methods for survival, incidence, prevalence, mortality according to report “Statistical Methods for Cancer Reporting in Switzerland” (5)
Remarks	

5A Age at diagnosis (invasive breast cancer)

Objective	To show the age distribution at the time of diagnosis in patients with invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1)
Calculation	Mean and median age (2.4 Age at incidence) at time of diagnosis. Number of cases and corresponding percentage within each age group, calculated among all cases. Age at diagnosis is categorised into the following groups: 0–49, 50–69, 70–79, 80+ years.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Median age of onset and cases per age group are published in the "Swiss Cancer Report" (2) and the Federal Statistical Office (FSO) (4).
Remarks	

5B Age at diagnosis (in situ breast cancer)

Objective	To show the age distribution at the time of diagnosis in patients with in situ breast cancer
In-/Exclusion criteria	- ICD code = D05 (separately) - Only primary in situ tumours (D05) diagnosed without or before a diagnosis of an invasive breast cancer
Calculation	Mean and median age (2.4 Age at incidence) at time of diagnosis. Number of cases and corresponding percentage within each age group, calculated among all cases. Age at diagnosis is categorised into the following groups: 0–49, 50–69, 70–79, 80+ years.
Stratification	- By sex (female / male)
Literature	
Remarks	

6 Age at death

Objective	To show the age distribution at time of death in patients with invasive breast cancer
In-/Exclusion criteria	- ICD code = C50
Calculation	Number of cases and corresponding percentage within each age group, calculated among all cases. Age at death is categorised into the following groups: 0–49, 50–69, 70–79, 80+ years.
Stratification	- By sex (female / male)
Literature	- Median age at death is published in the "Swiss Cancer Report" (2) and the Federal Statistical Office (FSO) (4)
Remarks	- Data source: FSO cause of death statistics data

Diagnosis

7 Stage distribution at diagnosis

Objective	To show the stage distribution at the time of diagnosis in breast cancer patients
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Including only tumours that were histologically verified (2.7 Most valid basis of diagnosis = 7 Histology) - Including only carcinomas (3.5 ICD-O Morphology = all codes except 8000 and except group "Other mesenchymal tumours" (see Indicator 11a)) - Excluding cases with missing UICC stage information
Calculation	Distribution of UICC stages I-IV (generated using 4.1-4.10, 4.13, 4.17 UICC TNM variables) at time of diagnosis, presented as counts and percentages.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By detection in organised screening program (yes/no) for female patients in screening age and living in cantons with organised screening programs (method of first detection = organised screening program vs. clinical symptoms, incidental discovery, opportunistic screening, self-examination, death with or without autopsy, other)
Literature	
Remarks	- Incidence by stage is included in the indicator “1A incidence”

8A Method of first detection (invasive breast cancer)

Objective	To show the proportion of first detection methods for invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases with missing information on method of first detection
Calculation	Distribution of first detection method (2.6 Method of first detection) groups presented as counts and percentages. The method of first detection is categorised into the following groups: - Clinical Symptoms / self-examination (2.6 = 1, 5) - Incidental discovery (2.6 = 2) - Opportunistic Screening (2.6 = 4) - Organised screening program (2.6 = 3) - Death with or without autopsy (2.6 = 6, 7) - Other (2.6 = 8)
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	

8B Method of first detection (in situ breast cancer)

Objective	To show the proportion of first detection methods for in situ breast cancer
In-/Exclusion criteria	- ICD code = D05 - Only in situ tumours (D05) diagnosed without or before a diagnosis of an invasive breast cancer - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases with missing information on method of first detection
Calculation	Distribution of first detection method (2.6 Method of first detection) groups presented as counts and percentages. The method of first detection is categorised into the following groups: - Clinical Symptoms / self-examination (2.6 = 1, 5) - Incidental discovery (2.6 = 2) - Opportunistic Screening (2.6 = 4) - Organized screening program (2.6 = 3) - Death with or without autopsy (2.6 = 6, 7) - Other (2.6 = 8)
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis)
Literature	
Remarks	

9A First detection in an organised screening program (invasive breast cancer)

Objective	To show the proportion of invasive breast cancer diagnosis with first detection in an organised screening program (OSP)
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Including only females of screening age (50-69* or 50-74 years) living in cantons with an organised screening program between 2020-2022 (BS, BE, FR, GE, GR*, JU, NE, SG*, TG, TI*, VS, VD) - Excluding cases with missing information on method of first detection
Calculation	Number and percentage of cases detected through organised screening programs (2.6 Method of first detection = 3 Organised screening program) among all included cases.
Stratification	- By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Swiss Cancer Screening: Overview of breast cancer screening programs (9)
Remarks	

9B First detection in an organised screening program (in situ breast cancer)

Objective	To show the proportion of in situ breast cancer diagnosis with first detection in an organised screening program (OSP)
In-/Exclusion criteria	- ICD code = D05 - Only primary in situ tumours (D05) diagnosed without or before a diagnosis of an invasive breast cancer - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Including only females of screening age (50-69* or 50-74 years) living in cantons with an organised screening program between 2020-2022 (BS, BE, FR, GE, GR*, JU, NE, SG*, TG, TI*, VS, VD) - Excluding cases with missing information on method of first detection
Calculation	Number and percentage of cases detected through organised screening programs (2.6 Method of first detection = 3 Organised screening program) among all included cases.
Stratification	None
Literature	- Swiss Cancer Screening: Overview of breast cancer screening programs (9)
Remarks	

10 Histological confirmation of the diagnosis

Objective	To show the proportion of breast cancer cases with histological confirmation of the diagnosis
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding with missing information on most valid basis of diagnosis
Calculation	Number and percentage of cases with histological confirmation among all included cases (2.7 Most valid basis of diagnosis = 7 Histology).
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Guideline-Based Quality Indicators in the Oncology Guideline Program: QI 2-Pre-therapeutic histologic confirmation (10) - Indicator sheet breast DKG, German Society of Senology: Indicator 13 - Pretherapeutic histologic confirmation (11)
Remarks	- Histological confirmation includes pretherapeutic biopsy and/or surgical resection.

