Kwaliteitsindicatoren in oncologie: teelbalkanker

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Federaal Kenniscentrum voor de Gezondheidszorg
Centre fédéral d'expertise des soins de santé
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Kwaliteitsindicatoren in oncologie: teelbalkanker

KCE-rapporten 149A

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VOORWOORD

Wanneer mensen met kanker af te rekenen krijgen, dan mogen ze terecht hopen op de best mogelijke zorg om hun overlevingskansen zo hoog mogelijk te houden. De verantwoordelijkheid voor een kwaliteitsvolle zorg ligt natuurlijk in de eerste plaats bij alle zorgverleners die op een of andere wijze in het proces van diagnose en behandeling betrokken worden. De oncoloog, de chirurg, de huisarts, de radiotherapeut, en nog vele anderen kunnen het verschil maken op het vlak van overleving en levenskwaliteit. Maar ook de overheid en het gezondheidszorgsysteem, in de bredere zin, moeten hier hun verantwoordelijkheid opnemen, en dit op verschillende domeinen.

In het Nationale Kankerplan 2008-2010 is de invoering van een "gepersonaliseerd zorgprogramma" voor alle nieuwe kankerpatiënten één van de initiatieven. In dat kader wil men ook komen tot een kwaliteitssysteem voor oncologie in België.

Als voorbereiding op het opstarten ervan vroeg de minister aan het KCE om de haalbaarheid en de relevantie van een indicatorensysteem te evalueren voor een frequente kanker, namelijk borstkanker, en voor een zeldzame kanker, namelijk teelbalkanker; zoals reeds gebeurd is voor rectale kanker in het kader van het PROCARE project.

Dit rapport baseert zich op de nationale richtlijnen die eerder dit jaar werden gepubliceerd (KCE rapporten 142 en 143). Het sluitstuk wordt het vinden van een aangepast operationeel systeem om de zorgkwaliteit in oncologie op te volgen. Deze kwestie zal worden behandeld in een volgend rapport.

In dit rapport wordt de ontwikkeling van een set kwaliteitsindicatoren voor teelbalkanker besproken. Het rapport over borstkanker wordt gelijktijdig met dit gepubliceerd. Wij hopen dat dit alles uiteindelijk zal bijdragen tot een betere zorg voor de toekomstige patiënt.

Jean Pierre CLOSON
Adjunct Algemeen Directeur

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Samenvatting en toelichtingen

INLEIDING

In 2004 werd het PROCARE-project (PROject on CAncer of the REctum) gelanceerd als een multidisciplinair project uitgaande van de beroepsgroep met als hoofddoel de diagnostische en therapeutische variabiliteit te verminderen en de resultaten van patiënten met rectale kanker te verbeteren. De gevolgde strategie omvatte een standaardisatie via richtlijnen, implementatie van deze richtlijnen, en kwaliteitsbewaking door registratie en feedback. In 2005 werd op het Belgische Kankerregister (BKR) een registratie opgestart van multidisciplinaire klinische data, specifiek voor rectale kanker. Om individuele feedback en nationale/internationale benchmarking mogelijk te maken werd een systeem van kwaliteitsindicatoren opgezet in 2008. Tot op heden kregen de deelnemende centra al tweemaal feedback.

Als voorbereiding op het opstarten van een breder kwaliteitssysteem voor oncologie in België werd aan het KCE gevraagd om de benadering van het PROCARE-project te herhalen voor een frequente kanker, namelijk borstkanker, en voor een zeldzame kanker, namelijk teelbalkanker. De voornaamste onderzoeksvragen zijn:

1. Is het haalbaar om een set kwaliteitsindicatoren te ontwikkelen voor borstkanker en teelbalkanker met behulp van de beschikbare administratieve gegevens? Meer specifiek zal de toegevoegde waarde van de Minimale Klinische Gegevens (MKG) en Minimale Financiële Gegevens (MFG) worden geëvalueerd.
2. Welke methoden/systemen/structuren om de zorgkwaliteit in oncologie op te volgen, worden beschreven in de literatuur? Deze onderzoeksvraag zal worden behandeld in een volgend rapport.

In een eerste fase werden de nationale richtlijnen voor beide kankertypes al bijgewerkt en gepubliceerd (KCE rapport 142 en 143). In een volgende fase wordt een set kwaliteitsindicatoren ontwikkeld. In dit rapport wordt de ontwikkeling van een set kwaliteitsindicatoren voor teelbalkanker besproken. Het rapport over borstkanker wordt gelijktijdig gepubliceerd.

KWALITEITSINDICATOREN: SELECTIEPROCES EN UITWERKING

METHODEN

Zowel OVID Medline als de grijze literatuur werden doorzocht om gepubliceerde en gevalideerde kwaliteitsindicatoren voor teelbalkanker te identificeren. Verschillende bronnen van grijze literatuur werden geraadpleegd, zoals het National Quality Measures Clearinghouse, het Agency for Healthcare Research and Quality, de Joint Commission (USA), het Clinical Indicators Support Team (UK) en de National Health Service (UK). Bestaande klinische praktijkrichtlijnen, geïdentificeerd tijdens de ontwikkeling van de richtlijn over teelbalkanker, werden eveneens geëvalueerd voor bijgesloten kwaliteitsindicatoren. De opzoekingen vonden plaats in december 2009. Kwaliteitsindicatoren afgeleid van de aanbevelingen uit de richtlijn voor borstkanker werden toegevoegd aan de lijst van kwaliteitsindicatoren uit het literatuuronderzoek.

Het selectieproces werd onafhankelijk uitgevoerd door 6 deskundigen. De selectiecriteria waren respectievelijk betrouwbaarheid, relevantie, interpreteerbaarheid en mogelijkheid om actie te ondernemen.

RESULTATEN

Globaal werd 1 indicator teruggevonden in de literatuur en 31 kwaliteitsindicatoren werden geformuleerd op basis van de Belgische richtlijn. Uit de definitieve lijst van 32 kwaliteitsindicatoren werden er 12 weerhouden (Tabel 1).

Tabel 1: Definitieve selectie van kwaliteitsindicatoren voor teelbalkanker

Indicator	Type indicator
Diagnose en stadiëring	
Proportie patiënten met teelbalkanker bij wie een bepaling van de tumormarkers gebeurde vóór enige behandeling	Proces
Proportie patiënten met teelbalkanker die een contrast-versterkte computertomografie (CE-CT) of kernspintomografie (NMR) ondergingen voor primaire stadiëring	Proces
Proportie patiënten met teelbalkanker besproken tijdens multidisciplinair oncolgisch consult (MOC)	Proces
Behandeling	
Jaarlijks aantal chirurgisch behandelde patiënten met teelbalkanker per centrum	Proces
Stralingsdosis en -veld bij patiënten met teelbalkanker behandeld met radiotherapie per stadium	Proces
Proportie patiënten met stadium I non-seminoom behandeld met actieve follow-up	Proces
Proportie patiënten die een CE-CT of NMR ondergaan voor bepaling van residuele ziekte op het einde van een systemische behandeling	Proces
Graad en duur van actieve follow-up bij patiënten met stadium I non-seminoom of seminoom	Proces
Proportie patiënten met recidiverende teelbalkanker na curatieve behandeling die deelnemen aan een klinische studie	Proces
Algemene indicatoren	
Algemene 5-jaarsoverleving per stadium	Uitkomst
Ziektespecifieke 5-jaarsoverleving per stadium	Uitkomst
Ziektevrije 5-jaarsoverleving per stadium	Uitkomst

KWALITEITSINDICATOREN: MEETBAARHEID

METHODEN

Om de meetbaarheid van deze indicatoren te analyseren werden 3 verschillende databanken gekoppeld. De primaire selectie bestond uit alle patiënten met een incidentiedatum van teelbalkanker tussen 01/01/2001 – 31/12/2006, i.e. geregistreerd met ICD-10 code C62 (maligne teelbaltumor) in het BKR. Voor deze patiënten werden de BKR-gegevens gekoppeld aan de gegevens van het Intermutualistisch Agentschap (IMA) (2001-2006) en MKG-MFG (2002-2006). Een aanvullende selectie werd uitgevoerd met behulp van geschikte ICD-9-CM codes in de MKG-MFG-databank om de volledigheid van de primaire selectie te controleren.

Voor elke geselecteerde kwaliteitsindicator werden de teller en de noemer (en hun respectievelijke in- and exclusiecriteria) gedefinieerd en werd de meetbaarheid beoordeeld.

Voor elke meetbare kwaliteitsindicator werd het resultaat ook berekend per centrum, waarvan de anonimiteit behouden bleef. De variabiliteit tussen de centra werd grafisch weergegeven met behulp van funnel plots.

RESULTATEN

Meetbaarheid van kwaliteitsindicatoren

Van de 12 geselecteerde indicatoren waren er 5 meetbaar, 1 was gedeeltelijk meetbaar en 2 indicatoren waren meetbaar met behulp van een proxy-indicator of proxy-informatie. De 4 overblijvende indicatoren waren niet meetbaar. De belangrijkste reden voor niet-meetbaarheid was de afwezigheid van administratieve codes (N=2) of het gebrek aan specificiteit van de bestaande administratieve codes (N=3). Zolang er geen voldoende recente nationale gegevens beschikbaar zijn over reden van overlijden is de ziektespecifieke overleving op zich niet meetbaar. Daarom werd de relatieve overleving (algemene overleving / verwachte overleving) gebruikt als proxy indicator.

Een van de doelstellingen van het huidige rapport was het evalueren van de toegevoegde waarde van MKG-gegevens om de meetbaarheid van de geïncludeerde indicatoren te verbeteren. Talrijke technische problemen leidden echter tot een onvolledige koppeling van de MKG-gegevens aan gekoppelde BKR-IMA gegevens. Uiteindelijk waren gekoppelde BKR-IMA-MKG-gegevens alleen beschikbaar voor de jaren 2002-2004 en voor een beperkt aantal gevallen (ongeveer 70%). MKG-gegevens hielpen de meetbaarheid te verbeteren van indicatoren die betrekking hadden op chirurgische behandeling (chirurgisch volume, proportie van stadium I patiënten behandeld met actieve follow-up). Bijkomende informatie uit de MKG-gegevens zou echter overbodig worden indien er een meer geschikte nomenclatuurcode voor orchidectomie zou zijn. De toegevoegde waarde van MKG voor andere indicatoren werd niet aangetoond. Omwille van bovenvermelde technische problemen konden de MKG-gegevens ook niet helpen om de volledigheid van de BKR-gegevens te beoordelen.

Resultaten op nationaal niveau

Tabel 2 toont de evolutie tussen 2001 (N patiënten = 209) en 2006 (N patiënten = 248) voor de meeste meetbare indicatoren. De volgende resultaten worden meer gedetailleerd besproken in het wetenschappelijke rapport:

- De vijfjaarsoverleving is hoog en nog lichtjes aan het stijgen, en is in overeenstemming met het percentage dat in andere landen wordt gemeld. In tegenstelling tot andere landen werd er geen verschil vastgesteld in 5-jaarsoverleving tussen seminoom en non-seminoom;
- Het gebruik van tumormarkers tijdens de diagnostische work-up is matig tot goed;
- Multidisciplinair overleg wint aan belang, maar de proportie is eerder laag in vergelijking met andere tumortypes;

- Het percentage orchidectomieën lijkt laag. Mogelijke verklaringen die door de deskundigen werden gegeven zijn het gebruik van een foutieve of zelfs geen nomenclatuurcode (bij gebrek aan een specifieke nomenclatuurcode voor een 'eenvoudige' radicale orchidectomie);
- Het percentage actieve follow-up bij stadium I patiënten is laag;
- Er is geen informatie beschikbaar over het aantal patiënten dat deelneemt aan klinische studies.

Tabel 2. Evolutie van meetbare kwaliteitsindicatoren tussen 2001 en 2006.

Indicator	**Resultaat 2001**	**Resultaat 2006**
Algemene 5-jaarsoverleving	91%	94% *(resultaat 2004)*
Relatieve 5-jaarsoverleving	92%	95% *(resultaat 2003)*
Proportie patiënten met teelbalkanker bij wie een bepaling van de tumormarkers gebeurde vóór enige behandeling	72.3%	80.6%
Proportie patiënten met teelbalkanker besproken tijdens het multidisciplinair oncologisch consult	*53.1%* *(resultaat 2004)*	67.3%
Proportie chirurgisch behandelde patiënten met teelbalkanker	81.3%	81.0%
Proportie patiënten met stadium I non-seminoom behandeld met actieve follow-up	28.0%	20.0%
Gemiddeld aantal bepalingen van tumormarkers in het eerste jaar na de chirurgische ingreep tijdens actieve follow-up voor patiënten met: - Seminoom - Non-seminoom	 5.5 10.5	*(resultaat 2005)* 6.5 8.9

Vergelijking tussen centra

Uit de resultaten van de beschrijvende statistieken en de meetbare kwaliteitsindicatoren blijkt dat er een aanzienlijke mate van variabiliteit is tussen de verschillende centra. Deze variabiliteit is het meest duidelijk voor de procesindicatoren, hoewel er ook variatie aanwezig is wat betreft overleving.

Opvallend is de spreiding van de zorg voor patiënten met teelbalkanker. Van alle orchidectomieën voor teelbalkanker tussen 2004 en 2006 werd 40% uitgevoerd in 14 centra, terwijl de resterende 60% werd gedaan in 83 centra. Meer dan een derde van de centra die patiënten met teelbalkanker behandelen voerde gemiddeld één orchidectomie of minder uit per jaar tussen 2004 en 2006.

Voor een juiste vergelijking tussen centra en om een zinvolle feedback naar de centra mogelijk te maken, is risicoaanpassing van uitkomstindicatoren noodzakelijk en kan worden overwogen voor procesindicatoren. Aangezien haalbaarheid het belangrijkste doel van het huidige project is, werd de noodzaak van risk-adjustment nog niet beoordeeld. Daarom kunnen de “ruwe” resultaten die in dit rapport worden voorgesteld, niet worden gebruikt voor vergelijking en feedback als dusdanig, hoewel ze deel moeten uitmaken van de individuele feedback die aan ziekenhuizen wordt gegeven.

CONCLUSIES

- Het is haalbaar om een set kwaliteitsindicatoren voor teelbalkanker te implementeren indien bepaalde acties worden ondernomen om de meetbaarheid van de kwaliteitsindicatoren te verbeteren. De lage incidentie van teelbalkanker is echter een belangrijke factor waarmee rekening moet worden gehouden wanneer operationalisering (frequentie van rapportering en feedback, accumulatie van verschillende jaren, enz.) van deze set wordt overwogen. De meest geschikte methode, i.e. implementatie van de volledige set kwaliteitsindicatoren of een mogelijk efficiënter alternatief, zoals een diepgaande analyse van de medische dossiers van de overleden patiënten, moet nog geëvalueerd worden.
- De gekoppelde BCR-IMA gegevens bleken voldoende voor de meetbaarheid van de huidige set kwaliteitsindicatoren. De toegevoegde waarde van MKG-gegevens is twijfelachtig en beperkt tot informatie over orchidectomieën. De beschikbaarheid van een meer geschikte nomenclatuurcode voor chirurgische interventies voor teelbalkanker kan de informatie uit MKG-gegevens nog meer overbodig maken.
- Deze preliminaire analyse geeft een gemengd beeld van de zorgkwaliteit voor teelbalkankerpatiënten. De overleving is goed, maar sommige resultaten suggereren dat van bepaalde interventies te veel of te weinig gebruik wordt gemaakt.
- Het gebrek aan risk-adjustment (vooral voor uitkomstindicatoren) in dit rapport laat geen betrouwbare vergelijking tussen centra toe op dit moment. Nochtans suggereert de preliminaire analyse een aanzienlijke variabiliteit op gebied van zorgkwaliteit, hetgeen het belang benadrukt van kwaliteitsmeting en verdere acties voor kwaliteitsverbetering, zelfs voor een zeldzame kanker zoals teelbalkanker. De spreiding van de zorg en het resulterende lage jaarlijkse aantal patiënten met teelbalkanker in meerdere centra doet vragen rijzen over de organisatie van de zorg voor deze patiënten en de nood om deze zorg te centraliseren in een beperkt aantal centra.

AANBEVELINGEN[a]

Op basis van de resultaten van dit rapport, waaruit een aanzienlijke variabiliteit in zorgkwaliteit voor teelbalkankerpatiënten blijkt, moet de opvolging van deze zorgkwaliteit overwogen worden. De meest geschikte methode (implementatie van de volledige set kwaliteitsindicatoren of een diepgaande analyse van de medische dossiers van de overleden patiënten) moet nog geëvalueerd worden. Vooraleer de set kwaliteitsindicatoren geïmplementeerd kan worden, wordt aanbevolen om de hieronder vermelde acties uit te voeren:

<u>Onderzoeksagenda</u>:

- **Voor elk van de geïncludeerde kwaliteitsindicatoren moet de noodzaak van risk-adjustment grondig worden bepaald;**
- **Voor elke individuele kwaliteitsindicator moeten geschikte afkapwaarden worden bepaald in samenwerking met het College voor Oncologie;**

<u>Data-gerelateerde acties:</u>

1. Nomenclatuur:

- **De bestaande nomenclatuurcodes voor kankergerelateerde teelbalchirurgie moeten worden herzien in overeenstemming met de huidige praktijkstandaarden;**
- **De nomenclatuurcodes voor CT en MRI moeten specifiek zijn voor een anatomische locatie.**

2. Kankerregistratie:

- **Het correct gebruik van de 7de editie van de TNM-classificatie en de volledige registratie ervan in het kankerregister moeten worden aangemoedigd;**
- **Het toevoegen van 'recidief' aan de huidige lijst van variabelen met verplichte registratie in het kankerregister moet overwogen worden, ten minste voor een geselecteerde groep van kankertypes;**
- **De volgende informatie zou moeten worden toegevoegd aan het MOC-formulier: stralingsdosis en -veld (klinisch doelvolume), inclusie in klinisch studie.**

a The KCE is the only responsible for the recommendations given to the public authorities

Scientific summary

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ABBREVIATIONS

95%CI	95 percent confidence interval
AFP	Alphafoetoprotein
APR-DRG	All Patients Refined Diagnosis Related Groups
BCR	Belgian Cancer Registry
BEP	Bleomycin, etoposide, cisplatin
CE-CT	Contrast-enhanced CT
CNK	Code National(e) Kode
CPG	Clinical practice guideline
CT	Computerized tomography
DCIS	Ductal carcinoma in situ
ESR	European Standardised Ratio
HCG	Human chorionic gonadotrophin
ICD	International classification of diseases
IMA	Common Sickness Funds Agency (Intermutualistisch Agentschap / L'Agence Intermutualiste)
KCE	Belgian Healthcare Knowledge Centre
KM	Kaplan-Meier
LDH	Lactate dehydrogenase
MCD	Minimal Clinical Data (Minimale Klinische Gegevens / Résumé Clinique Minimum)
MDC	Major Disease Category (Multidisciplinair Oncologisch Consult / Consultation Oncologique Multidisciplinaire)
MDT	Multidisciplinary team
MFD	Minimal Financial Data (Minimale Financiële Gegevens / Résumé Financier Minimum)
MRI	Magnetic resonance imaging
NSGCT	Non-seminoma germ cell tumour
PET	Positron emission tomography
PROCARE	PROject on CAncer of the REctum
RCT	Randomized controlled trial
SD	Standard deviation
SEER	Surveillance, Epidemiology, and End Results Program
SGCT	Seminoma germ cell tumour
US	United States

1 INTRODUCTION

In 2004, the Belgian Section for Colorectal Surgery, a section of the Royal Belgian Society for Surgery, launched the PROCARE project (PROject on CAncer of the REctum) as a multidisciplinary, profession-driven and decentralized project (www.belgiancancerregistry.be). The main objective of this multidisciplinary project is to reduce diagnostic and therapeutic variability and to improve outcome in patients with rectal cancer by means of:

- standardization through guidelines (which were issued in 2007 [1]);
- implementation of these guidelines (workshops, meetings, training);
- quality assurance through registration and feedback.

In 2005, a multidisciplinary dataset was elaborated for registration in a rectal cancer specific database at the Belgian Cancer Registry (BCR). Registration started in October 2005. In order to allow individual feedback and national/international benchmarking, a quality indicator system was set up in 2008 [2]. At present, two rounds of feedback were already given to the participating centres.

The PROCARE project drew the attention of the Minister of Health. Indeed, in the National Cancer Plan 2008-2010 (http://www.laurette-onkelinx.be/articles_docs/32_initiatieven_N.pdf, accessed on November 16th 2010), initiative 9 aimed at the instauration of a 'personalised care program' for all new cancer patients. The development of these care programs, together with the follow-up of the quality of care, are the responsibilities of the College of Oncology. To allow an efficient realisation of this task, a structure is needed that allows a rapid development and update of clinical practice guidelines, the translation of these guidelines into concrete care programs, and the definition and implementation of quality criteria to follow up the quality of care. At present, the College of Oncology and the KCE already collaborate for the development of clinical practice guidelines [3-5]. However, for the subsequent evaluation of the quality of care, no such collaboration exists.