11A Morphology (invasive breast cancer)

Objective	To show the distribution of morphological types of invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only invasive primary tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	Distribution of cases by morphology (3.5 ICD-O Morphology) group, shown as the number and percentage of cases in each group among all included cases. Morphology codes are categorised into the following groups (see remarks): - Invasive carcinoma NST 8500/3 Infiltrating duct carcinoma, NOS - Invasive lobular carcinoma 8520/3 Lobular carcinoma, NOS - Other ductal and lobular invasive neoplasms 8201/3 Cribriform carcinoma, NOS 8211/3 Tubular adenocarcinoma 8401/3 Apocrine adenocarcinoma 8507/3 Invasive micropapillary carcinoma of breast 8510/3 Medullary carcinoma, NOS 8513/3 Atypical medullary carcinoma 8514/3 Duct carcinoma, desmoplastic type 8519/3 Pleomorphic invasive lobular carcinoma 8521/3 Infiltrating ductular carcinoma 8522/3 Infiltrating duct and lobular carcinoma 8523/3 Infiltrating duct mixed with other types of carcinomas 8524/3 Infiltrating lobular mixed with other types of carcinomas - Mucinous carcinomas 8470/3 Mucinous cystadenocarcinoma, NOS 8480/3 Mucinous adenocarcinoma 8481/3 Mucin-producing adenocarcinoma 8490/3 Signet ring cell carcinoma - Papillary invasive neoplasms 8050/3 Papillary carcinoma, NOS 8260/3 Papillary adenocarcinoma, NOS 8503/3 Intraductal papillary adenocarcinoma with invasion 8504/3 Encapsulated papillary carcinoma with invasion 8509/3 Solid papillary carcinoma with invasion - Metaplastic carcinomas 8070/3 Squamous cell carcinoma, NOS 8072/3 Squamous cell carcinoma, large cell, nonkeratinizing, NOS 8123/3 Basaloid carcinoma 8560/3 Adenosquamous carcinoma 8570/3 Adenocarcinoma with squamous metaplasia 8571/3 Adenocarcinoma with cartilaginous and osseous metaplasia 8572/3 Adenocarcinoma with spindle cell metaplasia

	8573/3 Adenocarcinoma with apocrine metaplasia 8575/3 Metaplastic carcinoma, NOS - Neuroendocrine invasive neoplasms 8013/3 Large cell neuroendocrine carcinoma 8041/3 Small cell carcinoma, NOS 8045/3 Combined small cell carcinoma 8240/3 Neuroendocrine tumour, NOS 8246/3 Neuroendocrine carcinoma, NOS 8249/3 Neuroendocrine tumour, grade 2 8574/3 Adenocarcinoma with neuroendocrine differentiation 8244/3 Mixed adenoneuroendocrine carcinoma - Rare and salivary gland-type invasive tumours 8200/3 Adenoid cystic carcinoma 8502/3 Secretory carcinoma 8525/3 Rare and salivary gland-like tumours 8983/3 Other rare invasive carcinomas - Unspecific carcinomas 8010/3 Carcinoma, NOS 8022/3 Pleomorphic carcinoma 8033/3 Pseudosarcomatous carcinoma 8046/3 Non-small cell carcinoma 8140/3 Adenocarcinoma, NOS 8230/3 Solid carcinoma, NOS 8255/3 Adenocarcinoma with mixed subtypes - Paget disease +/- carcinoma 8540/3 Paget disease, mammary 8541/3 Paget disease and infiltrating duct carcinoma of breast 8543/3 Paget disease and intraductal carcinoma of breast - Mesenchymal and fibroepithelial malign tumours 8800/3 Sarcoma, NOS 8801/3 Spindle cell sarcoma 8802/3 Giant cell sarcoma 8805/3 Undifferentiated sarcoma 8830/3 Malignant fibrous histiocytoma 8852/3 Myxoid liposarcoma 9020/3 Phyllodes tumour, malignant 9120/3 Hemangiosarcoma - Inflammatory carcinoma 8530/3 Inflammatory carcinoma - Only malign clinical diagnosis/morphology unknown 8000/3 Neoplasm, malignant
Stratification	- By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis)
Literature	- Histological groups were defined based on the „Morphological classification of the WHO Classification of Tumours of the Breast", 5th edition (12) and 4th edition (13).
Remarks	- List of morphological codes was based on the registered morphology codes for breast cancer cases diagnosed from 2020 to 2022.

11B Morphology (in situ breast cancer)

Objective	To show the distribution of morphological types of in situ breast cancer
In-/Exclusion criteria	- ICD code = D05 - Only in situ breast cancer (D05) diagnosed without or before a diagnosis of an invasive breast cancer - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	Distribution of cases by morphology group, shown as the number and percentage of cases in each group among all included cases. Morphology codes are categorised into the following groups (see remarks): - In situ ductal neoplasms/DCIS 8500/2 Intraductal carcinoma, noninfiltrating, NOS 8201/2 Cribriform carcinoma in situ 8230/2 Ductal carcinoma in situ, solid type 8501/2 Comedocarcinoma, noninfiltrating 8507/2 Intraductal micropapillary carcinoma 8522/2 Intraductal carcinoma and lobular carcinoma in situ - In situ lobular neoplasms/LCIS 8520/2 Lobular carcinoma in situ, NOS 8519/2 Lobular carcinoma in situ, pleomorphic - In situ papillary neoplasms 8050/2 Papillary carcinoma in situ, NOS 8503/2 Noninfiltrating intraductal papillary adenocarcinoma 8504/2 Encapsulated papillary carcinoma 8509/2 Solid papillary carcinoma in situ - Paget disease +/- in situ carcinoma 8540/2 Paget disease 8543/2 Paget disease with DCIS - Unspecific in situ carcinomas - 8010/2 Carcinoma in situ, NOS
Stratification	- By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis)
Literature	- Histological groups were defined based on the „Morphological classification of the WHO Classification of Tumours of the Breast", 5th edition (12) and 4th edition (13).
Remarks	- List of morphological codes was based on the registered morphology codes for in situ breast cancer cases diagnosed from 2020 to 2022.

12 Proportion of in situ breast cancer among all breast tumours

Objective	To show the proportion of in situ breast cancer among all breast tumours
In-/Exclusion criteria	- ICD code = C50 and D05 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) and only in situ tumours (D05) diagnosed without or before a diagnosis of an invasive breast cancer - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	Proportion in situ (D05) tumours among all included cases
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By detection in organised screening program (yes/no) for female patients in screening age and living in cantons with organised screening programs (2.6 Method of first detection = organised screening program vs. clinical symptoms, incidental discovery, opportunistic screening, self-examination, death with or without autopsy, other)
Literature	
Remarks	

13A Synchronous bilateral breast cancer

Objective	To show the proportion of patients with synchronous bilateral invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Primary and non-primary cancer (C50) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	This indicator is analysed at patient level. The total number of patients includes all patients with at least one C50 diagnosis. The number of patients with bilateral invasive breast cancer diagnosed within 4 months (synchronous diagnosis) is calculated, along with the percentage of these cases among the total number of patients.
Stratification	- By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis)
Literature	- Retrospective study in Italy and meta-analysis of 56 women with bilateral breast cancer. Definition synchronous: within 4 months after diagnosis of primary breast cancer. Definition metachronous: more than 4 months after the diagnosis of primary breast cancer (14). - Retrospective study in Sweden of 6,550 women with bilateral breast cancer between 1970-2000. Definition synchronous: within 3 months of diagnosis of primary breast cancer. Definition metachronous: more than 3 months after the diagnosis of primary breast cancer (15). - Between 1973 and 2014, a total of 11,177 women with bilateral breast cancer in the SEER database. Definition synchronous: within one year of the diagnosis of primary breast cancer. Definition metachronous: more than one year after the diagnosis of primary breast cancer (16).
Remarks	

13B Synchronous bilateral in situ and invasive breast cancer

Objective	To show the proportion of patients with synchronous bilateral in situ and invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 or D05 - Only primary invasive tumours (C50) and all in situ (D05) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	This indicator is analysed at patient level. The total number of patients includes all patients with at least one primary C50 diagnosis or a D05 diagnosis. The number of patients with bilateral invasive and in situ breast cancer diagnosed within 4 months (synchronous diagnosis) is calculated, along with the percentage of these cases among the total number of patients.
Stratification	- By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis)
Literature	- Retrospective study in Italy and meta-analysis of 56 women with bilateral breast cancer. Definition synchronous: within 4 months after diagnosis of primary breast cancer. Definition metachronous: more than 4 months after the diagnosis of primary breast cancer (14) - Retrospective study in Sweden of 6,550 women with bilateral breast cancer between 1970-2000. Definition synchronous: within 3 months of diagnosis of primary breast cancer. Definition metachronous: more than 3 months after the diagnosis of primary breast cancer (15) - Between 1973 and 2014, a total of 11,177 women with bilateral breast cancer in the SEER database. Definition synchronous: within one year of the diagnosis of primary breast cancer. Definition metachronous: more than one year after the diagnosis of primary breast cancer(16)
Remarks	

14A Metachronous bilateral breast cancer

Objective	To show the proportion of patients with metachronous bilateral invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Primary and non-primary cancer (C50) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	This indicator is analysed at the patient level. The total number of patients includes all individuals with at least one C50 diagnosis. The number of patients with bilateral* metachronous** breast cancer is calculated along with the percentage of these cases among all patients. *Bilateral: the second tumour was diagnosed on the other/contralateral side compared to the first tumour. **Metachronous: the second tumour was diagnosed later than 4 months after the first tumour.
Stratification	- By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis)
Literature	- Between 1973 and 2014, a total of 11,177 women with bilateral breast cancer are in the SEER database. Definition metachronous: more than one year after the diagnosis of primary breast cancer(16).
Remarks	