As a preparation to set up a quality system for oncology in Belgium, the Minister asked the KCE to repeat the PROCARE project for a frequent cancer, i.e. breast cancer, and a rare cancer, i.e. testicular cancer. The main research questions are:

- Is it feasible to set up a quality indicator set for breast cancer and testicular cancer using the available administrative data? More specifically, the added value of the Minimal Clinical Dataset (MCD) and Minimal Financial Dataset (MFD) will be evaluated.
- Which methods/systems/structures are described in the literature to follow up the quality of care in oncology? This research question will be addressed in a subsequent report.

In a first phase, the national guidelines for both cancer types were updated and published earlier [6, 7]. In a second phase, a quality indicator set was developed for both cancer types. In the present report, the development of a quality indicator set for testicular cancer will be discussed. The report on breast cancer will be published in parallel.

Based on the results from the 3 exercises (PROCARE included) and the experiences in other countries, recommendations will be formulated to set up a quality system for oncology. These will be discussed in a subsequent report to be published early 2011.

2 SELECTION PROCESS OF QUALITY INDICATORS

2.1 METHODOLOGY

2.1.1 Literature search

Both OVID Medline (see appendix for search strategy) and the grey literature were searched to identify published and validated quality indicators for testicular cancer. The following sources were considered to identify grey literature:

- National Quality Measures Clearinghouse: http://qualitymeasures.ahrq.gov/
- Agency for Healthcare Research and Quality: http://www.ahrq.gov/
- Joint Commission: http://www.jointcommission.org/
- Clinical Indicators Support Team: http://www.indicators.scot.nhs.uk/
- National Health Service: http://www.nhs.uk/

Furthermore, the CPGs identified during the development of the testicular cancer guideline were evaluated for included quality indicators.

The main searches were conducted in December 2009. An additional Medline search for 'pattern of care' studies was done in February 2010.

2.1.2 Addition of guideline-based quality indicators

The list of quality indicators resulting from the literature search was complemented by quality indicators derived from the recommendations of the testicular cancer guideline [7]. To this end, most individual recommendations were translated in at least one quality indicator.

2.1.3 Selection process

The long list of indicators, resulting from the literature search and addition of guideline-based indicators, was subjected to a formal assessment based on 4 criteria:

- Reliability: the extent to which the measure provides stable results across various populations and circumstances;
- Relevance: the extent to which important health conditions accounting for a major share of the burden of disease, the cost of care, or policymakers' priorities are reflected;
- Interpretability: the extent to which clear conclusions are possible;
- Actionability: the extent to which action can be taken by individuals, organised groups and public and private agencies to meaningfully address this aspect or problem.

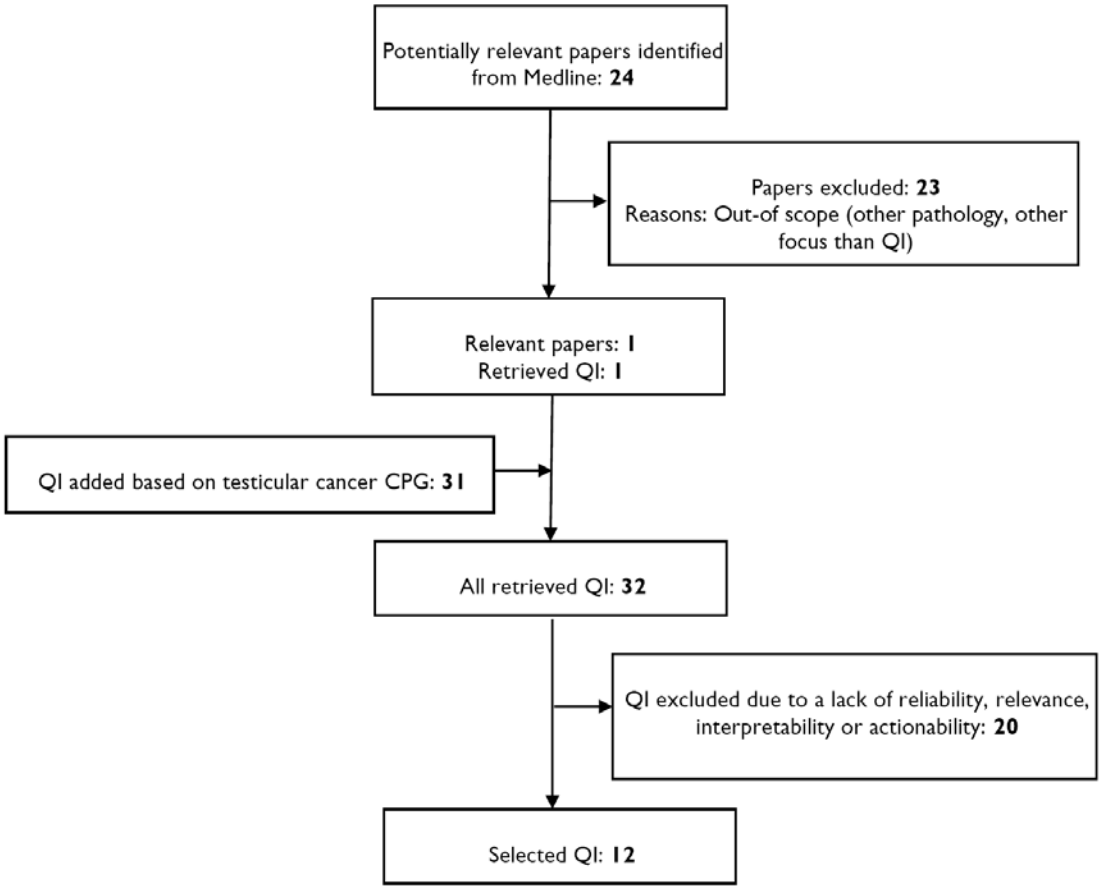
Six expert (5 clinical experts and 1 KCE expert) independently scored each indicator on these 4 criteria using a scale from 1 (strongly disagree) to 5 (strongly agree). For each indicator and per criterion, the scores were summarized in a median score, minimum score, maximum score and the percentage of '4' and '5' scores. Finally, these summary scores were used during a plenary meeting to guide the final selection of indicators.

2.2 RESULTS

The Medline search yielded 24 (December 2009) and 338 (February 2010) hits respectively. Only one quality indicator (use of tumour markers) was identified [8]. The search in the grey literature did not identify additional indicators.

Based on the testicular cancer guideline, 31 additional quality indicators were proposed resulting in a long list of 32 indicators (Figure 1).

Figure 1. Selection process of testicular cancer quality indicators.



The evaluation scores of these 32 indicators are provided in appendix. During the plenary meeting and based on these scores, the list of indicators was reduced to a final selection of 12 quality indicators (Table 1). The most important criterion during this selection was relevance.

Table 1. Final selection of testicular cancer quality indicators.

Indicator	Type of indicator
Diagnosis and staging	
Proportion of patients with testicular cancer undergoing tumour marker assessment before any treatment	Process
Proportion of patients with testicular cancer undergoing contrast-enhanced Computed Tomography (CE-CT) or Magnetic Resonance Imaging (MRI) for primary staging	Process
Proportion of patients with testicular cancer discussed at the multidisciplinary team meeting	Process
Treatment	
Number of annually surgically treated patients with testicular cancer per centre	Process
Radiation dose and field in patients with testicular cancer treated with radiotherapy by stage	Process
Proportion of patients with stage I non-seminoma treated with active surveillance	Process
Proportion of patients receiving CE-CT or MRI for residual disease assessment at the end of systemic treatment	Process
Degree and duration of active surveillance in patients with stage I non-seminoma or seminoma	Process
Proportion of patients with relapsing testicular cancer after curative treatment that are included in a clinical trial	Process
Generic indicators	
Overall 5-year survival by stage	Outcome
Disease-specific 5-year survival by stage	Outcome
Disease-free 5-year survival by stage	Outcome

3 DATA SELECTION

Since this report is part of a larger project, that also includes the development of a quality indicator set for breast cancer, the data selection was done for both tumours at the same time. Therefore, the description of the data selection process also includes data on breast cancer.

3.1 PRIMARY SELECTION

From the BCR, the following records were selected:

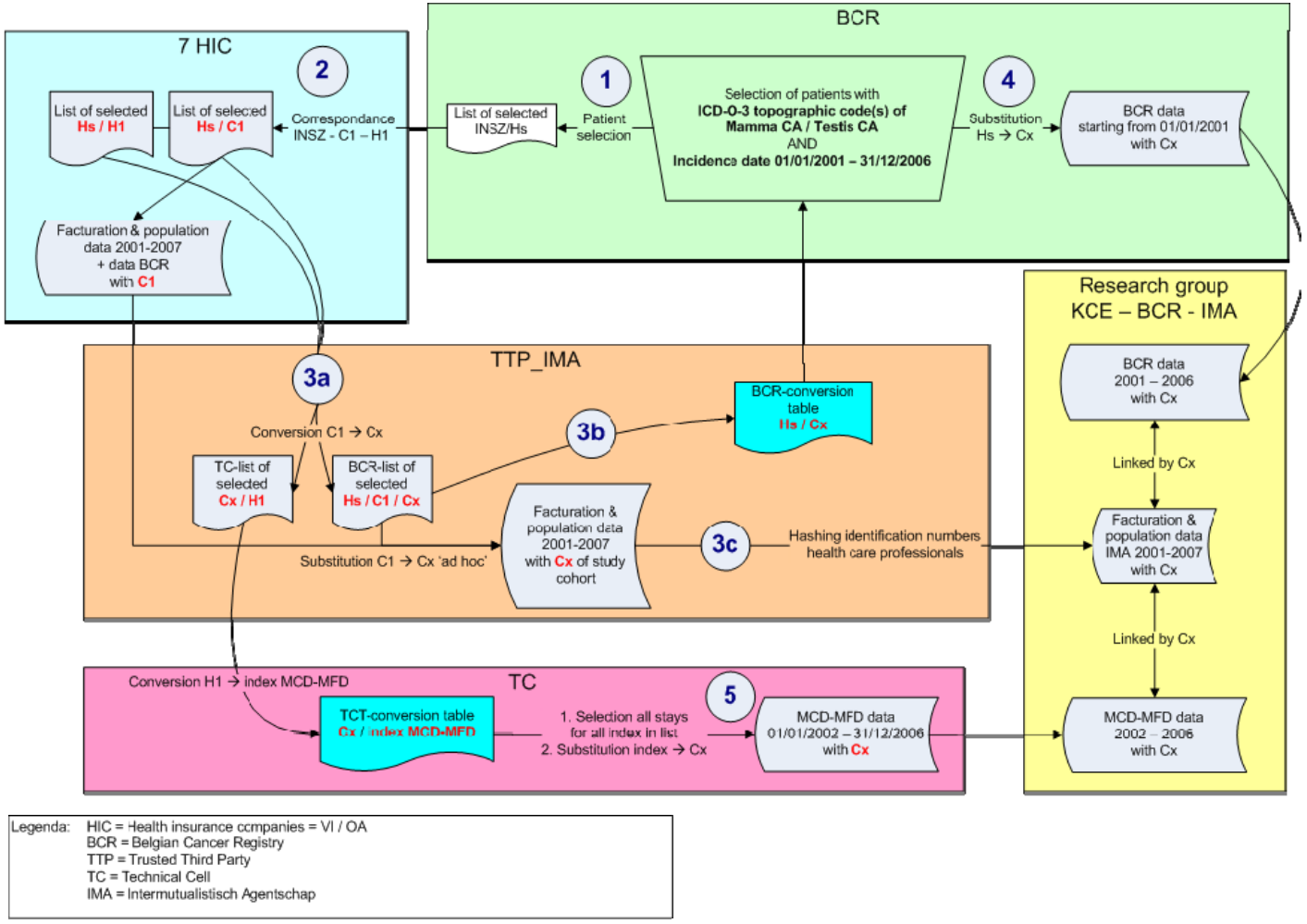
- All breast and testicular cancers with incidence date between 01/01/2001 – 31/12/2006:
  - ICD-10 breast: C50. (only invasive tumours)[a]
  - ICD-10 testis: C62. (only invasive tumours)
- For each selected patient, records related to other tumours (including in situ) were added

The primary selection resulted in 60 765 records, distributed amongst 54 173 patients. These data were sent to IMA and the Technical Cell for linkage (see Figure 2).[b]

[a] Breast carcinoma in situ (D05.) was not selected from the BCR data, because in the initial development of the project, only the quality of care for invasive tumours was considered. Because in a later phase also quality of care indicators (QCIs) for ductal carcinoma in situ (DCIS) were considered, Minimal Clinical Data (MCD) were used in order to estimate these indicators.

[b] The delivery of the BCR data to the IMA was done in two steps. First, the data of 2001-2004 were delivered; later on, the data of 2001-2006 were delivered. The present results all refer to the last data delivery.

Figure 2. Primary selection of breast and testicular cancer population.



Legenda: HIC = Health insurance companies = VI / OA
BCR = Belgian Cancer Registry
TTP = Trusted Third Party
TC = Technical Cell
IMA = Intermutualistisch Agentschap

3.2 ADDITIONAL SELECTION

From the MCD-MFD database (for the years 2002 – 2006), the selection of records was based on the following ICD-9-CM codes (see Figure 3):

Breast:

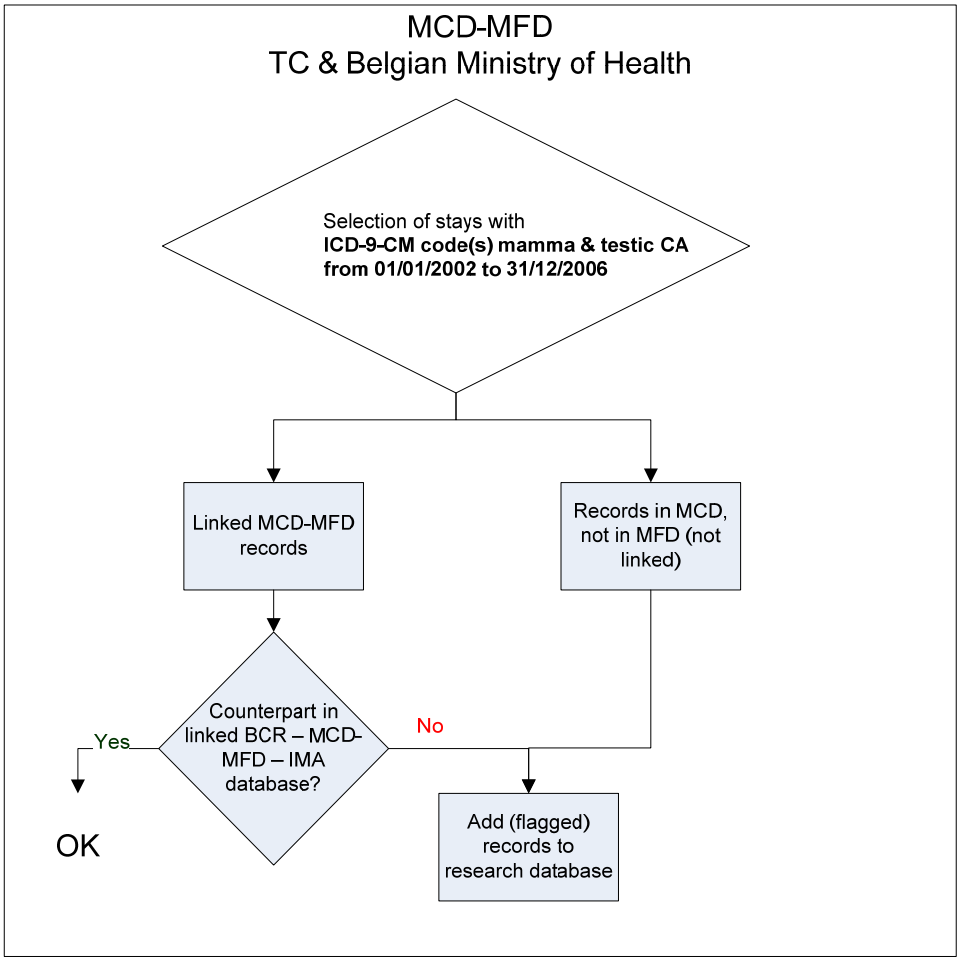
- 174.1 - 174.9: Malignant neoplasm of the breast
- 233.0: Carcinoma in situ of the breast

Testis:

- 86.0 and 86.9: Malignant neoplasm of the testis
- 36.4: Neoplasm with uncertain behavior of the testis

As an exhaustiveness check of the primary selection, the MCD records without an MFD-link and the MCD-MFD records without a counterpart in the linked BCR-IMA-MCD/MFD database were flagged and added to the research database.

Figure 3. Additional selection of breast cancer and testicular cancer patients using the MCD-MFD database as starting point.



3.3 EXPLORATION AND CHECK OF BCR DATA

Figure 4 gives an overview of the data selection, performed on the BCR dataset. The following steps were taken:

From the BCR dataset, selected as described above, the 845 records on non-melanoma skin tumours were omitted (due to an underregistration in the years 2001-2004)

Seventeen records were empty, because these patients, being foreigners, were omitted from the BCR database after the delivery of the data to the IMA. Furthermore, all records from patients who had any invasive tumour (including breast or testicular tumours) before 2001 were omitted, because previous invasive tumours may have significantly affected treatment of the breast or testicular cancer in the investigated period. In other words only patients with a first invasive breast or testicular carcinoma since 2001 were selected. In total, 2 803 records were deleted. Finally, 8 patients had a first invasive tumour between 2001 and 2006 that was not a breast or testicular tumour. These 8 were also omitted.

The resulting 57 092 records were split up into a file for testicular cancer and a file for breast cancer: 55 717 records concerned breast cancer patients, 1 375 records concerned testicular cancer patients. Furthermore, all records for men in the breast cancer database were deleted (471 records), resulting in a total of 55 246 records in the breast cancer database.

The next step was to obtain 1 record for each patient (Figure 5). The record that was chosen was the first reported invasive tumour within the topography investigated. If there was more than one tumour, the tumour with the highest pStage was chosen. If this selection did not result in one record per person, the tumour having a left laterality was chosen. The testis dataset with one record for each patient contained 1 337 patients, the breast dataset with one record for each patient contained 50 893 patients. In order to retain the information on multiple tumours, three variables were added to the dataset with one record per patient:

- The number of multiple tumours
- The number of multiple tumours within the same location as the primary tumour
- Whether multiple tumours were metachronous or synchronous. The definition of The American Society of Clinical Oncology (www.asco.org) was followed, considering synchronous tumours as those tumours that fall within the first three months after the incidence date of the first tumour (for the same laterality).

Figure 4. Data selection scheme.