14B Metachronous in situ and invasive bilateral breast cancer

Objective	To show the proportion of patients with metachronous bilateral in situ and invasive breast cancer
In-/Exclusion criteria	- ICD code = D05 - Only in situ breast cancer (D05) diagnosed without or before a diagnosis of an invasive breast cancer - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	This indicator is analysed at the patient level. The total number of patients includes all individuals with an in situ breast tumour diagnosis (D05). The number of patients with a contralateral* metachronous** invasive tumour is calculated along with the percentage of these cases among patients with an in situ tumour. *Contralateral/Bilateral: the second (invasive) tumour was diagnosed on the other/contralateral side compared to the first (in situ) tumour. **Metachronous: the second (invasive) tumour was diagnosed later than 4 months after the first (in situ) tumour.
Stratification	- By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis)
Literature	- Between 1973 and 2014, a total of 11,177 women with bilateral breast cancer are in the SEER database. Definition metachronous: more than one year after the diagnosis of primary breast cancer(16).
Remarks	

15 Oestrogen receptor status

Objective	To show the proportion of a positive oestrogen receptor (ER) in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases with missing ER status
Calculation	The number of cases with a positive oestrogen receptor status (5.1.1 Oestrogen receptor status = 1-100 positive percentage values or = 333 receptor status positive), along with the percentage among all included cases is calculated.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	- According to the National Cancer Data Dictionary V1.2, information about hormone receptor status can be recorded quantitatively as well as qualitatively (17).

16 Progesterone receptor status

Objective	To show the proportion of a positive progesterone receptor (PR) status in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases with missing PR status
Calculation	The number of cases with a positive progesterone receptor status (5.1.2 Progesterone receptor status = 1-100 positive percentage values or = 333 receptor status positive), along with the percentage among all included cases is calculated.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	- According to the National Cancer Data Dictionary V1.2, information about hormone receptor status can be recorded quantitatively as well as qualitatively (17).

17 Hormone receptor status

Objective	To show the proportion of a positive hormone receptor (HR) status in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Exclusion of cases with missing HR status
Calculation	The number of cases with a hormone receptor status (5.1.1 Oestrogen receptor status = 1-100 or = 333 receptor status positive OR/AND 5.1.2 Progesterone receptor status = 1-100 or = 333 receptor status positive) along with the percentage among all included cases is calculated.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	- According to the National Cancer Data Dictionary V1.2, information about hormone receptor status can be recorded quantitatively as well as qualitatively (17).

18 HER2 receptor status

Objective	To show the proportion of positive HER2 receptor status in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases with no information on HER2 receptor status (missing information, not performed, unknow whether performed or not)
Calculation	Number of cases with positive HER2 receptor status (5.1.2 HER2 receptor status = 1 overexpressed/amplified), alongside with the percentage among all included cases is calculated.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	

19 Tumour proliferation labelling (Ki-67)

Objective	To show the distribution of Ki-67 antigen expression in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases without information on tumour proliferation labelling
Calculation	Ki-67 antigen expression is categorised into five groups (5.1.4 Tumour proliferation labelling status = 0–9%, 10–19%, 20–29%, 30–39%, 40%+). The number and percentage of cases in each category among all included cases are calculated.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	

20 Triple-negative breast cancer

Objective	To show the proportion of triple-negative (TN) invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases without information on TN status
Calculation	Number of cases with triple-negative breast cancer (Oestrogen receptor status = 222 receptor status negative AND progesterone receptor status = 222 receptor status negative AND HER2 receptor status = 2 HER2 gene not overexpressed or amplified), alongside with the percentage among all included cases is calculated.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	

Treatment

21 Treatment decision at a tumour board

Objective	To show the proportion of invasive breast cancer cases with treatment decision at a tumour board
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	Number of cases with treatment decision at a tumour board* (7.1 Basis of first treatment complex decision = 1 tumour board), alongside with the percentage among all included cases is calculated. *Cases without any information on treatment decision were considered as having had no tumour board.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Indicator sheet breast DKG, German Society of Senology: Indicators 1 and 2 - Postoperative and pre-therapeutic case discussion (11). - Q-Label: Proportion of cases with pre-therapeutic discussion of the therapy concept in all new cases, proportion of cases with discussion at the post-operative tumour board in all new breast cancer cases (18).
Remarks	- According to the National Cancer Data Dictionary V1.2, only one tumour board with a treatment decision (preoperative or postoperative) can be recorded (17).

22 Surgical treatment

Objective	To show the proportion of surgical treatment in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	The number of cases with surgery* (7.4 First treatment complex code(s): CHOP code of category surgery (see Appendix 1.1 Surgery)), alongside with the percentage among all included cases is calculated. *CHOP codes lacking information on the start date were regarded as not initiated/conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	

23 Types of surgical treatment

Objective	To show the distribution of the surgical procedures in breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Only cases undergone surgery (see Appendix 1.1 Surgery) - Excluding cases with UICC stage IV (9.17 TNM Stage group = IV) / metastatic cancer (4.5 cM = 1 or 4.13 pM = 1)
Calculation	The number of cases receiving different types of surgical treatments* was calculated, along with the corresponding percentage among all included cases. The surgical treatment is categorised into the following groups (7.4 First treatment complex code(s): CHOP code of category surgery (see Appendix 1.1 Surgery): - breast-conserving surgery - nipple/skin-preserving mastectomy - total mastectomy - other surgeries Only the hierarchically most invasive surgery was counted (mastectomy > nipple- or skin-preserving mastectomy > breast conserving surgery). *CHOP codes lacking information on the start date were regarded as not initiated /conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Q-Label: Proportion of breast-conserving operations in all operations taking into account tumour size and proportion of mastectomies in all new breast cancer cases operated on (18) - Institute for Quality Assurance and Transparency in Health Care Germany: Surgical treatments for invasive carcinoma in primary disease (p. 79) (21). - Indicator sheet breast DKG, German Society of Senology: Indicator 16- Breast-conserving approach in pT1 tumours (22). - According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	

24 Resection status

Objective	To show the proportion of patients without detectable local residual tumour after surgery in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Including only cases undergone surgery (see Appendix 1.1 Surgery) - Excluding cases with UICC stage IV (9.17 TNM Stage group = IV) / metastatic cancer (4.5 cM = 1 or 4.13 pM = 1) - Excluding cases with resection status > 50 mm and cases with no information on resection status
Calculation	Number and percentage of cases without detectable local residual tumour among all included cases (6.3 Resection margin invasive tumour > 0 mm)
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	

25 Sentinel lymph node examination

Objective	To show the proportion of sentinel lymph node (SLN) examination in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 (N = 22'291) - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases with UICC stage IV (9.17 TNM Stage group = IV) / metastatic cancer (4.5 cM = 1 or 4.13 pM = 1) - Excluding cases with neoadjuvant therapy (see indicator 35) - Including only cases with no regional lymph node metastasis (pN0) - Including only cases undergone surgery (see Appendix 1.1 Surgery) - Excluding cases without any information on sentinel- or regional lymph node examination
Calculation	The number of cases with at least one examined sentinel lymph node (6.6 Number of examined sentinel lymph nodes = 1-98), AND no additional regional lymph nodes examined (4.12 Number of examined regional lymph nodes = 6.6 Number of examined sentinel lymph nodes), along with the percentage among all included cases is calculated.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Indicator sheet breast DKG, German Society of Senology: Indicator 20a - Sentinel lymph node removal only in pN0 (female patients) (22) - Indicator sheet breast DKG, German Society of Senology: Indicator 20b - Sentinel lymph node removal only in pN0 (male patients) (22)
Remarks	

26 Radiotherapy

Objective	To show the proportion of radiotherapy in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	The number of cases with radiotherapy* (7.4 First treatment complex code(s): CHOP code of category radiotherapy (see Appendix 1.5 Radiotherapy)), alongside with the percentage among all included cases is calculated. *CHOP codes lacking information on the start date are regarded as not initiated /conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	

27A Radiotherapy after breast-conserving therapy for invasive breast cancer

Objective	To show the proportion of radiotherapy after breast-conserving surgery (BCS) in patients with invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases with UICC stage IV (9.17 TNM Stage group = IV) / metastatic cancer (4.5 cM = 1 or 4.13 pM = 1) - Only cases with breast-conserving surgery (See Appendix 1.1 Surgery)
Calculation	The number of cases with radiotherapy* (7.4 First treatment complex code(s): CHOP code of category radiotherapy (See Appendix 1.5 Radiotherapy)), alongside with the percentage among all included cases is calculated. Only cases with radiotherapy AFTER breast-conserving surgery are considered. *CHOP codes lacking information on the start date are regarded as not initiated /conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Guideline-Based Quality Indicators in the Oncology Guideline Program: QI 8 - Radiotherapy performed after breast-conserving therapy (10) - Indicator sheet breast DKG, German Society of Senology: Indicator 4 - Radiotherapy after breast-conserving therapy for invasive breast cancer (22). - According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	

27B Radiotherapy after breast-conserving therapy for DCIS

Objective	To show the proportion of radiotherapy after breast-conserving surgery (BCS) in patients with ductal carcinoma in situ (DCIS)
In-/Exclusion criteria	- ICD code = D05 - Only in situ breast cancer (D05) diagnosed without or before a diagnosis of an invasive breast cancer - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Only cases with breast-conserving surgery (see Appendix 1.1 Surgery) - Only cases with ICD-O morphology code 8500/2 (=DCIS)
Calculation	The number of cases with radiotherapy* (7.4 First treatment complex code(s): CHOP code of category radiotherapy (see Appendix 1.5)), alongside with the percentage among all included cases is calculated. Only cases with radiotherapy AFTER breast-conserving surgery are considered. *CHOP codes lacking information on the start date are regarded as not initiated /conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis)
Literature	- Indicator sheet breast DKG, German Society of Senology: Indicator 5 - Radiotherapy after breast-conserving surgery for DCIS (22). - According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	

28 Chemotherapy

Objective	To show the proportion of chemotherapy in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	The number of cases with *chemotherapy (7.4 First treatment complex code(s): CHOP code of category chemotherapy (see Appendix 1.4 Chemotherapy)), alongside with the percentage among all included cases is calculated. *CHOP codes lacking information on the start date are regarded as not initiated /conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	- Adjuvant as well as neo-adjuvant chemotherapy is taken into account.