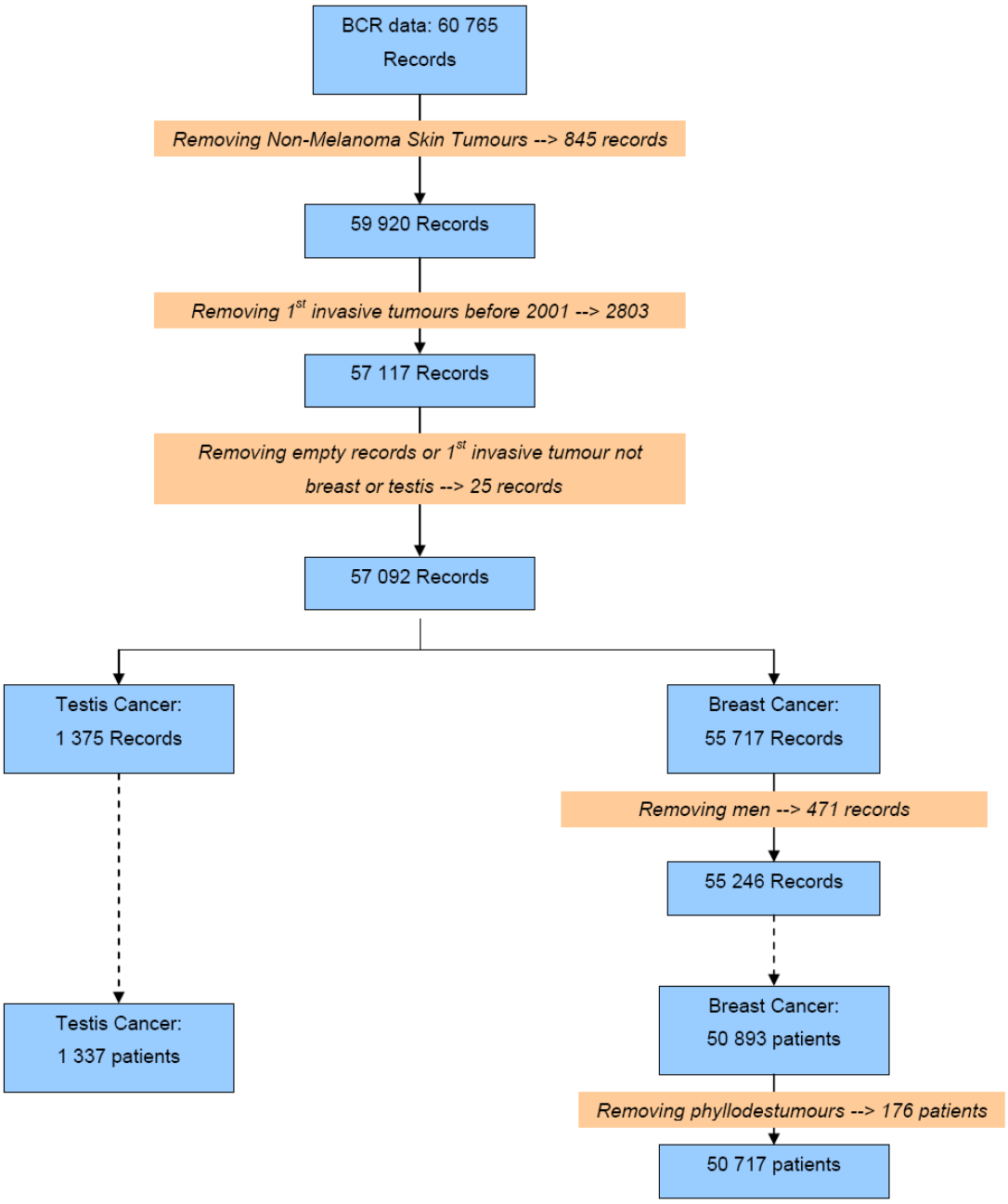
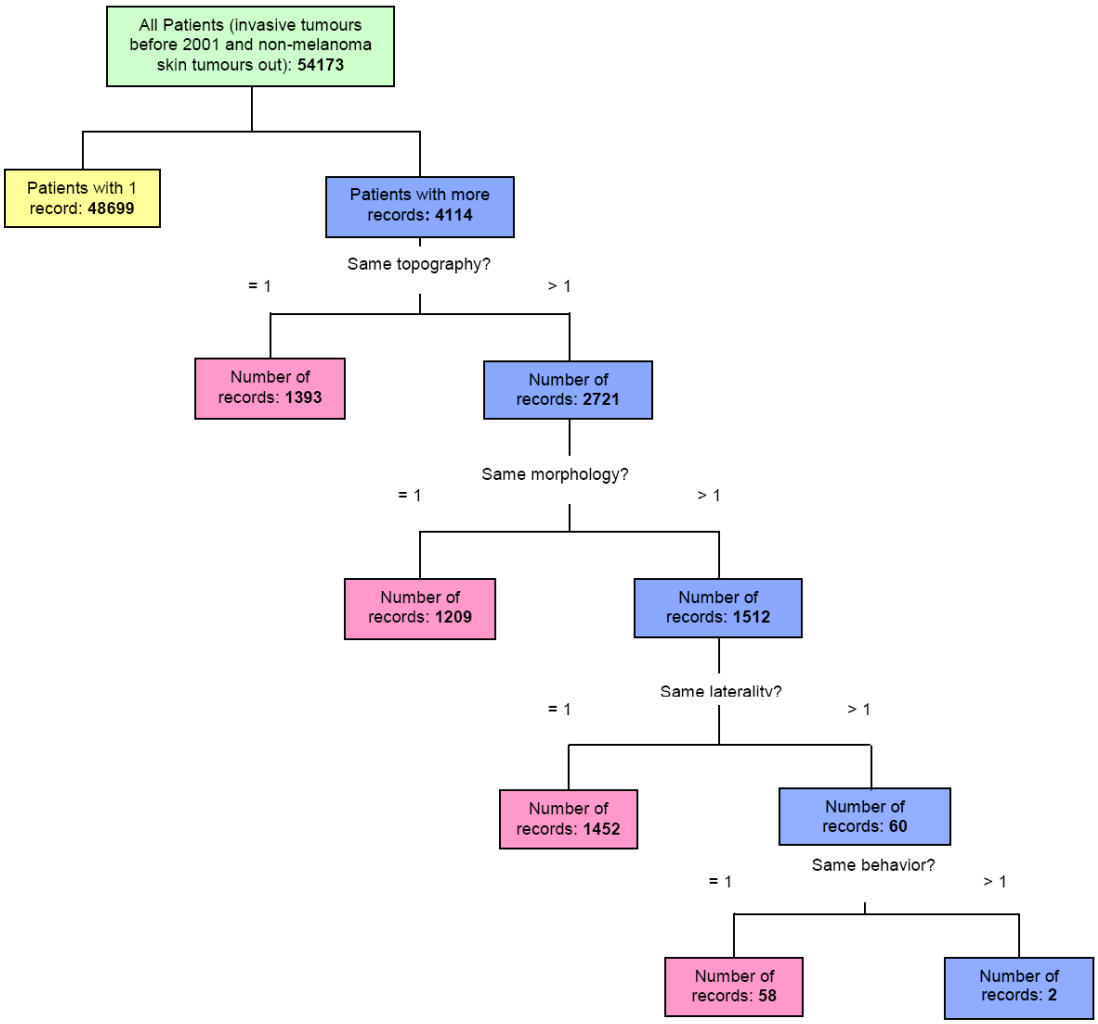


Figure 5. Steps for obtaining one record per patient.



The last step was to remove 176 patients with a phyllodes tumour as primary tumour from the breast cancer database. Phyllodes tumours call for a different treatment than other breast carcinomas. The common treatment for phyllodes is wide local excision. Other than surgery, there is no cure for phyllodes, as chemotherapy and radiation therapy are not effective [9, 10].

The presence of double records was checked in the database (Figure 5). In the end, two records (of one patient) were still similar. Therefore, we consulted the original cancer registry database in order to check whether the records were indeed similar. Because this was the case, one of the records was omitted.

3.4 DATA LINKAGE

3.4.1 Linking BCR data to IMA data

The BCR data of the years 2001 to 2006 were linked to the IMA data from the same time interval:

1. From the 52 024 selected BCR records, 51 376 could be found in the IMAHEALTH database.
2. 648 patients were present in the BCR data, but not in the IMAHEALTH data, including the empty records mentioned earlier.

Figure 3. Overview of match between IMA and BCR data.



This means that 98.8% of the BCR data could be linked to IMA data. The remaining records were probably of patients who had no medical insurance provided by the health insurance companies or of whom the National Number (INSS) was not valid.

3.4.2 Linking BCR data to MCD data

For the years 2002 to 2006, all MCD databases were delivered. First, the proportion of patients from the primary selection that were available in the MCD database was calculated for each year per tumour (Table 2). Because of some unexpected time delays in this project, the delivery of data had to be performed in two phases. First, data from 2002 to 2004 were delivered to KCE, and the linkage of the three databases (MCD, BCR, IMA) could be performed. Then, in a second phase, MCD data were delivered for the years 2005 and 2006. Unfortunately, the linkage of these two years could not be performed on time to be included in this study. Consequently, all analyses including MCD data are based only on the years 2002 to 2004.

Table 2. Overview of match between BCR, IMA and MCD databases by year and tumour.

Tumour	Year	N BCR	N link with IMA (%)	N link with MCD (%)	N link with IMA and MCD (%)
Breast	2001	7764	7669 (98.8)	-	-
	2002	7751	7686 (99.2)	5909 (76.2)	5890 (76.0)
	2003	8525	8443 (99.0)	6567 (77.0)	6545 (76.8)
	2004	8330	8232 (98.8)	6069 (72.9)	6039 (72.5)
	2005	9091	8942 (98.4)	-	-
	2006	9256	9067 (98.0)	-	-
	Total	**50717**	**50039**		
Testis	2001	212	209 (98.6)	-	-
	2002	177	175 (98.9)	126 (71.2)	125 (70.6)
	2003	215	214 (99.5)	154 (71.6)	154 (71.6
	2004	209	207 (99.0)	147 (70.3)	147 (70.3)
	2005	266	254 (95.5)	-	-
	2006	258	248 (96.1)	-	-
	Total	**1337**	**1307**		

In general, 18 972 patients could be linked between the BCR and the MCD database for the years 2002-2004 (75.3%). The number of patients that could be retrieved in both the IMA, BCR and MCD databases was 18 900 (75%).

This means that the linkage between the MCD data and the BCR data is much lower than between the BCR and the IMA data. A number of possible causes can be formulated:

Their was certainly a problem with the creation of the patient ID's in the MCD database

Patients received different ID's over consecutive years in the MCD database

Only hospitalized patients appear in the MCD data. If a patient is not hospitalized or hospitalization dates from before 01/01/2002 then this patient is not recorded in the MCD database

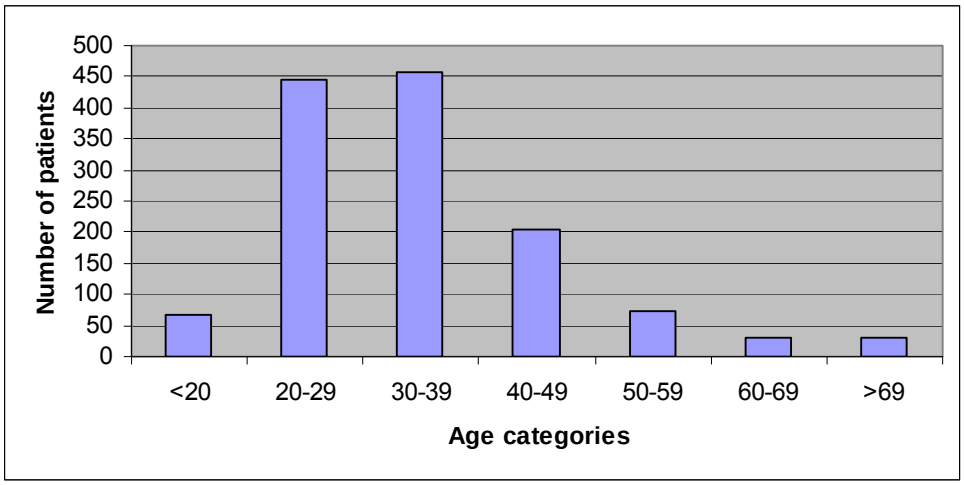
4 DESCRIPTIVE STATISTICS

In total, the number of records for testicular cancer that were taken into account for the analyses was 1 375. The total number of unique patients in the final BCR dataset was 1 337. For the calculation of the descriptive statistics and the quality indicators, only the patients with a successful linkage between BCR and IMA data were considered (n = 1 307).

4.1 DEMOGRAPHIC INFORMATION

Testicular cancer is more frequent in the age category 20-39 years (Figure 6). The youngest patient in the dataset was 0 years, the oldest patient was 95. The mean age of the sample was 34.5 years (SD=12.6).

Figure 6. Age distribution for testicular cancer (n = 1 307).



4.2 TUMOUR CHARACTERISTICS

4.2.1 Solitary vs. multiple tumours

Most patients had a solitary tumour (97.1%). Thirty-eight patients (2.9%) had multiple tumours of which 18 were synchronous (incidence date of the second tumour within three months after the incidence date of the first tumour) and 20 were metachronous (incidence date of the second tumour more than three months after the incidence date of the first tumour). The most common multiple tumour locations were the prostate (n = 8), bone marrow (n = 3) and kidney (n = 2).

When only considering testicular tumours, 1291 patients (98.8%) had a unilateral tumour, while 16 patients (1.2%) had a bilateral testicular tumour (Table 3).

Table 3. Distribution of number of testicular tumours, 2001 – 2006 (n = 1 307).

Number of testicular tumours	Frequency	%
Unilateral	1 291	98.8
Bilateral	16	1.2

4.2.2 Morphology

Seminomas were somewhat more frequent than non-seminomas (Table 4). Malignant teratomas are the most common non-seminoma tumours.

Table 4. Morphology of testicular tumours, 2001 – 2006 (n = 1 307).

Morphology		Frequency	%
Non-seminoma	Choriocarcinoma	33	2.5
	Malignant teratoma	269	20.6
	Embryonal carcinoma	225	17.2
	Other	84	6.4
Seminoma	Seminoma	696	53.3

4.2.3 pStage[c]

The number of patients with unknown pStage was 394 (30.1%). More than 88% of the patients in whom the stage was known had pStage I (Figure 7). Figure 8 shows that seminomas tend to have lower pStage than non-seminomas.

Figure 7. pStage distribution for testicular cancer, 2001 – 2006.

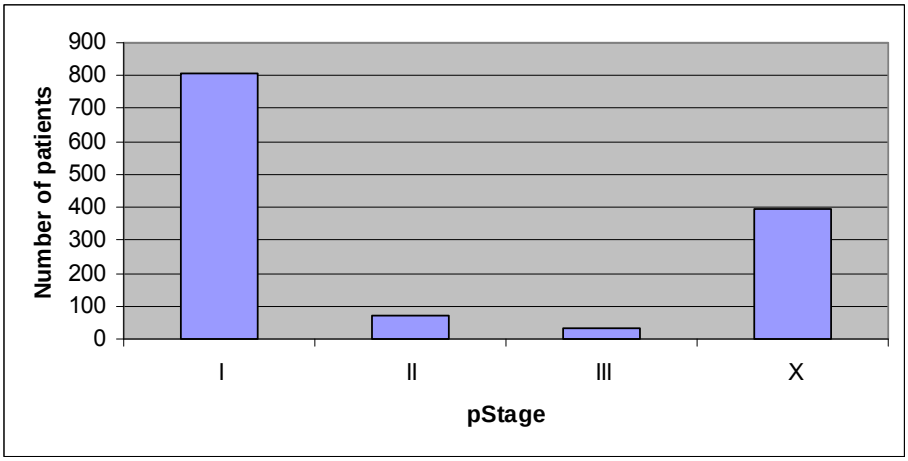
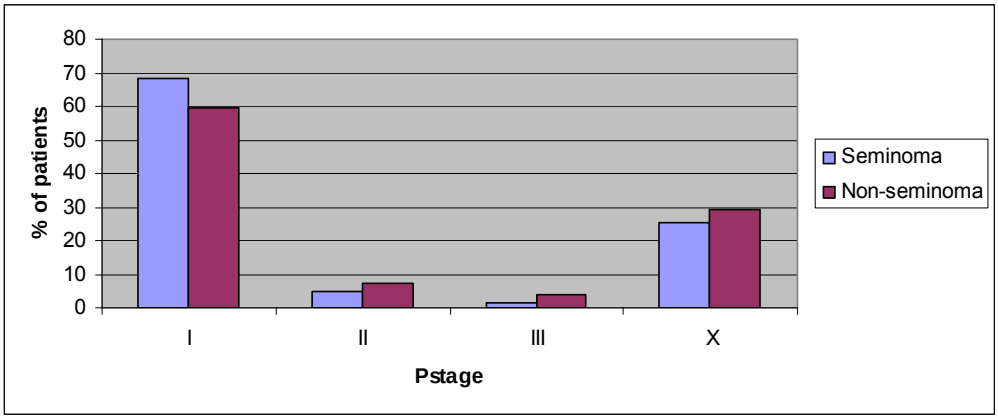


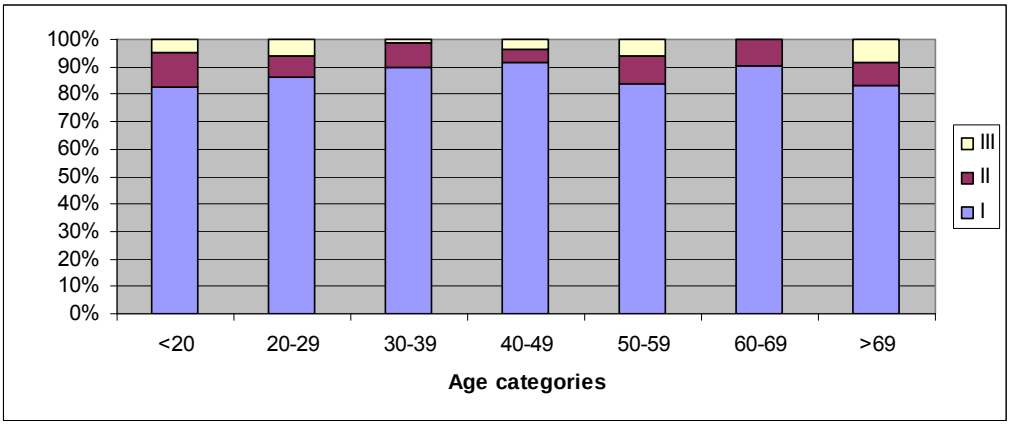
Figure 8. Morphology by pStage for testicular cancer, 2001 – 2006.



[c] Testicular cancer has only three pStages. The clinical stage is not presented here since the cT category is not used for staging testicular cancer. The small differences between the TNM version 5 (used until 2003) and version 6 (used from 2003 on) are neglected for this analysis: the two versions only differ in stage subcategories.

The stage distribution is comparable for all age categories, with stage I occurring most frequently, followed by stage II and III (Figure 9).

Figure 9. pStage distribution by age for testicular cancer, 2001 – 2006.



4.2.4 Incidence rates

In Table 5, the age-standardized incidence rate using a European standard (ESR) [11] is given for all available years. Note that data of the Walloon and Brussels region are not complete for the years 2001-2003. In 2006, Luxembourg had the highest ESR and Oost-Vlaanderen the lowest. Because testicular cancer is rather rare, a few more cases can cause a large increase in the incidence rate.

Table 5. Age-standardised incidence (ESR) per year and per region for testicular cancer.

PROVINCE	2001	2002	2003	2004	2005	2006
Antwerpen	3.05	2.61	2.75	2.95	4.81	5.64
Brussel-Bruxelles	-	-	-	2.63	4.36	3.81
Hainaut	-	-	-	4.34	6.21	4.51
Limburg	3.59	3.88	3.86	4.74	5.76	5.47
Liège	-	-	-	5.91	6.52	6.09
Luxembourg	-	-	-	2.43	7.23	7.83
Namur	-	-	-	4.54	4.49	7.16
Oost-Vlaanderen	3.74	3.57	4.04	3.78	3.72	3.04
Vlaams Brabant	2.89	3.79	2.96	3.36	3.93	6.19
Brabant Wallon	-	-	-	5.41	4.89	5.15
West-Vlaanderen	4.29	2.49	3.81	3.52	5.55	4.50

4.3 DIAGNOSIS AND STAGING

An overview of a selection of diagnostic techniques used in the workup of testicular cancer (between one month before and three months after incidence date) is given in Table 6. More than 70% of the patients underwent scrotal ultrasonography. The majority of the patients underwent a CT, although it is impossible to say of which anatomical location. Almost one fifth of the patients underwent a PET scan, of which most patients also underwent a CT and/or MRI.

Table 6. Overview of diagnostic techniques for testicular cancer, 2001 – 2006; BCR-IMA data only (n = 1 307).

Method	Frequency	Percent
Scrotal ultrasonography: • Specific codes[d] • Non-specific codes[e]	 927 76	 70.9 5.8
CT	1 230	94.1
MRI	84	6.4
PET scan[f]	236	18.1
CT and/or MRI	1239	94.8
(CT and/or MRI) and PET scan	232	17.8

4.4 TREATMENT

A general overview of first treatment (time frame of 6 months after surgery) by pStage is provided in Table 7 and Table 8. Using the coupled BCR and IMA data only, 84.1% of all patients underwent orchidectomy for testicular cancer (Table 7). The proportion of surgically treated patients (orchidectomy) was slightly higher for pStage I (86.1%) and pStage II (86.3%) than for pStage III (76.4%). However, more pStage I patients only underwent orchidectomy compared to pStage II and III patients (18.1% vs. 0% vs. 14.7%).

The majority of the patients underwent adjuvant chemotherapy (41.5%), particularly in the case of pStage II disease (72.6%) and to a lesser extent in the case of pStage III disease (52.9%). An important proportion of the pStage I patients underwent adjuvant radiotherapy (at least 25.7%). Finally, 23.5% of the patients with pStage III disease only received chemotherapy.

Table 7. Treatment in general by stage, 2001 – 2006; BCR-IMA data only (n = 1 307).

	pStage				
Treatment	**pI**	**pII**	**pIII**	**pX**	**All**
Surgery only	146 (18.1%)	- (0%)	5 (14.7%)	102 (25.9%)	253 (19.4%)
Chemotherapy only	55 (6.8%)	9 (12.3%)	8 (23.5%)	45 (11.4%)	117 (9.0%)
Surgery + chemotherapy[$]	334 (41.4%)	53 (72.6%)	18 (52.9%)	137 (34.8%)	542 (41.5%)
Surgery + radiotherapy	207 (25.7%)	4 (5.5%)	- (0%)	55 (14.0%)	266 (20.4%)
Chemotherapy + surgery[$]	7 (0.9%)	6 (8.2%)	3 (8.8%)	20 (5.1%)	36 (2.8%)
Other / no treatment	57 (7.1%)	1 (1.4%)	0 (0%)	35 (8.9%)	93 (7.1%)
Total	**806 (100%)**	**73 (100%)**	**34 (100%)**	**394 (100%)**	**1307 (100%)**

[$] Some of these patients also received radiotherapy.

[d] Nomenclature codes 460272, 460283, 469512 and 469523
[e] Nomenclature codes 459793 and 459804
[f] Nomenclature codes 442971, 442982, 442595 and 442606

When considering the coupled BCR, IMA and MCD data (only available for 417 patients and for the years 2002 – 2004), 89.9% of all patients had a specific code for orchidectomy (Table 8). The other results are more or less in line with those based on the BCR-IMA data, except for the rate of chemotherapy only (lower as calculated with the BCR-IMA-MCD data).

Table 8. Treatment in general by stage, 2002 – 2004; BCR, IMA and MCD data (n = 417).

	pStage				
Treatment	**pI**	**pII**	**pIII**	**pX**	**All**
Surgery only	63 (26.0%)	- (0%)	1 (7.7%)	44 (31.4%)	108 (25.9%)
Chemotherapy only	2 (0.8%)	1 (4.5%)	- (0%)	8 (5.7%)	11 (2.6%)
Surgery + chemotherapy[$]	104 (43.0%)	14 (63.6%)	9 (69.2%)	51 (36.4%)	178 (42.7%)
Surgery + radiotherapy	55 (22.7%)	1 (4.5%)	- (0%)	17 (12.1%)	73 (17.5%)
Chemotherapy + surgery[$]	2 (0.8%)	3 (13.6%)	2 (15.4%)	9 (6.4%)	16 (3.8%)
Other / no treatment	16 (6.6%)	3 (13.6%)	1 (7.7%)	11 (7.9%)	31 (7.4%)
Total	**242 (100%)**	**22 (100%)**	**13 (100%)**	**140 (100%)**	**417 (100%)**

[$] Some of these patients also received radiotherapy.

The analyses presented in Table 7 were repeated by morphology (Table 9 and Table 10). Slightly more patients with stage I non-seminoma were treated with orchidectomy only compared with stage I seminoma patients (21.1% vs. 16.0%). More importantly, while the majority of stage I seminoma patients was treated with orchidectomy and adjuvant radiotherapy (42.8%), the majority of stage I non-seminoma patients was treated with orchidectomy and adjuvant chemotherapy (64.8%). The latter was also the most important treatment for stage II (63.6%) and III (54.5%) seminoma patients and stage II (80.0%) and III (52.2%) non-seminoma patients.

Table 9. Treatment for seminoma by stage, 2001 – 2006; BCR-IMA data only (n = 696).

	pStage				
Treatment	**pI**	**pII**	**pIII**	**pX**	**All**
Surgery only	76 (16.0%)	- (0%)	1 (9.1%)	34 (19.1%)	111 (15.9%)
Chemotherapy only	25 (5.3%)	5 (15.2%)	2 (18.2%)	18 (10.1%)	50 (7.2%)
Surgery + chemotherapy[$]	119 (25.1%)	21 (63.6%)	6 (54.5%)	46 (25.8%)	192 (27.6%)
Surgery + radiotherapy	203 (42.8%)	4 (12.1%)	- (0%)	52 (29.2%)	259 (37.2%)
Chemotherapy + surgery[$]	4 (0.8%)	2 (6.1%)	2 (18.2%)	12 (6.7%)	20 (2.9%)
Other / no treatment	47 (9.9%)	1 (3.0%)	- (0.0%)	16 (9.0%)	64 (9.2%)
Total	**474 (100%)**	**33 (100%)**	**11 (100%)**	**178 (100%)**	**696 (100%)**

[$] Some of these patients also received radiotherapy.

Table 10. Treatment for non-seminoma by stage, 2001 – 2006; BCR-IMA data only (n = 611).

	pStage				
Treatment	**pI**	**pII**	**pIII**	**pX**	**All**
Surgery only	70 (21.1%)	- (0%)	4 (17.4%)	68 (31.5%)	144 (23.6%)
Chemotherapy only	30 (9.0%)	4 (10.0%)	6 (26.1%)	27 (12.5%)	67 (11.0%)
Surgery + chemotherapy[$]	215 (64.8%)	32 (80.0%)	12 (52.2%)	91 (42.1%)	350 (57.3%)
Surgery + radiotherapy	4 (1.2%)	- (0%)	- (0%)	3 (1.4%)	7 (1.1%)
Chemotherapy + surgery[$]	3 (0.9%)	4 (10.0%)	1 (4.3%)	8 (3.7%)	16 (2.6%)
Other / no treatment	10 (3.0%)	- (0%)	- (0%)	19 (8.8%)	27 (4.4%)
Total	**332 (100%)**	**40 (100%)**	**23 (100%)**	**216 (100%)**	**611 (100%)**

[$] Some of these patients also received radiotherapy.

In total, 735 patients (56.2%) received any type of chemotherapy (second-line included). From these, 586 (77.3%) received the BEP regimen (cisplatinum + etoposide + bleomycine) (Table 11). Other frequently used regimens were EP (cisplatinum + etoposide), carboplatinum or VIP (cisplatinum + ifosfamide + vinblastine). Regimens that are not recommended are not frequently used.

Table 11. Overview of chemotherapy products used for testicular cancer, 2001 – 2006; BCR-IMA data only (n = 1 307).

Product	Frequency	Percent
Cisplatinum	616	47.1
Etoposide	612	46.8
Bleomycine	575	44.0
Carboplatinum	131	10.0
Ifosfamide	84	6.4
Vinblastine	46	3.5
Cyclofosfamide	16	1.2
Doxorubicine	5	0.4
Any chemotherapy	735	56.2

4.5 HOSPITALIZATION

In the period 2002-2004, the majority of the patients with testicular cancer were hospitalized in APR-DRG 483 and 693 (Table 12).

Table 12. Overview of hospitalizations for testicular cancer by APR-DRG, 2002 – 2004 (n = 417).

APR-DRG	2002	2003	2004	Total
480: Major male pelvic procedures	-	2	-	2
483: Testes and scrotal procedures	36	58	50	144
484: Other male reproductive system & related procedures	1	2	-	3
500: Malignancy, male reproductive system	6	5	4	15
692: Radiotherapy	-	-	-	-
693: Chemotherapy	34	44	42	120
Other	45	40	48	133
Total	**122**	**151**	**144**	**417**

5 INDICATOR RESULTS

5.1 OVERALL MEASURABILITY OF THE SELECTED QUALITY INDICATORS

Of the 12 selected indicators, 5 were found to measurable, 1 was partially measurable, and 2 indicators were measurable using a proxy indicator or proxy information (Table 13). The most important reason for being not measurable was the absence of administrative codes (N=2) or specific administrative codes (N=3). In the absence of national data on reasons for mortality disease-specific survival is not measurable as such. Therefore, relative survival was used as a proxy indicator.

Table 13. Measurability of testicular cancer quality indicators.

Quality indicator	Measurable	Comment
Diagnosis and staging		
TC1: Proportion of patients with testicular cancer undergoing tumour marker assessment before any treatment	Yes	
TC2: Proportion of patients with testicular cancer undergoing CE-CT or MRI for primary staging	No	No specific code available specifying the anatomical location for CT and MRI
TC3: Proportion of patients with testicular cancer discussed at the MDT meeting	Yes	
Treatment		
TC4: Number of annually surgically treated patients with testicular cancer per centre	Yes	Due to the absence of a nomenclature code for orchidectomy alone (without lymphadenectomy) other surgical codes needed to be taken into account (e.g. inguinal hernia repair)
TC5: Radiation dose and field in patients with testicular cancer treated with radiotherapy by stage	No	No administrative data on radiation dose and field
TC6: Proportion of patients with stage I non-seminoma treated with active surveillance	Yes	
TC7: Proportion of patients receiving CE-CT or MRI for residual disease assessment at the end of systemic treatment	No	No specific code available specifying the anatomical location for CT and MRI
TC8: Degree and duration of active surveillance in patients with stage I non-seminoma or seminoma	Partially	No specific code available specifying the anatomical location for CT and MRI
TC9: Proportion of patients with relapsing testicular cancer after curative treatment that are included in a clinical trial	No	No administrative data on inclusion in clinical trials
Generic indicators		
TC10: Overall 5-year survival by stage	Yes	
TC11: Disease-specific 5-year survival by stage	Yes	Calculable using relative survival
TC12: Disease-free 5-year survival by stage	Yes	Calculable using proxy for recurrence

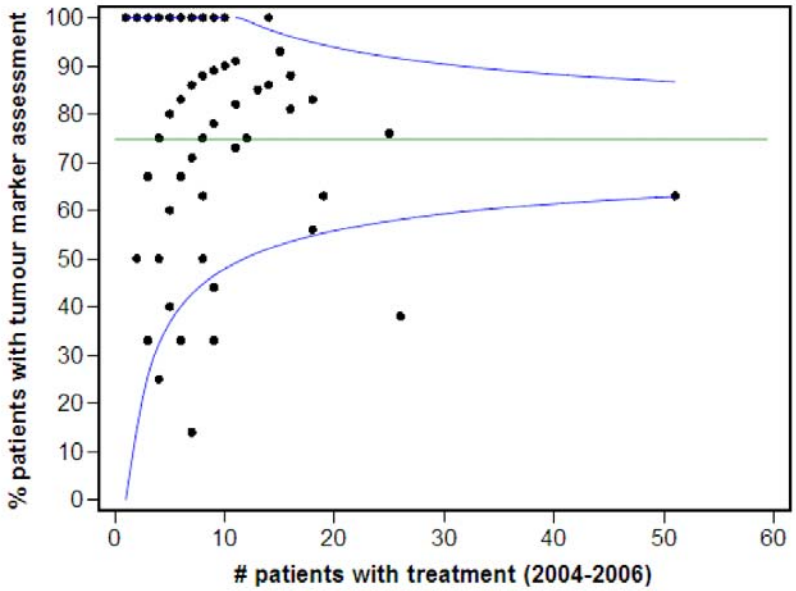
5.2 INDICATOR RESULTS

For the graphical presentation of the variability between centres, it was decided to use funnel plots. A discussion on the choice of the methodology to calculate the funnel plots is presented in appendix. For this project it was decided to use the normal approximation for most funnel plots, but the Agresti-Coull interval for the funnel plots on survival.

5.2.1 Diagnosis and staging

According to the national guideline on testicular cancer [7], alphafetoprotein (AFP) and human chorionic gonadotrophin (HCG) should be measured preoperatively to distinguish between seminoma and non-seminoma and to guide postoperative management (expert opinion). Ideally, this measurement should be as close as possible to the first treatment. In the period 2001 – 2006, 73% of the treated patients underwent tumour marker assessment within 3 months of the first treatment, while 50% underwent the measurement within 2 weeks of the first treatment. A large variability was found across the different centres (Figure 10), with several centres attaining 100% for the period 2004 – 2006. Six outliers below the lower limit were identified for this period.

Figure 10. Proportion of treated patients with testicular cancer undergoing tumour marker assessment within 3 months of first treatment, analysis by centre (N=97), period 2004-2006 (BCR-IMA data only).



Primary staging for testicular cancer encompasses contrast-enhanced CT thorax, abdomen and pelvis, or, in particular cases, MRI abdomen/pelvis and CT thorax [7]. In the period 2001 – 2006, almost 95% of all patients with testicular cancer underwent a CT and/or MRI within 1 month before and 3 months after incidence date. However, no information is available on the exact anatomic location of these imaging procedures.

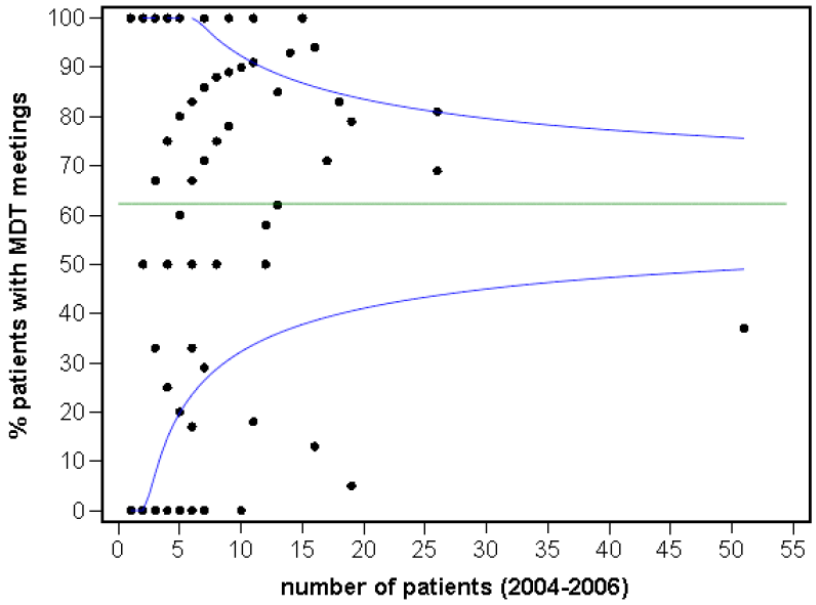
Since testicular cancer is a rare cancer and asks for a specialized approach, a discussion of the therapeutic approach in a multidisciplinary setting, and based on the diagnostic and staging results, is necessary. Since February 2003, a specific nomenclature code became available for the billing of a multidisciplinary team meeting. Of all patients with an incidence date between February 1st 2003 and December 31st 2006, 58% were discussed during a multidisciplinary team meeting registered with the appropriate nomenclature code. Since the introduction of this code, its utilisation increased every year (Table 14).

Table 14. Proportion of patients with testicular cancer discussed during a multidisciplinary team meeting, BCR-IMA data, 2003 – 2006.

	Numerator	Denominator	Proportion
2003	88	198	44.4
2004	110	207	53.1
2005	165	254	65.0
2006	167	248	67.3
Total	530	907	58.4

However, the analysis per centre for the period 2004 – 2006 again shows a high variability among the centres (Figure 11). For a number of (small) centres no patient who was discussed at a MDT meeting could be identified using the IMA data. Importantly, the absence of a nomenclature code for a MDT meeting for a particular patient does not necessarily mean that no MDT was held. Some centres might not bill MDT meetings, and in turn, they do not appear in the IMA database. Moreover, these data do not allow an evaluation of the quality of this multidisciplinary discussion.

Figure 11. Proportion of patients with testicular cancer discussed during a multidisciplinary team meeting, analysis per centre (N=97), period 2004-2006 (BCR-IMA data only).



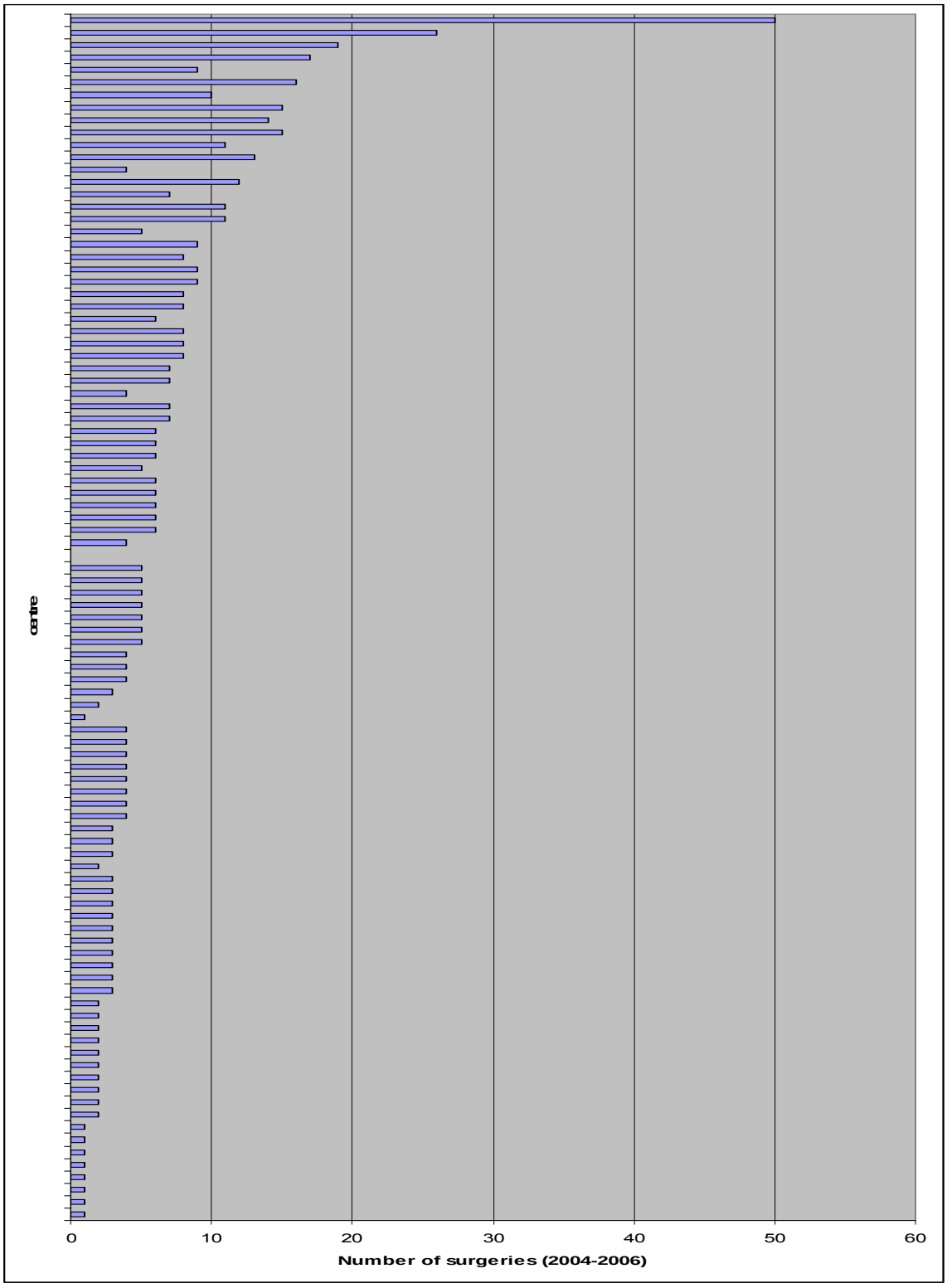
5.2.2 Treatment

5.2.2.1 Surgical volume

Using specific nomenclature codes for orchidectomy (available from the IMA database), only 71% of the patients with testicular cancer with an incidence date between 2001 and 2006 were found to be treated with orchidectomy. However, this number was considered an underestimation, and more detailed analyses showed that for a considerable number of patients (N=174) nomenclature codes for an inguinal hernia operation were registered between one month before and six months after testicular cancer diagnosis. Taking these codes into account (because of the time relation), 84% of the patients with testicular cancer were found to be treated with orchidectomy. Moreover, when also taking into account the hospital database (MCD), a total number of 90% was found to be treated with orchidectomy.

Between 2001 and 2003, 96 centres performed at least 1 orchidectomy for testicular cancer. Only 10 centres performed at least 10 orchidectomies during this time period, representing about one third of the surgically treated testicular cancer population. Between 2004 and 2006, 14 centres (out of a total of 97) performed at least 10 orchidectomies, representing about 40% of the surgically treated testicular cancer population during this time period (Figure 12).

Figure 12. Number of surgically treated patients with testicular cancer by centre, BCR-IMA data (2004-2006)*.



* Centres are sorted by total number of patients.

5.2.2.2 *Radiotherapy*

In total, about one third of the patients with stage I disease were treated with radiotherapy between 2001 and 2006. Of all stage II and III patients, about one fifth received radiotherapy. However, no information is available on the radiation dose and field used in these patients.

5.2.2.3 *Active surveillance in stage I disease*

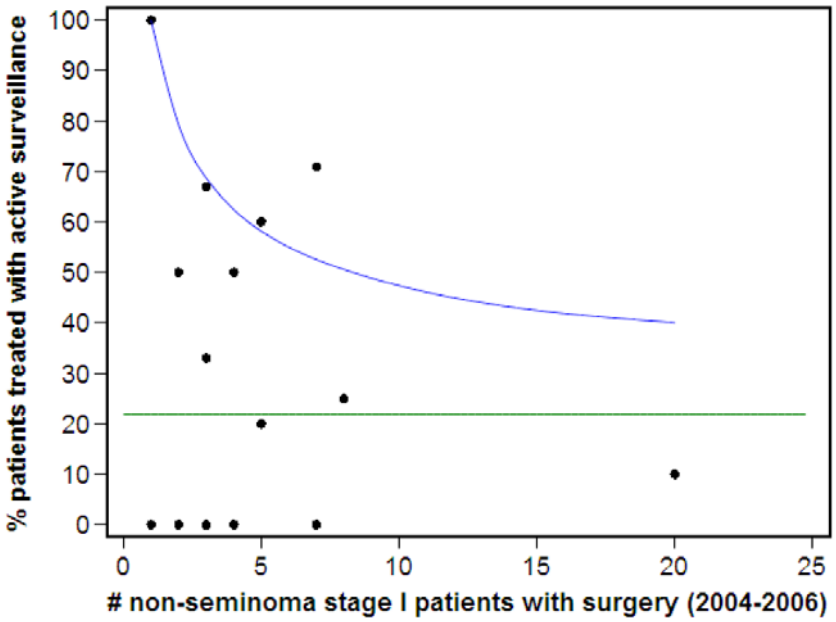
Non-seminoma patients

Of all patients with known stage I non-seminoma diagnosed between 2001 and 2006 (N=332), 86% had a surgical nomenclature code and information on the vital status available. Of these, 24% were not treated with chemotherapy or radiotherapy within 6 months after surgical treatment, and were considered to be on active surveillance according to the initial definition of the indicator. In the period 2001-2006, the proportion of stage I non-seminoma patients on active surveillance remained quite stable, apart from a peak in 2003 (Table 15). However, data for 2006 need to be interpreted with caution, because nomenclature data after 2006 were not included in this study. The analysis per centre again showed a high variability (Figure 13).