29 Chemotherapy for HER2-positive invasive breast cancer

Objective	To show the proportion of chemotherapy in patients with HER2-positive invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Only HER2-positive invasive breast cancer (see Indicator 18)
Calculation	The number of cases with chemotherapy* (7.4 First treatment complex code(s): CHOP code of category chemotherapy (see Appendix 1.4 Chemotherapy)), alongside with the percentage among all included cases is calculated. *CHOP codes lacking information on the start date are regarded as not initiated /conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Indicator sheet breast DKG, German Society of Senology: Indicator 6 - Chemotherapy for receptor-positive and nodal-positive findings (11). - According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	

30 Chemotherapy for triple-negative invasive breast cancer

Objective	To show the proportion of chemotherapy in patients with triple-negative invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Only triple-negative invasive breast cancer (see indicator 20)
Calculation	The number of cases with chemotherapy* (7.4 First treatment complex code(s): CHOP code of category chemotherapy (see Appendix 1.4 Chemotherapy)), alongside with the percentage among all included cases is calculated. *CHOP codes lacking information on the start date are regarded as not initiated /conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	

31 Hormone therapy

Objective	To show the proportion of hormone therapy in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	The number of cases with hormone therapy* (7.4 First treatment complex code(s): CHOP code of category hormone therapy (see Appendix 1.3 Hormone therapy)), alongside with the percentage among all included cases is calculated. *CHOP codes lacking information on the start date are regarded as not initiated /conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	

32 Hormone therapy for hormone receptor-positive invasive breast cancer

Objective	To show the proportion of hormone therapy in patients with hormone receptor (HR)-positive invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Only hormone receptor-positive cases (see indicator 17)
Calculation	The number of cases with *hormone therapy (7.4 First treatment complex code(s): CHOP code of category hormone therapy (see Appendix 1.3 Hormone therapy)), alongside with the percentage among all included cases is calculated. *CHOP codes lacking information on the start date are regarded as not initiated/conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Guideline-Based Quality Indicators in the Oncology Guideline Program: QI 9 - Endocrine therapy for receptor-positive findings (10) - Breast DKG, German Society of Senology: Indicator 7 - Endocrine therapy with as many steroid-positive findings as possible (22). - According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	

33 Targeted therapy/Immunotherapy

Objective	To show the proportion of targeted therapy/immunotherapy in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	The number of cases with targeted therapy/immunotherapy* (7.4 First treatment complex code(s): CHOP code of category targeted therapy/immunotherapy (see Appendix 1.2 Targeted therapy/immunotherapy)), alongside with the percentage among all included cases is calculated. *CHOP codes lacking information on the start date were regarded as not initiated /conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	- Targeted therapy/immunotherapy includes antibody therapy.

34 Targeted therapy/Immunotherapy for HER2-positive invasive breast cancer

Objective	To show the proportion of targeted therapy/immunotherapy in patients with HER2-positive invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Only cases with pT ≥ 1c (4.8 pT ≥ 1c) - Only HER2-positive invasive breast cancer (see indicator 18)
Calculation	The number of cases with targeted therapy/immunotherapy* (7.4 First treatment complex code(s): CHOP code of category targeted therapy/immunotherapy (see Appendix 1.2 Targeted therapy/immunotherapy)), alongside with the percentage among all included cases is calculated. *CHOP codes lacking information on the start date were regarded as not initiated/conducted
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- Guideline-Based Quality Indicators in the Oncology Guideline Program: QI 10 - Trastuzumab therapy for HER2-positive findings (Note: Metastatic tumours are excluded in the quality indicator from Germany (10) - Indicator sheet breast DKG, German Society of Senology: Indicator 8 - Trastuzumab therapy over 1 year for HER-2 positive findings (22). - According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	- Targeted therapy/immunotherapy includes antibody therapy.

35 Neoadjuvant treatment

Objective	To show the proportion of neoadjuvant treatment in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only)
Calculation	Number and percentage of cases (among all included cases) receiving chemotherapy or targeted therapy/immunotherapy prior to surgery*. Treatments were identified using 7.4 First treatment complex CHOP codes for chemotherapy, targeted therapy/immunotherapy, and surgery (see Appendix 1 CHOP codes), with the sequence determined from the corresponding start dates (7.5.1 First treatment complex start date(s)). *CHOP codes lacking information on the start date were regarded as not initiated /conducted.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA**) **For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19). - The Cancer Registry of Lower Saxony (Germany) reports all tumour-relevant therapies that were carried out within 12 months following the initial diagnosis (20).
Remarks	

36 Time between diagnosis and start of treatment

Objective	To show the time between the diagnosis and the start of the first treatment in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Only cases with surgery, chemotherapy, radiotherapy, hormone therapy or targeted therapy/immunotherapy with start between the day of diagnosis and 9 months after the diagnosis (see Appendix 1 CHOP codes)
Calculation	- Mean and median time between diagnosis and start of the treatment in days
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19).
Remarks	

37 Time between diagnosis and surgery

Objective	To show the time between the diagnosis and the surgery in invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases with UICC stage IV (9.17 TNM Stage group = IV) / metastatic cancer (4.5 cM = 1 or 4.13 pM = 1) - Only cases with surgery with start between the day of diagnosis and 9 months after the diagnosis and without neoadjuvant treatment (see Appendix 1 CHOP codes, neoadjuvant therapy was defined as receiving chemotherapy or targeted therapy/immunotherapy prior to surgery)
Calculation	- Mean and median time between diagnosis and date of the surgical treatment in days
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- According to the ENCR recommendation to treatment data recording in cancer registration anticancer treatment is defined as first course procedures (i.e. first line treatment modalities) started within 9 months following diagnosis (19).
Remarks	

Course of the disease

38 New event during the course of the disease

Objective	To show the proportion of a new event (recurrence, progression, metachronous metastasis) during the course of the disease in patients with breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1) - Excluding cases detected by death certificate only (2.7 Most valid basis of diagnosis = 0 Death Certificate Only) - Excluding cases with UICC stage IV (9.17 TNM Stage group = IV) / metastatic cancer (4.5 cM = 1 or 4.13 pM = 1)
Calculation	Number of cases with recurrence, progression, metachronous metastasis (8.1 Type of recurrence(s)/transformation(s) = 1 progression, 3 metastasis, 4 recurrence, 9 Unknown whether progression or recurrence), along with the percentage of these cases among the total number of patients are calculated.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- DKG Breast Indicator Sheet, German Society of Senology: Indicator 14b - Patients with new (local) recurrence and/or distant metastases (without primary M1 patients) (22).
Remarks	

39 Event-free survival

Objective	To show the event-free survival (no recurrence, progression, metachronous metastasis or death) in patients with invasive breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary invasive tumours (C50) according to ENCR rules for multiple primaries (1)
Calculation	Observed 1- and 2-year event-free survival proportion, representing the proportion of patients who are alive and have not experienced an event at a given time after diagnosis.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	

Comorbidities and hereditary predispositions

40. Comorbidities

Objective	To show the distribution of comorbidities in breast cancer patients
In-/Exclusion criteria	- ICD code = C50 - Only primary tumours (C50) according to ENCR rules for multiple primaries (1)
Calculation	Number of cases with specific comorbidity (see below), along with the percentage of these cases among the total number of patients. Variables 10.1-10.13 ≥ 1 (supplementary variables of the national cancer data dictionary (17): 1) Diabetes mellitus = 1 (Uncomplicated), 2 (End-organ damage) 2) Liver disease = 1 (mild), 2 (moderate to severe) 3) HIV/AIDS = 1 (Yes) 4) Moderate to severe chronic kidney disease = 1 (Yes) 5) Congestive Heart failure = 1 (Yes) 6) Myocardial infarction = 1 (Yes) 7) Chronic pulmonary disease = 1 (Yes) 8) Peripheral vascular disease = 1 (Yes) 9) Cerebrovascular Accident or Transient Ischemic Attack = 1 (Yes) 10) Dementia = 1 (Yes) 11) Hemiplegia / paraplegia = 1 (Yes) 12) Connective Tissue Disease - Rheumatic disease = 1 (Yes) 13) Peptic ulcer disease = 1 (Yes) 14) Any comorbidity: at least one of the above-mentioned comorbidities
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	

41 Charlson Index

Objective	To show the distribution of the Charlson Index in breast cancer patients
In-/Exclusion criteria	- ICD code = C50 - Only primary tumours (C50) according to ENCR rules for multiple primaries (1)
Calculation	Percentage distribution of the Charlson index (10.14 Charlson Index) (in steps of 1 or 2 or other categories, to be defined)
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	- The Charlson index is a scoring system that can be used to approximately assess the mortality rate of patients (23).
Remarks	- The individual components of the Charlson Index recorded (supplementary variables 10.1 -10.13 of the national cancer data dictionary) enable the NACR to calculate the Charlson Index, if the index itself (supplementary variable 10.14) is not provided (17).

42 Familial and hereditary breast cancer

Objective	To show the proportion of familial and hereditary breast cancer
In-/Exclusion criteria	- ICD code = C50 - Only primary tumours (C50) according to ENCR rules for multiple primaries (1)
Calculation	Number of cases with predispositions (supplementary variable of the national cancer data dictionary 9.1 Hereditary predisposition(s) = 3 hereditary breast and ovarian cancer (HBOC syndrome) OR = 4 hereditary breast cancer)) along with the percentage of these cases among the total number of patients.
Stratification	- By sex (female / male) - By age category (0-49, 50-69, 70-79, 80+ years old at diagnosis) - By UICC stage (stage I, stage II, stage III, stage IV, NA*) *For cases with missing UICC stage information or where UICC staging is not applicable (e.g., DCO cases, non-histologically verified cases, or non-carcinomas).
Literature	
Remarks	

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APPENDIX

Appendix 1: CHOP Codes

1.1 Surgery

1.1.1 Breast conserving surgery

CHOP code	Name
Z00.R8	Minor surgical procedure on tumor, not otherwise specified (for cancer registration only)
Z00.RD	Local excision, not otherwise specified (for cancer registration only)
Z00.RE	Extended excision (for cancer registration only)
Z85.12	Open biopsy of the breast
Z85.20	Excision or destruction of breast tissue, not otherwise specified
Z85.21	Local excision of a lesion of the breast
Z85.25	Nipple excision
Z85.26	Partial mastectomy
Z85.27	Local excision of lesion or tissue of the skin of the breast
Z85.28	Local excision of lesion or tissue of the breast
Z85.29	Excision or destruction of breast tissue, other
Z85.A1	Partial mastectomy

1.1.2 Nipple/skin-preserving mastectomy

CHOP code	Name
Z85.34.00	Subcutaneous mastectomy, not otherwise specified
Z85.34.11	Skin-sparing mastectomy with complete resection of glandular tissue, without additional procedures
Z85.34.12	Skin-sparing mastectomy with complete resection of glandular tissue, with skin envelope tightening
Z85.34.22	Nipple-sparing mastectomy with complete resection of glandular tissue, with skin envelope tightening
Z85.A2.11	Skin-sparing mastectomy with complete resection of glandular tissue, without additional procedures
Z85.A2.12	Skin-sparing mastectomy with complete resection of glandular tissue, with skin envelope tightening
Z85.A3.11	Nipple-sparing mastectomy with complete resection of glandular tissue, without additional procedures
Z85.A3.12	Nipple-sparing mastectomy with complete resection of glandular tissue, with skin envelope tightening
Z85.A3	Nipple-sparing mastectomy with complete resection of glandular tissue