Table 15. Proportion of patients with stage I non-seminoma on active surveillance, BCR-IMA data, 2001 – 2006.

	Numerator	Denominator	Proportion
2001	7	26	28.0
2002	6	36	17.1
2003	17	46	37.0
2004	11	51	22.0
2005	16	69	23.5
2006	12	58	20.0
Total	69	286	24.1

Figure 13. Proportion of patients with stage I non-seminoma on active surveillance, analysis per centre (N=67), period 2004-2006 (BCR-IMA data only)*.



* Several centres only treated 1 or 2 patients with stage I non-seminoma, resulting in overlapping point estimates for these centres.

Because of the somewhat surprisingly low number of stage I non-seminoma patients treated with active surveillance, the calculation of this indicator was repeated using an adapted definition. As many recurrences already occur within 6 months after orchidectomy, treatment started at least 3 months after orchidectomy was considered to be because of a recurrence in the adapted definition, while treatment started within 3 months after orchidectomy was considered to be adjuvant.

Using this adapted definition, the proportion of stage I non-seminoma patients treated with active surveillance was found to be about 29% for the period 2001-2006 (using BCR-IMA data only), which is only slightly higher than the original result.

Degree and duration of active surveillance

According to the national guidelines [7], active surveillance should encompass regular tumour marker assessment and imaging. Concerning imaging, the lack of specificity of the nomenclature codes for CT and MRI prevented the determination of this indicator (see also above). On the other hand, the degree and duration of tumour marker assessment after surgery could be determined.

Of all patients with known stage I disease (seminoma and non-seminoma) and with a surgical nomenclature code and information on vital status available (N=680), 21% were treated with active surveillance between 2001 and 2006. The mean number of tumour marker assessments by follow-up period fluctuated between 2001 and 2005. For seminomas, the mean number of tumour marker assessments during the first year after surgery approached the recommended number of 4 in 2002 (mean 3.89, SD 3.55), and started to increase since then (Table 16). For non-seminomas, the mean number of tumour marker assessments during the first year after surgery fluctuated between 10.5 and 14.6 during the time period 2001-2004 (Table 17). In 2005, it dropped to 8.9 (SD 8.4). For both tumour types, the mean number of tumour marker assessments decreased by year of postoperative follow-up (Table 16, Table 17, Figure 14 and Figure 15).

Table 16. Tumour marker assessment during active surveillance of patients with stage I seminoma, by year of surgery, BCR-IMA data only (2001-2006).

	Mean	SD	Median	25th Pctl	75th Pctl
Year of surgery: 2001 (N=13)					
1st year after surgery	5.54	5.24	4	2	7
2nd year after surgery	3.08	2.47	3	0	5
3rd year after surgery	2.77	3.19	2	0	4
4th year after surgery	2.69	4.27	2	0	3
5th year after surgery	1.77	1.83	2	0	2
Year of surgery: 2002 (N=9)					
1st year after surgery	3.89	3.55	4	0	5
2nd year after surgery	2.78	2.05	2	2	4
3rd year after surgery	2.33	3.50	1	0	2
4th year after surgery	1.67	2.60	1	0	2
Year of surgery: 2003 (N=14)					
1st year after surgery	4.14	4.80	2	0	7
2nd year after surgery	5.00	10.34	2	0	5
3rd year after surgery	3.64	5.47	2	0	4
Year of surgery: 2004 (N=14)					
1st year after surgery	6.07	7.76	4	3	6
2nd year after surgery	4.07	5.01	2.5	2	4
Year of surgery: 2005 (N=15)					
1st year after surgery	6.47	5.72	5	2	11

Figure 14. Number of tumour marker assessments per patient according to follow-up period, stage I seminoma, 2001-2005.

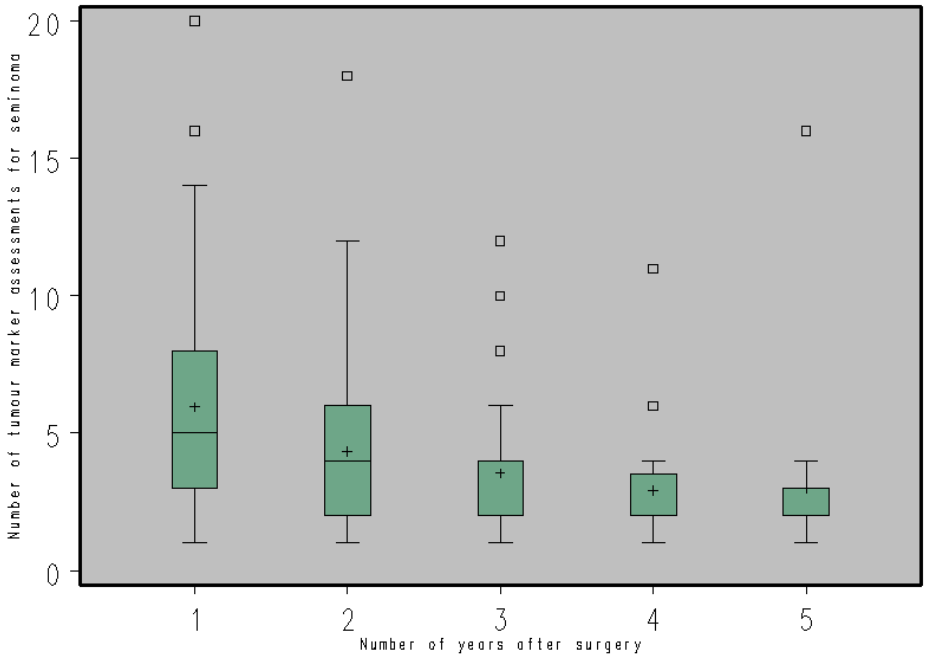
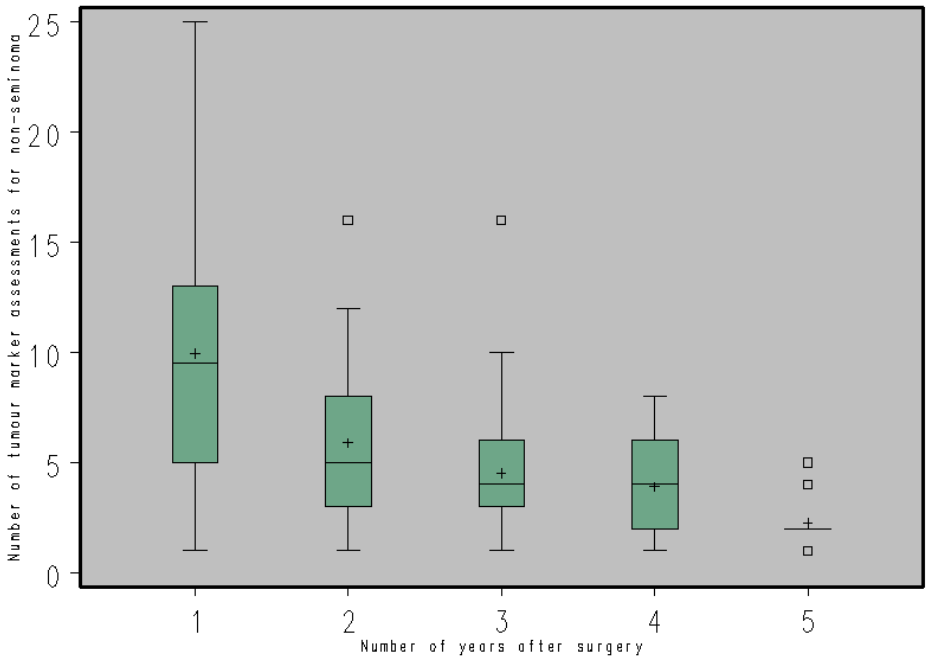


Table 17. Tumour marker assessment during active surveillance of patients with stage I non-seminoma, by year of surgery, BCR-IMA data only (2001-2006).

	Mean	SD	Median	25th Pctl	75th Pctl
Year of surgery: 2001 (N=6)					
1st year after surgery	10.50	6.19	10.5	6	16
2nd year after surgery	8.00	4.60	7	5	10
3rd year after surgery	5.50	2.95	4.5	4	8
4th year after surgery	5.67	2.34	6	4	8
5th year after surgery	2.17	2.04	2	0	4
Year of surgery: 2002 (N=6)					
1st year after surgery	13.33	9.14	11	11	12
2nd year after surgery	7.50	2.17	8	5	9
3rd year after surgery	5.00	2.10	4.5	3	7
4th year after surgery	3.17	2.04	3.5	2	4
Year of surgery: 2003 (N=11)					
1st year after surgery	14.64	8.41	15	6	19
2nd year after surgery	5.55	3.05	6	3	8
3rd year after surgery	3.73	2.20	3	2	6
Year of surgery: 2004 (N=18)					
1st year after surgery	11.94	10.32	9.5	3	22
2nd year after surgery	8.06	11.02	4.5	2	8
Year of surgery: 2005 (N=19)					
1st year after surgery	8.89	8.39	6	2	12

Figure 15. Number of tumour marker assessments per patient according to follow-up period, stage I non-seminoma, 2001-2005.



Using the adapted definition of recurrence and active surveillance as discussed above (3 months time delay after surgery), 27% of the patients with known stage I disease (seminoma and non-seminoma) and with a surgical nomenclature code and information on vital status available were considered to be on active surveillance between 2001 and 2006. With this adapted definition, the mean number of tumour marker assessments by follow-up period only slightly changed for seminomas (first year after surgery: between 3.86 in 2003 and 6.79 in 2005) (see tables in appendix). However, for non-seminomas clearly higher mean numbers were found in comparison with the first analysis (first year after surgery: between 9.60 in 2005 and 15.88 in 2001) and a decreasing trend became more clearly apparent (see tables in appendix).

5.2.3 Residual disease assessment after systemic treatment for stage II and III disease

In the time period 2001-2006, 107 patients were found to have known stage II or III testicular cancer. Of these, 91% were treated with chemotherapy. Restaging after chemotherapy is ideally performed with contrast-enhanced CT thorax, abdomen and pelvis or, in case of contra-indications, MRI abdomen-pelvis and CT thorax [7]. However, no specific nomenclature codes were available for CT thorax or abdomen or pelvis, or MRI abdomen-pelvis. Moreover, the identification of contrast-enhanced CT was difficult, since the available codes for contrast were not consistently used (the combination of the nomenclature codes for CT and the CNK codes for contrast resulted in zero records). As a result, this indicator could not be assessed.

Nevertheless, some results can be calculated using the available administrative data. Of the stage II/III patients treated with chemotherapy, 54% underwent a CT (of the neck and/or thorax and/or abdomen) and/or a MRI (of the neck and/or thorax and/or abdomen) within 6 months after the end of the chemotherapy.

5.2.4 Survival

Three measures of survial were calculated: overall survival, relative survival (as a proxy for disease-specific survival) and disease-free survival.

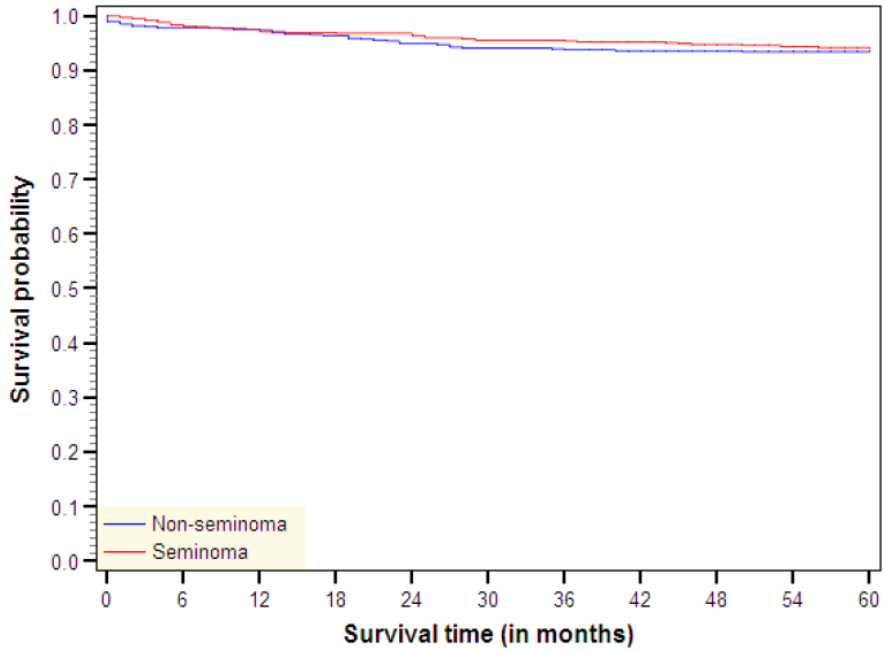
For the entire population, survival measures are presented by stage in Table 18. Especially for stage I and II, 5-year survival is high (97% and 95% respectively). For stage III disease, 5-year relative survival still is 76%.

Table 18. Survival for testicular cancer by stage, 2001-2006.

	pStage		
	I	II	III
5-year overall survival	0.97	0.95	0.71
5-year relative survival	0.97	0.95	0.76

No obvious differences in survival were found between seminomas and non-seminomas (5-year observed survival 94% vs. 93%).

Figure 16. Kaplan-Meier curve for observed survival, seminoma vs. non-seminoma, 2001-2006.



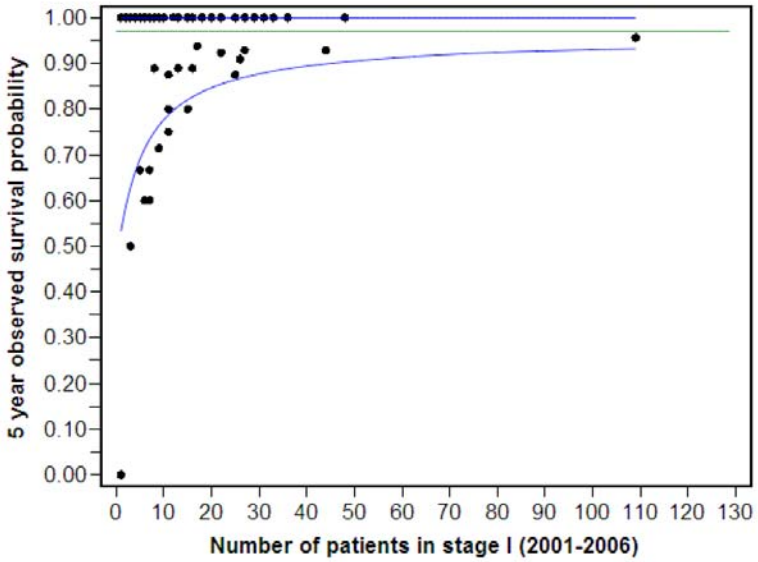
Overall, 5-year survival slightly increased between 2001 and 2004 (Table 19).

Table 19. Evolution of survival for testicular cancer, 2001-2004.

	2001	2002	2003	2004
5-year overall survival	0.91	0.93	0.95	0.94
5-year relative survival	0.92	0.94	0.95	-

The analysis by centre shows a high proportion of centres achieving a 5-year survival of 100% for pStage I patients (Figure 17). Nevertheless, some centres clearly achieved worse survival rates. The number of patients and events in pStage II and III were too small for the analysis by centre.

Figure 17. Observed 5-year survival of stage I disease by centre, 2001-2006.



For the calculation of the disease-free survival, in the absence of a specific code, recurrence was originally defined as the event of receiving new treatment at least 6 months after the first treatment. Using this definition, the 5-year disease-free survival for the entire cohort was estimated to be 96% (Table 20).

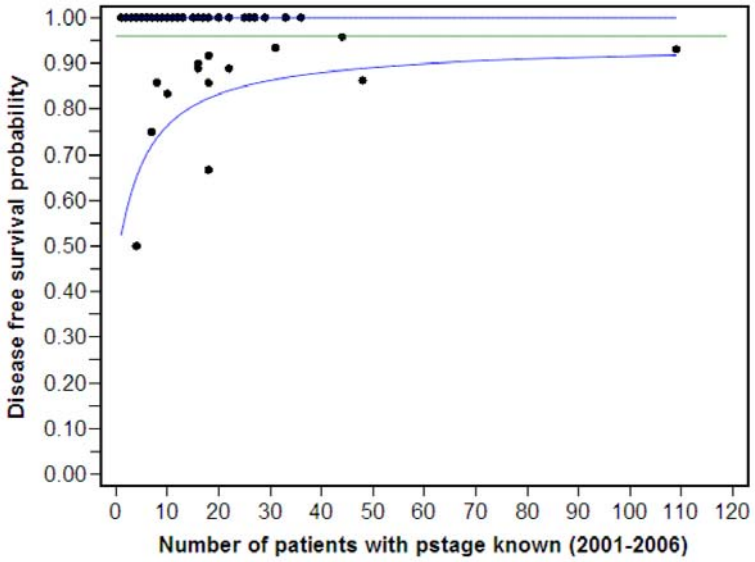
Table 20. Disease-free survival for testicular cancer, 2001-2004.

	1 year	2 year	3 year	4 year	5 year
Disease-free survival*	0.99	0.98	0.98	0.97	0.96

* pX stage included.

The degree of variability across centres was rather limited, with many centres achieving a 5-year disease-free survival of 100% (Figure 18). Still, for some smaller centres, lower disease-free survival rates were detected.

Figure 18. Disease-free 5-year survival for testicular cancer by centre, 2001-2004.



Using the adapted definition as discussed above, the 5-year disease-free survival slightly decreased to 94%. However, the variability across the centres largely remained the same.

6 DISCUSSION

6.1 INDICATOR RESULTS

6.1.1 National level

Results show a mixed picture

The descriptive statistics and selected quality indicators show a mixed picture of the quality of care for patients with testicular cancer in Belgium in the period 2001-2006. Positive evolutions are found for the pre-treatment assessment of tumour markers and the multidisciplinary team meeting (Table 21). Above this, the survival of testicular cancer patients is slightly improving since 2001. On the other hand, the proportion of stage I non-seminoma patients treated with active surveillance seems to be too low and still declining. Furthermore, the use of tumour marker assessment during active surveillance is increasing for seminomas (to a level above the recommended number), but decreasing for non-seminomas (to a level below the recommended number).

Importantly, for the interpretation of these evolutions, one should take into account the fact that a selection bias is present for the years 2001-2003 (and even 2004). In that period, mostly university hospitals participated at the cancer registration. Also, the Walloon and Brussels Capital Region had an incomplete coverage at that time. Progressively, more and more smaller centres started to participate at the cancer registration, possibly resulting in a 'diluting' effect for some indicators (e.g. active surveillance). It would therefore be interesting to evaluate in how far each indicator remains stable over time on the individual centre level.

Table 21. Evolution of measurable quality indicators between 2001 and 2006.

Indicator	Result 2001	Result 2006
Proportion of patients with testicular cancer undergoing tumour marker assessment before any treatment	72.3%	80.6%
Proportion of patients with testicular cancer discussed at the MDT meeting	53.1% (2004 result)	67.3%
Proportion of surgically treated patients with testicular cancer	81.3%	81.0%
Proportion of patients with stage I non-seminoma treated with active surveillance	28.0%	20.0%
Mean number of tumour marker assessments in the first year after surgery during active surveillance of patients with: • Seminoma • Non-seminoma	 5.5 10.5	(2005 result) 6.5 8.9
Observed 5-year survival	91%	94% (2004 result)
Relative 5-year survival	92%	95% (2003 result)

Survival is slightly increasing

Between 2001 and 2003 the relative survival for the entire Belgian cohort rose from 92% to 95% (Table 21). The survival rates found in the present report are in line with the rates reported for other countries (Table 22). However, where some reports described a difference in 5-year relative survival between seminomas and non-seminomas (France: 100% and 91% respectively; Japan: 96% and 82% respectively) [12, 13], no such difference was found for the Belgian cohort.

Table 22. Relative survival in foreign cohorts.

Year of diagnosis	Relative 5-year survival
The Netherlands [14]	
1993-1997	94%
1998-2002	91%
2003	94%
France [12]	
1994-1999	97%
Norway [15]	
1994-1998	91%
1999-2003	92%
Sweden [15]	
1994-1998	92%
1999-2003	94%
US [12]	
1999-2005	95%
Japan [13]	
1993-1999	91%

During the expert meeting for the present report, it was suggested to present the survival by prognostic risk group. However, information on risk profile is not yet available at the BCR. If the 7th edition of the TNM classification [16] would be used correctly with complete registration at the BCR (including the S category for tumour markers), this risk stratification would be possible.

Use of tumour markers is moderate to good

In testicular cancer, the use of tumour markers is an important component of care as they impact the subsequent treatment and outcome. The proportion of patients with testicular cancer undergoing pre-treatment tumour marker assessment rose from 72% in 2001 to about 81% in 2006.

In a US study using SEER data of 4 742 testicular cancer cases (1998-2002), the proportion of patients undergoing tumour marker assessment (AFP and HCG) was 45%[8], which is considerably lower than in the present study. In the US study, tumour marker use also varied substantially according to the SEER site.

Multidisciplinary discussion is gaining interest

The increase of the proportion of patients with testicular cancer discussed at the MDT meeting is not surprising, since the nomenclature code was only created early 2003. However, in comparison to other tumour types, the proportion is rather low. For breast cancer for example, the proportion was already about 80% in 2006 (Stordeur et al. 2010, in press), while in the year the nomenclature code was implemented (2003), the proportion was already 65% for rectal cancer (cT3-4, cN+ and/or cStage IV) [2]. A possible explanation is that not all MDT meetings are billed. A subanalysis by stage or age group might have revealed other explanations, but was not considered necessary for the present report.

Rates of orchidectomy seem to be low

Using the linked BCR-IMA data a surprisingly low rate of orchidectomies (71%) was found when using specific nomenclature codes (Table 23). Taking into account nomenclature codes for inguinal hernia repair, as suggested by some experts, the rate rose to 84%. When considering also the MCD codes, a rate of 90% was found. However, even this result was considered to be too low, as almost all patients with testicular cancer should undergo orchidectomy. Osswald et al. for example found an orchidectomy rate of above 99% in 702 testicular cancer cases [17].

Possible explanations raised by the experts for this low orchidectomy rate are the use of a wrong or even no nomenclature code. Indeed, as no specific nomenclature code exists for a 'simple' radical orchidectomy without lymphadenectomy, some experts prefer not to bill the intervention. Note that also aspecific nomenclature codes exist for retroperitoneal lymph node dissection. These codes were not considered in this report.

Table 23. Rates of orchidectomy (2001-2006) according to used administrative codes.

Administrative code	Rate 2001 - 2006
Radical orchidectomy for primary testicular tumour with inguinal and/or iliac and/or lumbar lymphadenectomy (nomenclature codes 261111, 261122) OR Bilateral orchidectomy (nomenclature codes 261096, 261100)	71%
Above codes OR Surgical treatment of inguinal hernia without bowel resection (nomenclature codes 241113, 241124) OR Surgical treatment of hernia, irrespective of used technique (nomenclature codes 241161, 241150)	84%
Above codes AND/OR Unilateral orchidectomy (ICD-9-CM 62.3) OR Bilateral orchidectomy (62.4) OR Removal of both testes at same operative episode (62.41) OR Removal of remaining testis (62.42)	90%

Rates of active surveillance are low

The rates of active surveillance were found to be low, even when using a more 'liberate' definition of active surveillance (29% for stage I non-seminomas, 27% for stage I seminomas). For stage I seminomas, this can be explained by the fact that there is really a choice between active surveillance, single-dose carboplatin and radiotherapy [7]. However, for stage I non-seminomas, primary surveillance is recommended for patients *without vascular or lymphatic invasion and without a predominant embryonal component* [7]. Unfortunately, these characteristics could not be analysed in the present project to explain the low rate of active surveillance.

In comparison, Osswald et al. found a rate of active surveillance of 41% for localized non-seminomas and 12% for localized seminomas [17].

No information on number of patients included in clinical trials

No exact data are available on the number of patients with testicular cancer that are included in a clinical trial. According to the consulted experts, mainly the larger academic centres include patients in clinical trials, representing about 30-40% of all patients with testicular cancer at a maximum.

Recently, Deloitte analysed the number of clinical trials in Belgium that are registered at the Federal Agency for Medicines and Health Products [18]. About 24% of the newly started clinical trials between 2006 and the first semester of 2009 (n = 1943) were in the domain of antineoplastic and immunomodulating agents. However, no information was presented by tumour type.

6.1.2 Comparison between centres

The results available from the descriptive statistics and measurable quality indicators show a considerable degree of variability across the different centres. This variability is most prominent for the included process indicators, although some variation is also present in terms of survival.

Striking is the dispersion of care for patients with testicular cancer. Of all orchidectomies for testicular cancer between 2004 and 2006, 40% was performed in 14 centres, while the remaining 60% was performed in 83 centres. More than one third of the centres treating patients with testicular cancer performed a mean of one orchidectomy or less per year between 2004 and 2006. This dispersion of care and the resulting low annual number of patients with testicular cancer in many centres renders comparison between centres difficult. It also raises questions about the organisation of care for these patients and the need to centralise this care in a limited number of centres. In fact, in 2011 the KCE will start a project to investigate the optimal organisation of care for rare cancers, including testicular cancer.

In at least one (Japanese) study [13] a relation between surgical volume and outcome was suggested. Using data of 326 patients with testicular germ cell cancer diagnosed between 1993 and 1999, a significant association was found between survival and hospital procedure volume after adjustment for clinical stage, age and histology (adjusted hazard ratio for hospitals with at least 25 procedures compared to hospitals with 7 or less procedures between 1993 and 1999: 0.111, 95%CI 0.025-0.495). Because this was not foreseen in the present project, a volume-outcome analysis was not performed with Belgian data. Nevertheless, such analysis would probably proof to be very interesting.

For the correct comparison between centres and to allow a meaningful feedback to the centres, risk adjustment is probably necessary for outcome indicators, and can be considered for process indicators. Since feasibility was the main scope of the present project, the need for risk adjustment was not yet evaluated. Therefore, the 'raw' results presented in this report should not be used for comparison and feedback as such. Nevertheless, they should be part of the individual feedback given to the hospitals. Before the included quality indicators are implemented, the exercise of risk adjustment should be done first, in particular because the added value of risk-adjustment is unsure for rare cancers. Table 24 provides an overview of possible factors to be adjusted for when calculating the quality indicators, although it should be noted that some of these risk factors are not (yet) available from the administrative databases. Importantly, to allow a correct adjustment by pStage, the current rate of known pStages (70% between 2001 and 2006) is insufficient and every effort should be made to increase this rate.

Interestingly, the KCE is currently performing a study on methodologies for risk-adjustment using the PROCARE data. The results of that study can probably be used for more general recommendations that are of interest for other cancer types too.

Table 24. Possible risk factors to adjust for per indicator.

Quality indicator	Risk factors
Diagnosis and staging	
TC1: Proportion of patients with testicular cancer undergoing tumour marker assessment before any treatment	Age, stage, morphology
TC2: Proportion of patients with testicular cancer undergoing CE-CT or MRI for primary staging	Age, stage, morphology
TC3: Proportion of patients with testicular cancer discussed at the MDT meeting	Age, stage, morphology
Treatment	
TC4: Number of annually surgically treated patients with testicular cancer per centre	Age, stage, morphology
TC5: Radiation dose and field in patients with testicular cancer treated with radiotherapy by stage	Age, morphology, prognostic group
TC6: Proportion of patients with stage I non-seminoma treated with active surveillance	Age, prognostic group
TC7: Proportion of patients receiving CE-CT or MRI for residual disease assessment at the end of systemic treatment	Age, stage, morphology, prognostic group
TC8: Degree and duration of active surveillance in patients with stage I non-seminoma or seminoma	Age
TC9: Proportion of patients with relapsing testicular cancer after curative treatment that are included in a clinical trial	Age, stage, morphology, prognostic group
Generic indicators	
TC10: Overall 5-year survival by stage	Age, morphology, prognostic group
TC11: Disease-specific 5-year survival by stage	Age, morphology, prognostic group
TC12: Disease-free 5-year survival by stage	Age, morphology, prognostic group

6.2 INDICATOR MEASURABILITY AND INTERPRETABILITY

Of the 12 included quality indicators, 4 were clearly not measurable, 1 was partially measurable, while 2 others were only measurable using proxy information (Table 13). It is well known that the current nomenclature and hospital data are not always suitable for quality measurement, simply because they were not created for this cause. Nevertheless, it is also clear that the nomenclature is not always adapted to the current state-of-the-art medicine. For the present report, this was clearly the case for orchidectomy (see discussion above). Furthermore, as in other reports [2], the absence of nomenclature codes for CT and MRI (and to a lesser extent ultrasonography) with unambiguous specification of the anatomic location is an important hinder to evaluate diagnostic, staging and follow-up procedures. A possible solution would be to link the nomenclature to the diagnosis.

Even when the available administrative data allowed the measurement of quality indicators or descriptive statistics, the results were sometimes questionable. An example is the number of pStage III patients exclusively treated with surgery (N=5 between 2001 and 2006), which should be zero (and in reality probably is zero). Possible explanations for this high number are absence of billing, errors in the administrative databases, or inclusion of these patients in clinical trials (rendering some of the therapeutic interventions untraceable). These considerations should be taken into account when interpreting the results of all quality indicators measured with these administrative data. Nevertheless, it should be stressed that results of quality indicators are only indicative and, if aberrant, should lead to more in depth analysis.

Besides the data quality, timeliness of information is another important aspect influencing the interpretation of results. For the 3 consulted administrative databases, a time delay of 2-3 years is achievable. Furthermore, the linkage and analysis of data also takes several months. For the present study, data from 2001 – 2006 were used, and therefore the results should be interpreted taking into account the guidelines applicable for that time period. For cancer types with a rapidly evolving evidence base, this can be a true problem. Ideally, the delay between the incidence date and the availability of data must be kept as short as possible, with a maximum of 2 years.

Being an important outcome in oncology, (local or distant) recurrence or disease-free survival is often considered for inclusion in quality indicator sets. However, in Belgium, recurrence is not registered. For the present report, this was solved by using a proxy for recurrence, i.e. the instauration of new treatment at least 3-6 months after the first treatment. However, using this definition, patients with a real recurrence within 3-6 months after the first treatment are not counted as having a recurrence. Furthermore, for other tumour types, such as breast cancer or rectal cancer, this solution would not be adequate. Therefore, adding 'recurrence' to the current list of variables with obligatory registration at the cancer registry should be considered, at least for a selected group of cancer types (including the most frequent cancer types and some less frequent cancer types with high impact). In a first phase, this could be done in the context of a well-defined (prospective) registration protocol, as is done for PROCARE[2].

Another problem is the absence of national data on causes of mortality, hampering the calculation of the disease-specific survival. As in other studies (see above), this was solved by using relative survival as a proxy. However, in the near future, national data should again be available. The upcoming European regulation in this domain should enhance the capacity to have data on causes of mortality with a delay of less than a 2-year period.

One of the outcomes of the present report was to evaluate the added value of MCD data to increase the measurability of the included indicators. However, many technical problems led to an incomplete linkage of MCD data to linked BCR-IMA data. Eventually, linked BCR-IMA-MCD data were only available for the years 2002-2004 and for a limited number of cases. MCD data helped improving the measurability of indicators involving surgical treatment (surgical volume, proportion of stage I patients treated with active surveillance). If there would be a more appropriate nomenclature code for orchidectomy, the added value of the MCD data would become questionable. The added value of MCD for other indicators was not demonstrated. Also, because of the above mentioned technical problems, the MCD data could not help to assess exhaustivity of the BCR data.

Based on the above discussion, actions are suggested to increase the measurability of some quality indicators (Table 25). Some suggested actions have an impact on several indicators, and are not always repeated. Apart from these suggestions, target rates need to be determined for each individual indicator.

Table 25. Suggested actions to increase measurability of testicular cancer quality indicators.

Quality indicator	Action
Diagnosis and staging	
TC1: Proportion of patients with testicular cancer undergoing tumour marker assessment before any treatment	-
TC2: Proportion of patients with testicular cancer undergoing CE-CT or MRI for primary staging	Create nomenclature codes for CT and MRI with unambiguous specification of the anatomic location, e.g. separate codes for CT thorax, CT abdomen and CT pelvis (same applies to MRI)
TC3: Proportion of patients with testicular cancer discussed at the MDT meeting	-
Treatment	
TC4: Number of annually surgically treated patients with testicular cancer per centre	Create specific nomenclature codes for orchidectomy reflecting the current state-of-the-art (e.g. separate codes for (1) radical orchidectomy for testicular cancer and for (2) retroperitoneal lymph node dissection for testicular cancer, instead of the existing nomenclature code for orchidectomy)
TC5: Radiation dose and field in patients with testicular cancer treated with radiotherapy by stage	Include information in MDT form
TC6: Proportion of patients with stage I non-seminoma treated with active surveillance	Oblige registration of recurrence? If using the proxy definition of the present report, use 3 months instead of 6 months as time delay between surgery and new treatment
TC7: Proportion of patients receiving CE-CT or MRI for residual disease assessment at the end of systemic treatment	Create nomenclature codes for CT and MRI with unambiguous specification of the anatomic location (see above)
TC8: Degree and duration of active surveillance in patients with stage I non-seminoma or seminoma	Create nomenclature codes for CT and MRI with unambiguous specification of the anatomic location (see above)
TC9: Proportion of patients with relapsing testicular cancer after curative treatment that are included in a clinical trial	Include information in MDT form
Generic indicators	
TC10: Overall 5-year survival by stage	Collect data on risk groups to allow presentation of survival by risk group
TC11: Disease-specific 5-year survival by stage	Collect national data on causes of mortality
TC12: Disease-free 5-year survival by stage	Oblige registration of recurrence?

6.3 DESIRABILITY OF A QUALITY INDICATOR SET FOR TESTICULAR CANCER

As discussed above, this preliminary analysis at least suggests a considerable variability in the quality of care for patients with testicular cancer, underpinning the importance of quality measurement and subsequent quality improvement actions, even for a rare cancer such as testicular cancer. However, several factors need to be taken into account when the operationalisation of this indicator set is considered.

First, the survival data show that the prognosis of most patients with testicular cancer is already good with little room for improvement. Therefore, it may be more useful to focus on results suggesting overtreatment (e.g. the low number of patients treated with active surveillance) and on patients that died during the follow-up period. About 80 patients with testicular cancer died within 5 years after diagnosis in this cohort, which is a manageable number for a more in depth analysis of the medical file. Such an analysis of a limited number of medical files may be a more efficient alternative to the measurement of an entire quality indicator set.

Furthermore, being a rare cancer, the impact of testicular cancer on public health is very limited. Other cancer types, such as breast cancer, have a much higher impact and probably should and will receive priority. Nevertheless, even patients with a rare cancer deserve care of the best quality.

Finally, implementation of a quality indicator set only has sense when it is embedded in a quality improvement cycle. When abnormal or unexpected results are found, indicators are indicative of a potential problem and deserve a closer look. If real problems are encountered, they should lead to quality improvement actions and, subsequently, a re-evaluation after a certain time period. Although actionability was one of the selection criteria for the quality indicators, it is clear that some indicators are more actionable than others.

6.4 CONCLUSIONS

The following conclusions can be drawn from the present report:

- It is feasible to implement a quality indicator set for testicular cancer if some actions are undertaken to increase the measurability of the quality indicators. However, the low incidence of testicular cancer is an important factor to be taken into account when operationalisation (frequency of reporting and feedback, accumulation of several years, etc.) of this indicator set is considered. The most appropriate method, i.e. the implementation of an entire quality indicator set or the use of a possibly more efficient alternative such as an in depth analysis of the medical files of the deceased patients, still needs to be determined.
- The linked BCR-IMA data were found to be sufficient for the measurement of the present quality indicator set. The added value of MCD data is questionable and is limited to information on orchidectomies. The availability of a more appropriate nomenclature code for surgical interventions related to testicular cancer would render the information from the MCD data even more redundant.
- This preliminary analysis shows a mixed picture of the quality of care for testicular cancer patients. Survival is good, but there are indications of over- and underuse of certain interventions.
- The absence of risk-adjustment in the present report (especially for outcome indicators) does not allow a reliable comparison between centres at present. Nevertheless, the preliminary analysis at least suggests a considerable variability in quality of care between centres, underpinning the importance of quality measurement and subsequent quality improvement actions, even for a rare cancer such as testicular cancer. The dispersion of care and the resulting low annual number of patients with testicular cancer in many centres raises questions about the organisation of care for these patients and the need to centralise this care in a limited number of centres.

7 APPENDICES

7.1 SEARCH STRATEGY OVID MEDLINE

Search date: December 10th 2009

1	"Quality of Health Care"/
2	Patient Care Management/
3	"Organization and administration"/
4	Quality Assurance, Health Care/
5	Quality Indicators, Health Care/
6	or/1-5
7	Testicular Neoplasms/
8	Seminoma/
9	Teratoma/
10	((testis or testicular or testes) adj5 (neoplasm$ or cancer$ or carcinoma$ or tumo$ or malign$ or metasta$)).tw.
11	or/7-10
12	6 and 11

Search date: February 9th 2010

1	exp Physician's Practice Patterns/
2	exp Guideline Adherence/
3	exp "Diffusion of Innovation"/
4	exp Registries/
5	exp Health Care Surveys/
6	or/1-5
7	Testicular Neoplasms/
8	Seminoma/
9	Teratoma/
10	((testis or testicular or testes) adj5 (neoplasm$ or cancer$ or carcinoma$ or tumo$ or malign$ or metasta$)).tw.
11	or/7-10
12	6 and 11

7.2 EVALUATION SCORES OF THE LONG LIST OF QUALITY INDICATORS

Number	Indicator	Relevance				Reliability				Interpretability				Actionability			
		Med	Min	Max	%4-5	Med	Min	Max	%4-5	Med	Min	Max	%4-5	Med	Min	Max	%4-5
Diagnosis, staging & primary management																	
1	Time interval between first referral by GP and orchidectomy	3,5	3	5	50%	1,5	1	3	0%	3	1	3	0%	2,5	1	4	33%
2	Proportion of patients with testicular cancer undergoing tumour marker assessment before any treatment.	4	3	5	83%	3,5	2	5	50%	4	2	5	50%	4,5	2	5	67%
3	Proportion of patients with testicular cancer undergoing CE-CT vs. MRI for primary staging.	4,5	1	5	67%	4	2	5	83%	3	1	5	33%	5	3	5	67%
4	Proportion of patients receiving staging techniques other than CT/MRI before or within 1 month after radical orchidectomy.	2,5	1	3	0%	2	1	3	0%	2	1	3	0%	3	2	5	17%
5	**Proportion of patients with testicular cancer treated with chemotherapy and/or radiotherapy that made use of sperm storage.**	4	1	5	60%	4	2	5	60%	3	3	5	40%	5	4	5	100%
Contralateral testis																	
6	Proportion of patients with testicular cancer and infertility, an atrophic testis and/or a history of cryporchidism that underwent a biopsy of the contralateral testis.	4	2	5	60%	3	2	3	0%	3	3	4	20%	4	2	5	60%
7	Proportion of patients with carcinoma in situ of the testis that underwent: a. No treatment b. Radiotherapy c. Chemotherapy	3	1	3	0%	3	1	4	20%	3	1	3	0%	2	1	3	0%
General																	
8	Proportion of patients with testicular cancer discussed at the MDT meeting.	5	4	5	100%	5	4	5	100%	4,5	3	5	83%	5	4	5	100%
9	Number of annually treated patients with testicular cancer per centre.	5	3	5	67%	4,5	3	5	67%	4	2	5	67%	4	3	5	83%
10	Radiation dose and field in patients with testicular cancer treated with radiotherapy, by stage	4,5	1	5	75%	4	3	5	50%	4	2	5	50%	3,5	2	5	50%
Stage I Seminoma																	
11	Proportion of patients with stage I seminoma treated with: a. Active surveillance b. Radiotherapy c. Single-dose carboplatin	3	2	5	25%	3	2	5	40%	3	1	5	40%	3	1	5	20%
Stage I Non-seminoma																	
12	Proportion of patients with stage I non-seminoma treated with active surveillance.	3,5	2	5	50%	4	3	5	60%	4	2	5	60%	4	2	5	60%

Number	Indicator	Relevance				Reliability				Interpretability				Actionability			
		Med	Min	Max	%4-5	Med	Min	Max	%4-5	Med	Min	Max	%4-5	Med	Min	Max	%4-5
M+ Seminoma																	
13	Proportion of patiens with stage IIA/B seminoma treated with adjuvant treatment. ~~a. Chemotherapy~~ ~~b. Radiotherapy~~	3	2	5	20%	3	1	4	20%	3	1	5	40%	3	1	5	20%
14	Proportion of patiens with stage IIC seminoma treated with chemotherapy.	4	3	5	60%	4	3	5	60%	3	2	5	40%	5	3	5	60%
15	Proportion of patiens with stage III seminoma treated with cisplatin-based chemotherapy.	5	3	5	60%	4	3	5	60%	5	2	5	60%	5	3	5	60%
M+ Non-seminoma																	
16	Proportion of patiens with good prognosis metastatic non-seminoma treated with 3 cycles of first-line BEP.	4	3	5	60%	4	3	5	60%	3	3	5	40%	5	3	5	60%
17	Proportion of patiens with intermediate prognosis metastatic non-seminoma treated with 4 cycles of first-line BEP.	4	3	5	60%	4	3	5	60%	3	3	5	40%	5	3	5	60%
18	Proportion of patiens with poor prognosis metastatic non-seminoma treated with 4 cycles of first-line BEP.	4	3	5	60%	4	3	5	60%	3	3	5	40%	5	3	5	60%
Residual disease																	
19	Proportion of patiens with metastatic seminoma undergoing PET scan after first-line treatment.	3	2	5	17%	3	2	5	17%	3	2	5	17%	3	1	5	33%
20	Proportion of patients receiving CE-CT or MRI for residual disease assessment at the end of systemic treatment.	4	3	5	83%	3,5	3	5	50%	3,5	3	5	50%	3,5	3	5	50%
21	Proportion of patients treated with RLNPD.	3	3	5	40%	4	3	5	60%	4	2	5	60%	5	2	5	60%
22	Number of lymph nodes removed.	3	1	4	20%	1	1	3	0%	2	1	3	0%	2	1	3	0%
23	Average length-of-stay of primary hospitalisation for testicular cancer.	2	2	5	40%	2	1	5	40%	2	1	5	20%	2	1	5	20%
24	Proportion of re-hospitalisation after primary treatment for testicular cancer.	2	1	5	40%	2	1	5	40%	2	1	5	20%	2	1	5	20%

Number	Indicator	Relevance				Reliability				Interpretability				Actionability			
		Med	Min	Max	%4-5	Med	Min	Max	%4-5	Med	Min	Max	%4-5	Med	Min	Max	%4-5
Follow-up																	
25	Mean number of CT scans in patients with stage I non-seminoma under primary surveillance during the first year after orchidectomy.	4	3	5	83%	3,5	3	5	50%	4	2	5	67%	4	3	5	83%
25 bis	**Degree of surveillance (i.e. number of CTs and laboratory tests) during the first year post-orchidectomy in patients with stage I NSGCT or SGCT not treated with adjuvant radiotherapy or chemotherapy**																
26	Mean number of CT scans in patients with stage I seminoma under primary surveillance during the first two years and during years 3-4 after orchidectomy.	4	3	5	83%	3,5	3	5	50%	4	2	5	67%	4	3	5	83%
Relapse																	
27	**Proportion of patients with relapsing testicular cancer after curative treatment that are included in a clinical trial.**	5	2	5	60%	3	3	5	40%	3	3	5	40%	3	2	5	40%
Generic indicators																	
28	Overall 5-year survival by stage	5	3	5	80%	4	3	5	80%	4	3	5	60%	4	1	5	80%
29	Disease-specific 5-year survival by stage	5	3	5	80%	4	3	5	80%	5	3	5	80%	4	3	5	80%
30	Disease-free 5-year survival by stage	5	3	5	80%	4	3	5	80%	5	3	5	80%	4	4	5	100%
31	Recurrence rate after primary treatment with no residual disease	5	3	5	80%	3	2	5	40%	4	3	5	60%	3	3	5	40%
32	Correlation between cStage and pStage	2	1	5	20%	2	1	5	20%	2	1	5	20%	2	1	5	20%

7.3 CONSTRUCTION OF AN ALGORITHM TO ATTRIBUTE A PATIENT TO A HOSPITAL BASED ON IMA ADMINISTRATIVE DATA

7.3.1 Introduction

Description of the problem: how to identify the "main centre" for each patient, when the available data arise from three databases, each having different ways to identify the hospital?