1.1.3 Total mastectomy

CHOP code	Name
Z85.40	Mastectomy, not otherwise specified
Z85.41	Simple mastectomy
Z85.45.00	Radical mastectomy, not otherwise specified
Z85.45.11	Radical mastectomy with partial resection of chest wall
Z85.A0	Mastectomy, not otherwise specified
Z85.A4	Simple mastectomy
Z85.A5	Modified radical mastectomy
Z85.A6.11	Radical mastectomy without partial resection of chest wall
Z85.A6.12	Radical mastectomy with partial resection of chest wall
Z85.A7	Extended radical mastectomy
Z85.A9	Mastectomy, other

1.1.4 Other surgery

CHOP code	Name
Z00.R1	Surgical treatment, not otherwise specified (cancer registration only)
Z00.RJ	Resection with incomplete removal (cancer registration only)
Z00.R2	Surgical procedure on organ, not otherwise specified (cancer registration only)
Z85.9	Other operations on the breast
Z85.J9	Other operations on skin and subcutaneous tissue of the breast, other

1.2 Targeted therapy/Immunotherapy

CHOP code	Name
Z99.28.00	Instillation of cytotoxic materials and immunomodulators, not otherwise specified
Z99.28.10	Other immunotherapy, not otherwise specified
Z99.28.11	Other immunotherapy with unmodified antibodies
Z99.28.12	Other immunotherapy with modified antibodies
Z99.28.13	Other immunotherapy with immunomodulators
Z99.28.14	Other immunotherapy, immunosuppression, intravenous
Z99.28.15	Other immunotherapy, immunosuppression, other route of administration

1.3 Hormone therapy

CHOP code	Name
Z65.30	Oophorectomy, not otherwise specified
Z65.31	Oophorectomy, laparoscopic
Z65.39	Oophorectomy, other
Z65.40	Salpingo-oophorectomy, not otherwise specified
Z65.41	Salpingo-oophorectomy, laparoscopic
Z99.2R	Code only for cancer registration
Z99.2R.0	Hormone therapy (cancer registration only)
Z99.2R.01	Hormone therapy, not otherwise specified (cancer registration only)
Z99.2R.02	Anti-estrogen hormone, not otherwise specified (cancer registration only)
Z99.2R.03	Anti-estrogen hormone, type Tamoxifen (cancer registration only)
Z99.2R.04	Hormone therapy, type anti-aromatase (cancer registration only)
Z99.2R.05	Hormone therapy, type LHRH inhibitor (cancer registration only)
Z99.2R.06	Hormone therapy, other, new generation (cancer registration only)
Z99.2R.07	Anti-testosterone hormone, type Zoladex (cancer registration only)

1.4 Chemotherapy

CHOP code	Name
Z99.25	Administration of cytostatic drug for cancer treatment
Z99.25.00	Administration of cytostatic drug for cancer treatment, not otherwise specified
Z99.25.51	Non-complex chemotherapy
Z99.25.52	Moderately complex and intensive chemotherapy
Z99.25.53	Highly complex and intensive chemotherapy

1.5 Radiotherapy

CHOP code	Name
Z92.22	Deep orthovoltage radiotherapy
Z92.2	Therapeutic radiology and nuclear medicine
Z92.21.00	Superficial beam therapy, not otherwise specified
Z92.22.00	Orthovoltage beam therapy, not otherwise specified
Z92.22.1	Intraoperative X-ray therapy
Z92.23	Radioisotope teletherapy
Z92.23.00	High-voltage beam therapy, not otherwise specified
Z92.24	Teletherapy with photons
Z92.24.00	Teletherapy with photons, linear accelerator, not otherwise specified
Z92.24.04	Teletherapy with photons, linear accelerator, intraoperative radiotherapy
Z92.24.09	Teletherapy with photons, linear accelerator, other
Z92.25.00	Teletherapy with electrons, linear accelerator, not otherwise specified
Z92.25.04	Teletherapy with electrons, linear accelerator, intraoperative radiotherapy
Z92.25.09	Teletherapy with electrons, linear accelerator, other
Z92.26	Teletherapy with other particle beams
Z92.26.00	Teletherapy with other particle beams, not otherwise specified
Z92.26.11	Proton therapy, with image-guided setup, up to 2 treatment fields
Z92.27	Implantation or insertion of radioactive elements
Z92.27.00	Implantation or insertion of radioactive elements (brachytherapy with sealed radionuclides), body surface, other or not otherwise specified application site
Z92.27.23	Implantation or insertion of radioactive elements (brachytherapy with sealed radionuclides), intraluminal
Z92.29.00	Brachytherapy with sealed radionuclides, not otherwise specified
Z92.29.1	Interstitial brachytherapy with implantation of removable sources in one plane
Z92.29.2	Interstitial brachytherapy with implantation of removable sources in multiple planes
Z92.29.40	Brachytherapy with surface applicators, not otherwise specified
Z92.4	Intraoperative irradiation procedures
Z92.41	Intraoperative radiotherapy with electrons