This document will address different questions:

1. How to deal with hospital merging?
2. How to identify centre in IMA data?
3. How to identify centre in MCD data?
4. Is there consistency between approaches to identify centres?
5. What's the added value of MCD data compared to IMA data to identify centre?
6. How to construct a valid algorithm?

For this project, there are three sources of data:

1. **BCR dataset** (initial selection): there is no centre identifier (at least for this project)

   Unique key: patient – type of tumour – incidence date

2. **IMA Health dataset** (linked to BCR data): the centre is identified by a nomenclature code (if the MDT meeting and surgery are performed at two different places, the two centres are identified in the database)
   Unique key: patient (after regularizations) – nomenclature code – prestation date

   There are two variables which identify the institution in the IMA.Health dataset:
   The variable **SS00075** indicates where the patient was hospitalized, but is often left blank, so does not provide reliable information.
   The variable **SS00085** is the location where the medical act (nomenclature code) was performed. This variable specifies the centre (hospital) in addition to the service (or lab centre). It requires a specific recoding by the data manager, who will group together all different codes/ identifiers from the same hospital (see annex 1).

3. **MCD dataset** (linked to BCR data): the centre is the one where the patient was hospitalized.

   Unique key: patient- hospitalization (isnr).

   The variable **HOSPIDR_NEW** (in the MCD.STAYHOSP dataset) is the hospital where the patient was hospitalized. This variable also requires a recoding by the data manager, so that the same hospital is recoded by the same identifier in the IMA health dataset and in the MCD dataset

7.3.2 Methods

7.3.2.1 How to deal with hospital merging?

The table HOSPITAL (see a selection below) makes the link between the recoded ss00085 (ss00085r) and the hospital. Merges between hospitals are indicated by the "change" and "change_date" variables. This table has been created by the data manager, and is based on the 2009 situation. For the purpose of this project, all centres were merged retrospectively (in the past). For instance, centre A and centre B which merged into centre C in 2005 were labelled centre C during the whole study period (2001-2006). Hospitals which merged after the study period (2007-2009) were also retrospectively merged.

Table 26. Reference table for the link between the variable SS00085 and the hospital code in IMA data.

SS75or85r	hospidr	hospidr_new	change_date	change	hosp_type
030479B	FF007		.		HOP-ZKH
03328B5	96361		.		HOP-ZKH
03341CB	7343B		.		HOP-ZKH
0341907	8DFB1	53359	01JAN2000	FUSION	HOP-ZKH

7.3.2.2 How to select centre in the IMA data?

There are several possibilities to select centre in the IMA data

- From the **MDT meetings** (see nomenclature codes in the technical document)
- From the **surgery** (see nomenclature codes in the technical document)
- From the **chemotherapy** (see nomenclature codes in the technical document)
- From the **lump sums for hospital admission and per diem price** (see nomenclature codes in Table 27)
- Hormonal therapy is not considered here as mainly given in an ambulatory setting.

Table 27. Nomenclature codes for lump sums (per diem) in IMA data.

Code	Start Date	NL	FR
760001	01/01/1993	Heelkundige aandoeningen - Observatie en behandeling : Niet-universitaire inrichtingen	Affections chirurgicales - Observations et traitement : Etablissements non-universitaires
760060	01/01/1993	Heelkundige aandoeningen - Observatie en behandeling : Gemengde inrichtingen	Affections chirurgicales - Observations et traitement : Etablissements mixtes
760126	01/01/1993	Heelkundige aandoeningen - Observatie en behandeling : Universitaire inrichtingen	Affections chirurgicales - Observations et traitement : Etablissements universitaires
768003	7/01/2005	Ziekenhuisverpleging - variabel gedeelte op basis van ingediende facturen : Acute ziekenhuizen - bedrag per opname.	Hospitalisation - partie variable sur base des factures introduites : Hôpitaux aigus - forfait par admission.
768025	7/01/2002	Ziekenhuisverpleging - variabel gedeelte op basis van ingediende facturen : acute ziekenhuizen - bedrag per dag	Hospitalisation - partie variable sur base des factures introduites :hôpitaux aigus - forfait par jour

However, for each of these codes, time limits have to be set with regard to the incidence date of the cancer (see Table 28). This is to ensure that the treatment relates to the selected cancer. In general, a time limit of 6 months before or after the incidence date is chosen. A smaller time window has been chosen for the lump sums, because these are not specific for cancer (these codes are valid for any hospitalization, cancer or non cancer related).

These limits are cancer specific and should be reviewed by experts for each type of cancer.

Table 28. Time windows applied to nomenclature codes in IMA (reference date: incidence date from BCR).

Category	Source of data	Time between nomenclature code date and incidence date (after)	Time between nomenclature code date and incidence date (before)
MDT meetings	IMA	6 months (180 days)	1 month (30 days)
Surgery	IMA	6 months (180 days)	1 month (30 days)
Chemotherapy	IMA	6 months (180 days)	6 months (180 days)
Lump sum any hospitalization	IMA	1 month (30 days)	1 month (30 days)

The last step is to check that the centre can be uniquely identified for each category. For instance, for patients having two MDT meetings in two different centres within the 6 months period after incidence date, the centre cannot be uniquely identified on this criterion.

The consistency between different approaches should be described.

7.3.2.3 How to select centre in the MCD data?

First, only hospitalizations with regard to the studied cancer have to be retained. One possibility is to select all the relevant APR-DRGs, or all the relevant stays with the appropriate primary diagnosis, but a first broad and easier selection can be done at the level of the Major Disease Classification (MDC). For testis, the relevant MCD is MCD 12 "Diseases and Disorders of the Male Reproductive Systems", which contains the APR-DRGs reported in Table 29.

Table 29. APR-DRGs in MDC 12 "Diseases and Disorders of the Male Reproductive Systems".

APR-DRG	M/P	NL	FR	ENG
480	P	MAJEURE INGREPEN OP DE PELVIS BIJ DE MAN	INTERVENTIONS MAJEURE SUR PETIT BASSIN, SEXE MASCULIN	MAJOR MALE PELVIC PROCEDURES
481	P	INGREPEN OP DE PENIS	CHIRURGIE DU PENIS	PENIS PROCEDURES
482	P	TRANSURETHRALE PROSTATECTOMIE	PROSTATECTOMIE TRANSURETRALE	TRANSURETHRAL PROSTATECTOMY
483	P	INGREPEN OP DE TESTES	INTERVENTIONS SUR LES TESTICULES	TESTES PROCEDURES
484	P	ANDERE INGREPEN OP HET MANNELIJK VOORTPLANTINGSSTELSEL	AUTRES INTERVENTIONS SUR LE SYSTEME GENITAL MASCULIN	OTHER MALE REPRODUCTIVE SYSTEM PROCEDURES
500	M	MALIGNE AANDOENINGEN VAN HET MANNELIJK VOORTPLANTINGSSTELSEL	AFFECTIONS MALIGNES DU SYSTEME GENITAL MASCULIN	MALIGNANCY, MALE REPRODUCTIVE SYSTEM
501	M	ANDERE AANDOENINGEN, BEHALVE MALIGNE, VAN HET MANNELIJK VOORTPLANTINGSSTELSEL	AUTRES AFFECTIONS DU SYSTEME GENITAL MASCULIN SAUF AFFECTIONS MALIGNES	MALE REPRODUCTIVE SYSTEM DIAGNOSES EXCEPT MALIGNANCY

Another relevant MDC for all cancers is the MDC 17 "Lymphatic, Hematopoietic, Other Malignancies, Chemotherapy and Radiotherapy" but it includes radiotherapy stays, which can be given in a different centre than the "main" patient centre (where all the other treatments were given). Therefore we suggest not to include MDC 17 in the selection of stays to identify patient centre.

Once the selection on the MCD basis is done, a second selection has to be done on the time between the cancer incidence date (from BCR data) and the admission date, to avoid that recurrent cases are selected in place of primary tumour. As only admissions months and years are available in MCD, the selection retains all hospitalisations within 6 months of incidence month (see Table 6).

Table 30. Time windows applied to admission month in MCD data (reference month: incidence month from BCR).

	Source of data	Number of months after the incidence date	Number of months before the admission date
Any hospitalisation in MCD of interest	MCD	6 months	6 months

7.3.2.4 Construction of the algorithm

Based on all pre-analyses discussed above, we propose the following algorithm to attribute each patient to a centre:

1. based on the centre where MDT meeting occurred (taking into account all MDT within 6 months after incidence date, and including those which occurred one month before the incidence date)
2. if there was no MDT, based on the centre where surgery occurred (taking into account all surgeries within 6 months after incidence date, and including also those which were performed one month before the incidence date)
3. if there was no MDT and no surgery, based on the centre where chemotherapy was given (including chemo within 6 months before or after incidence date)
4. if there was no MDT, no surgery and if no chemotherapy was given, based on the per diem lump sums from IMA data (within one month before or after incidence date)
5. if none of the above, based on centre where the patient was hospitalized for a cancer related hospitalisation (in MCD data, within 6 months before or after incidence date)

The fact that MCD data are used in the last step of this algorithm is due to the linkage problems that are specific to this project. When the linkage is good, MCD data could be used as a second or third step in the algorithm.

7.3.3 Results

7.3.3.1 Algorithm for testis cancer

Table 31 presents the percentage of patients for which the centre can be identified for testis cancer patients, by type of nomenclature code (thus based on IMA data only). In 2006, the centre could be identified for 66.1% of the patients based on MDT meeting and for 76.6% based on the surgery code. Chemotherapy can be used to identify the centre in 57.7% of the cases (in 2006). Finally, using the stringent criteria of an admission code within the month of the incidence date led the identification of the centre in 82.7% of the cases (in 2006).

Table 31. Comparison of different ways to identify centre of patients in IMA data (testicular cancer).

	N	Centre can be unequivocally identified based on MDT meeting within 30 days before or 180 after ID (IMA)		Centre can be unequivocally identified based on cancer surgery code within 30 days before or 180 days after ID (IMA)		Centre can be unequivocally identified based on chemotherapy within 180 days before or after ID (IMA)		Centre can be unequivocally identified based on non specific hospital admission code within 30 days before or after ID (IMA)	
		yes		yes		yes		yes	
		N	%	N	%	N	%	N	%
Incidence year									
2001	209	.	.	143	68.42	94	44.98	170	81.34
2002	175	6	3.43	123	70.29	91	52.00	145	82.86
2003	214	86	40.19	164	76.64	106	49.53	180	84.11
2004	207	103	49.76	152	73.43	103	49.76	171	82.61
2005	254	164	64.57	200	78.74	136	53.54	223	87.80
2006	248	164	66.13	190	76.61	143	57.66	205	82.66
All	1307	523	40.02	972	74.37	673	51.49	1094	83.70

Using this algorithm, 96.4% of the patients can be attributed to a centre based on IMA data exclusively (see Table 32). There is an improvement of the performance of the algorithm over the years, due to the increase in the number of MDT meetings. One can hypothesize that it would even perform better now, when all patients (should) have a MDT meeting.

Table 32. Results of algorithm to identify centre of patients based on IMA data (testis cancer).

	N	Centre can be identified based on IMA data (algorithm)			
		no		yes	
		n	%	n	%
Incidence year					
2001	209	15	7.18	194	92.82
2002	175	7	4.00	168	96.00
2003	214	7	3.27	207	96.73
2004	207	9	4.35	198	95.65
2005	254	4	1.57	250	98.43
2006	248	5	2.02	243	97.98
All	1307	47	3.60	1260	96.40

Table 33 presents the results of the attribution of centre based on MCD data only (data were only linked to MCD for the years 2002, 2003 and 2004). For 2001, some centres can be identified for those patients with incidence date at the end of the year and with hospitalizations in 2002. Globally, the percentages are very low (between 48% and 57%), and reflect the problems in the data linkage. One can hypothesize that these percentages would be much higher, would the linkage problems be resolved.

Table 33. Results of algorithm to identify centre of patients based on MCD data only.

		Centre is unequivocally identified based on hospitalisation for testis cancer within 6 months before or after ID (MCD)			
		no		yes	
	N	N	%	N	%
Incidence year					
2001	209	200	95.69	9	4.31
2002	175	91	52.00	84	48.00
2003	214	93	43.46	121	56.54
2004	207	102	49.28	105	50.72
2005	254	254	100.00	.	.
2006	248	248	100.00	.	.
All	1307	988	75.59	319	24.41

Table 34 tests whether the different approaches to identify centres give the same results (based on patients for which the centre can be unequivocally identified, as explained above). In 95% of the cases, MDT and surgery occurred in the same centre. This percentage is lower for chemo (86%). Also, when centre can be identified based on MCD data, it matches the IMA algorithm in 97% of the cases. This confirms the validity of the IMA algorithm.

Table 34. Check consistency of approaches to identify centres based on administrative data.

Consistency between	N of patients	N of consistent cases	% of consistency
MDT centre and surgery centre	397	377	94.96
MDT centre and chemotherapy	293	251	85.67
MDT centre and lump sum IMA	459	438	95.42
IMA algorithm versus MCD data	316	305	96.52

7.3.3.2 Volume of centres for testis cancer

The results of the above algorithm (only based on IMA data due to the linkage problems) gives the following results for testis cancer (Table 17).

Table 35. Summary measures of volume of centres for testis cancer.

2001-2006	N hospitals	Mean	Median	Std Dev	Minimum	Lower Quartile	Upper Quartile	Maximum
Total patients	105	12.0	8.0	12.3	1.0	5.0	16.0	96.0
Annual volume	105	2.0	1.3	2.1	0.2	0.8	2.7	16.0

Annual volume (2001-2006) category	Frequency	Percent	Cumulative Frequency	Cumulative Percent
<1 /year	33	31.43	33	31.43
1-<2 /year	34	32.38	67	63.81
2-<3 /year	17	16.19	84	80.00
3-<4 /year	9	8.57	93	88.57
>= 4 /year	12	11.43	105	100.00

7.4 METHODS OF ANALYSIS

7.4.1 Descriptive statistics by type of outcome

Continuous variables

Continuous variables (such as the patient age, the number of tumour marker assessments …) were described with the mean, standard deviation (SD), median, 25th and 75th percentile of their distribution. For the quality indicators, these data were also presented with a box plot. The square of the box includes 50% of the observations (between the lower and the upper quartile, the interquartile range, IQR). The two whiskers (i.e. the vertical bars departing from the square) are drawn down till the last observation below Q1 (first quartile) - 1.5 x IQR and up above Q3 (third quartile) + 1.5 x IQR. The outliers outside those boundaries are located outside the box and indicated with an asterisk. The mean of the distribution is represented by a "+" sign and the median is the horizontal line dividing the box in 2 (if the median is different from Q1 or Q3).

Binary variables

Binary variables (the majority of the quality indicators) were described as percentages (denominator N, numerator n, %). The unit of analysis was most of the time the patient, otherwise explicitly mentioned.

Standardized Incidence Rates

Incidence rates by province were standardized for the age using the direct standardization method. The age structure of the European population was used as the standard [11].

5-year overall survival

Overall 5-year survival curves have been calculated using the Kaplan Meier method, stratifying the curves by pStage. The vital status of each patient at the end of December 2009 was available.

5-year relative survival

The calculation of the disease-specific survival is impossible at present, and the relative survival (i.e. observed survival / expected survival) is calculated as a proxy. Expected survival rates were retrieved from the mortality tables of 2006 (http://statbel.fgov.be/nl/statistieken/cijfers/bevolking/sterfte_leven/tafels/index.jsp) and were linked to the individual patient, taking into account age, gender and region.

7.4.2 Graphical description of the variability per centre (funnel plots)

The variability in outcome results has been described graphically for all quality indicators. The algorithm to attribute a patient to a center has been described in chapter 7.3. Patients who could not be attributed to a centre are not included in these graphics.

7.4.2.1 Definition of a funnel plot

The definition of funnel plots has four components. In each unit (hospital), r events are observed out of a sample size n (cross sectional binomial data).

An indicator (summary statistic) which is the observed proportion of event r/n.

A target proportion which is the average event rate θ_0. It is given by the sum of all events divided by the sum of all sample sizes.

A measure of the precision, in that case given by the unit sample size n.

The control limits that depend of the target θ_0, of the sample size n and of a given p-value. These limits are constructed such that the chance of exceeding these limits for a « in control » unit is p. Usual sets of values for p are p=0,001, p=0,999 corresponding to 3 SD (the usual limits in control charts framework), and p=0,025, p=0,975 corresponding to 2 SD (the usual limits set in the test of hypotheses framework).

In the case of binomial cross sectional data, the limits are given by $y_p(\theta_0, n) = \theta_0 + z_p\sqrt{\frac{\theta_0(1-\theta_0)}{n}}$, with z_p as such that $P(Z \leq z_p)=p$ for a standard normal distribution Z ($z_{0.025}$=-1.96).

These charts aim to differentiate between « in control » units, showing a common cause of variation, and « out of control » units, exhibiting a special cause of variability, which has then to be investigated further. They show the outcome measure plotted against a measure of its precision, so that control limits form a funnel around the target outcome.

Funnel plots have many advantages: the axes are readily interpretable, so that additional information can be added by hand if desired, the eye is naturally drawn to important points that lie outside the funnels, there is no spurious ranking of institutions, and there is clear allowance of additional variability in institutions with small volume.

7.4.2.2 How to calculate the limits of variability for the funnel plot?

Calculating a confidence interval around a proportion looks like a very simple statistical problem, but is not, as shown by the extensive literature on the subject. A relatively recent review listed 11 available methods to do so, from the easy-to-calculate and widely used normal approximation to the more sophisticated Bayesian interval[g] [h]. Confidence intervals typically are classified as being "approximate", meaning that they make use of the normal approximation of the binomial distribution, or as being "exact", meaning they are based on the binomial distribution itself. Contrary to what their name suggests, "exact" methods are not unique, and are not necessarily better than "approximate" methods[i].

This methodological note presents the 4 most frequently used methods, describes their advantages and inconveniences, and motivates a choice to compute limits for the funnel plots. In all formulas: $\hat{p} = X / n$ (with X = number of events, n = sample size)

The Wald interval (Normal approximation):

$$CI_{normal} = \hat{p} \pm z_{\alpha/2}\sqrt{\hat{p}(1-\hat{p})/n}$$

Extensive simulations have shown that the normal approximation performs badly. The real coverage can be noticeably smaller than the nominal value (confidence intervals are shorter than what they should be), even for large sample sizes and non extreme probabilities.

The Wilson interval:

$$CI_{Wilson} = \frac{X + z^2_{\alpha/2}/2}{n + z^2_{\alpha/2}} \pm \frac{z_{\alpha/2}\sqrt{n}}{n + z^2_{\alpha/2}}\sqrt{\hat{p}(1-\hat{p}) + z^2_{\alpha/2}/4n}$$

This interval performs much better than the Wald interval, even for small sample sizes.

---

g. Brown L, Cai T, DasGupta A. Interval estimation for a binomial proportion. Statistical science 2001; 16(2): 101-133.

h Newcombe RG. Two-sided confidence intervals for the single proportion: comparison of seven methods. Stat Med 1998; 17(8): 857-872.

i Agresti A, Coull BA. Approximate is better than 'exact' for interval estimation of binomial proportions. The American Statistician 1998; 52: 119-126.

The Agresti-Coull interval:

$$CI_{AC} = \tilde{p} \pm z_{\alpha/2}\sqrt{\tilde{p}(1-\tilde{p})/\tilde{n}}$$
$$with \quad \tilde{X} = X + z^2_{\alpha/2}/2, \quad \tilde{n} = n + z^2_{\alpha/2}, \quad \tilde{p} = \tilde{X}/\tilde{n}$$

This interval, a simplified version of the Wilson interval, is appealing because of its simplicity (it has the same form as the Wald interval) and because of its easy-to-remember rule of thumb: "add 2 successes and 2 failures" (using the value 2 instead of 1.96 for z). This method and the Wilson method are often recommended in papers comparing different methods on statistical properties (mainly the real coverage).

The Clopper-Pearson interval:

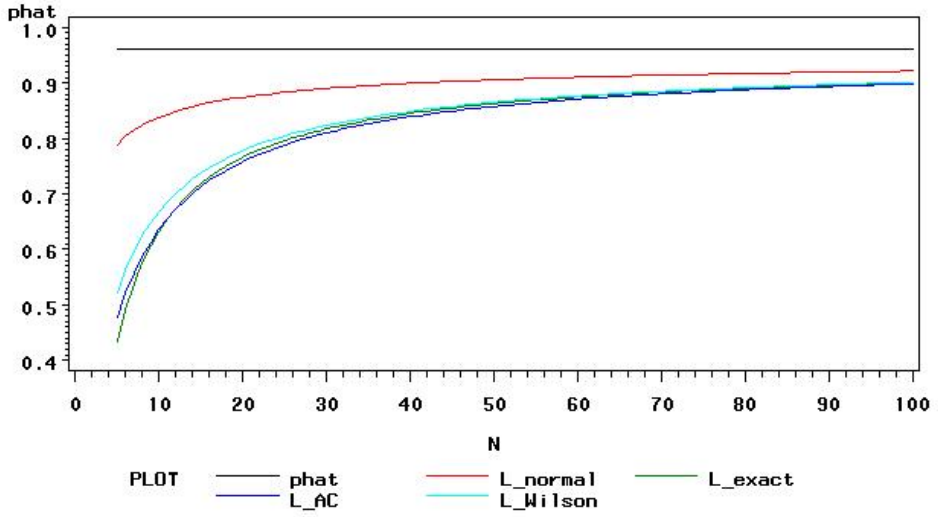
This interval directly derives the probabilities from the binomial distribution. Because of the connections between the Binomial, the F-distributions and the Beta distributions, a closed form of the confidence limits is given by inverting beta distributions:

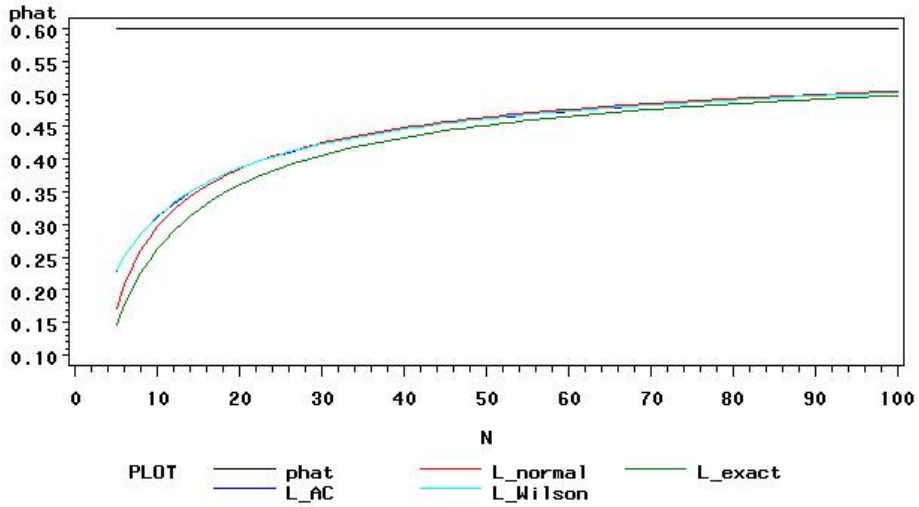
$$Lower_{CP} = Beta^{-1}(\alpha/2, x, N-x+1)$$
$$Upper_{CP} = Beta^{-1}(1-\alpha/2, x+1, N-x)$$

The common critic on this interval is that its actual coverage probability is at least as large as the nominal level, for any probability, and it can be much larger. This means that these intervals are unnecessarily conservative (unnecessarily large), especially for small sample sizes. Some authors have proposed modifications which lead to better properties, but these methods are computationally intensive and are not (yet) standard available in SAS.

To graphically illustrate the extend of differences between the 4 methods, Figure 19A and B below present the lower confidence limits for an extreme probability (A, p=0.96) and for an average probability (B, p=0.60). When p=0.96, the Wald approximation gives much smaller limits than the three other methods. When p=0.60, the Wilson and Agresti-Coull intervals are not discernable, and the Clopper-Pearson interval is the widest.

Figure 19. Lower limit (95%CI) for funnel plot computed for p=0.96 (figure above) and p=0.60 (figure below).





In conclusion, we suggest to use the Agresti-Coull method, as simulations showed good properties even on small sample sizes. This is also the method used by Zichtbare Zorg in The Netherlands[i].

7.5 TECHNICAL FILES INDICATORS

7.5.1 TC1: Proportion of patients with testicular cancer undergoing tumour marker assessment before any treatment

7.5.1.1 Rationale

According to the guidelines, AFP and HCG should be measured preoperatively to distinguish between seminoma and non-seminoma and to guide postoperative management (expert opinion) [7]. Ideally, this measurement should be as close as possible to the first treatment. The cut-off has been arbitrarily set at 3 months.

7.5.1.2 Numerator

All patients diagnosed with testicular cancer in a given year undergoing tumour marker assessment (HCG and AFP) before any treatment.

7.5.1.3 Denominator

All patients diagnosed with testicular cancer in a given year.

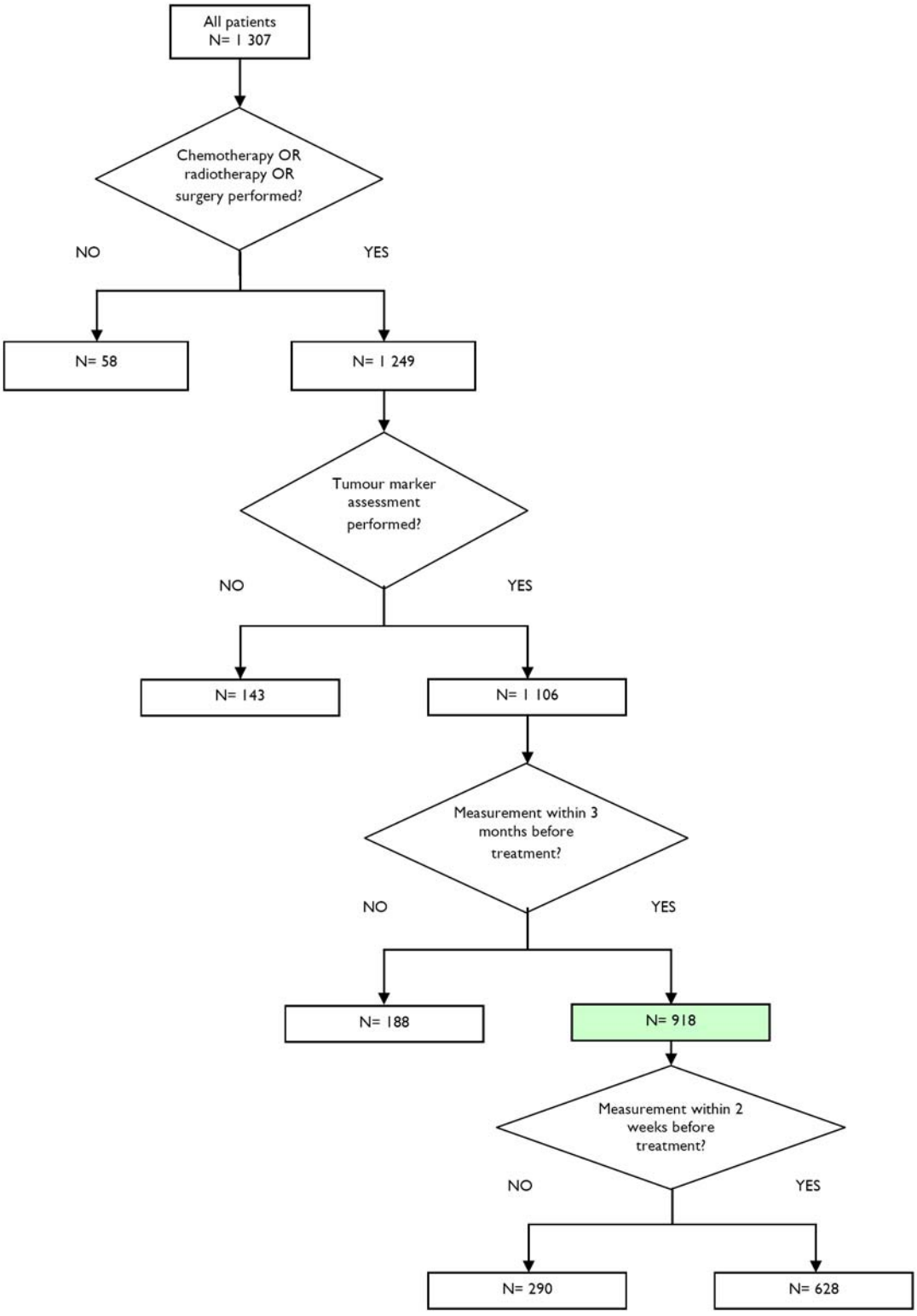
7.5.1.4 Elaboration

Figure 20 provides the algorithm for indicator TC1. From the testicular cancer population, only patients receiving treatment (surgery and/or chemotherapy and/or radiotherapy) are selected (denominator). In this subpopulation, patients undergoing HCG and AFP measurement are identified. Two numerators are calculated:

- The number of patients undergoing the measurement within 3 months before first treatment;
- The number of patients undergoing the measurement within 2 weeks before first treatment.

i Personal communication, Prof. Damhuis.

Figure 20. Flowchart of indicator TC1.



7.5.1.5 Data source(s)

Source database(s)

- BCR for source population
- IMA and MCD for interventions

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Tumour marker assessment*: nomenclature codes (IMA)
- *AFP*: see Table 55
- *HCG*: see Table 55
- *Date of first treatment*:
  - *Surgical treatment*: nomenclature codes (IMA) (Table 60) or ICD-9-CM codes (MCD) (Table 61)
  - *Radiotherapy*: nomenclature codes (IMA) (Table 62)
  - *Chemotherapy*: CNK codes (IMA) (Table 63)

7.5.1.6 Results

For the period 2001 – 2006, 96% (1249/1307) of all patients with testicular cancer underwent treatment. Of the treated patients, 89% (1106/1249) underwent tumour marker assessment. 73% of the treated patients (918/1106) underwent the measurement within 3 months of the first treatment (Table 36), while 50% underwent the measurement within 2 weeks of the first treatment. When analysing the population with coupled BCR-IMA-MCD data, the results are completely in line (Table 37).

Table 36. Proportion of treated patients with testicular cancer undergoing tumour marker assessment within 3 months of first treatment, BCR-IMA data only (2001-2006).

	Numerator	Denominator	Proportion
2001	141	195	72.3
2002	125	165	75.8
2003	141	206	68.4
2004	127	199	63.8
2005	193	247	78.1
2006	191	237	80.6
Total	918	1249	73.5

Table 37. Proportion of treated patients with testicular cancer undergoing tumour marker assessment within 3 months of first treatment, BCR-IMA-MCD data (2002-2004).

	Numerator	Denominator	Proportion
2002	89	117	76.1
2003	95	146	65.1
2004	95	143	66.4
Total	279	406	68.7

The proportion of patients receiving tumour marker assessment within 3 months before treatment start fluctuated between 2001 and 2006. The highest proportions were measured during the last two years of analysis, with more than 80% in 2006.

The variability between centres was investigated for two time frames and revealed no major differences between these time periods (Figure 21 and Figure 22). The number of outliers below the lower limit was 5 for the period 2001-2003 and 6 for the period 2004-2006.

Figure 21. Proportion of treated patients with testicular cancer undergoing tumour marker assessment within 3 months of first treatment, analysis by centre (N=95), period 2001-2003 (BCR-IMA data only).

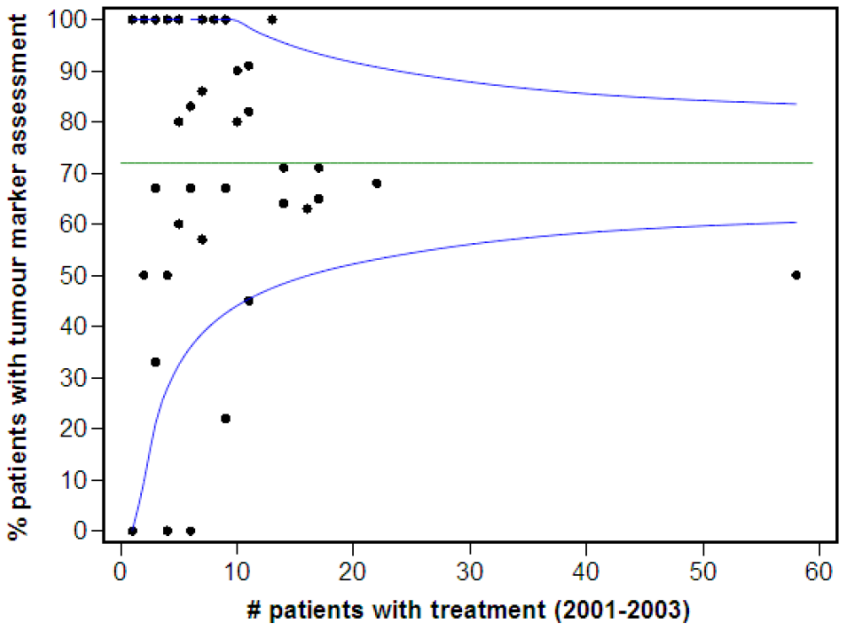
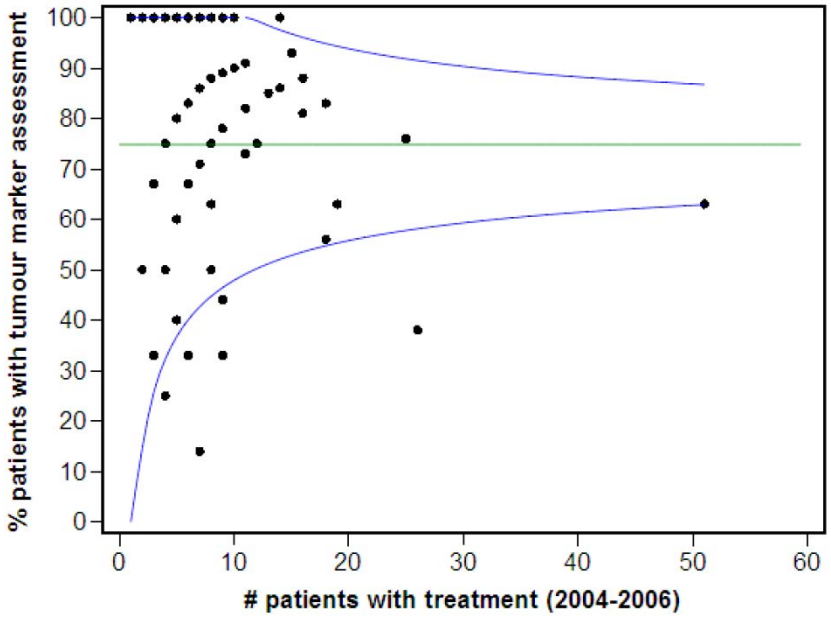


Figure 22. Proportion of treated patients with testicular cancer undergoing tumour marker assessment within 3 months of first treatment, analysis by centre (N=97), period 2004-2006 (BCR-IMA data only).



7.5.2 TC2: Proportion of patients with testicular cancer undergoing CE-CT or MRI for primary staging

7.5.2.1 Rationale

Contrast-enhanced CT of the thorax, abdomen and pelvis is the imaging technique of first choice for the detection of retroperitoneal and mediastinal lymph nodes and pulmonary and hepatic metastases in patients with histopathologically confirmed testicular cancer (2C evidence) [7]. However, CT is a high radiation-dose examination, and every effort should be made to avoid unnecessary scanning, particularly in young patients. Furthermore, adequate precautions should be taken in order to avoid iodine allergy or nephrotoxicity. For these patients, magnetic resonance imaging (MRI) could be an alternative staging technique (expert opinion). In case a MRI is performed, a CT thorax is also necessary.

7.5.2.2 Numerator

All patients diagnosed with testicular cancer in a given year undergoing CE-CT or MRI for primary staging.

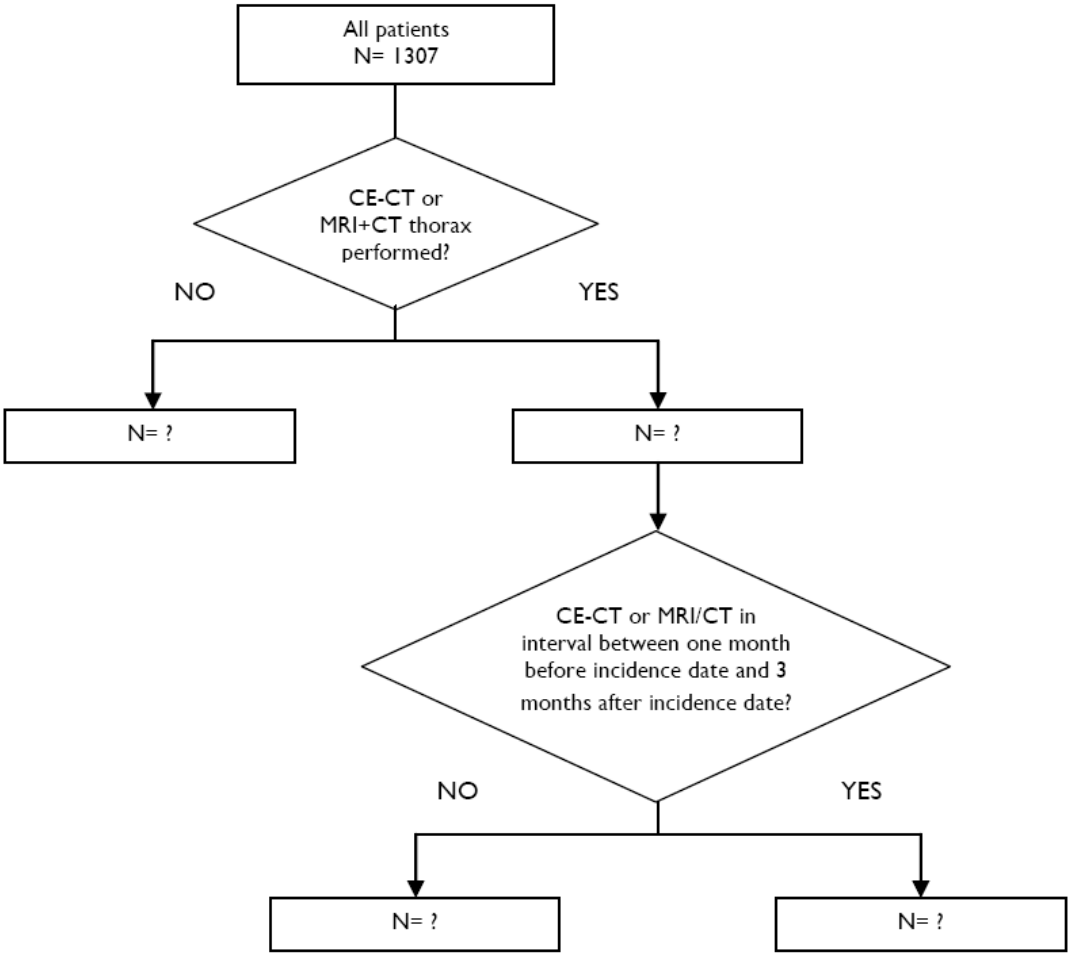
7.5.2.3 Denominator

All patients diagnosed with testicular cancer in a given year.

7.5.2.4 Elaboration

Figure 23 provides the algorithm for indicator TC2. From the testicular cancer population (denominator), patients undergoing CE-CT thorax/abdomen/pelvis or (MRI abdomen/pelvis + CT thorax) are selected. To allow the identification of these imaging tests performed for primary staging reasons, a time limit of 1 month before incidence date and 3 months after incidence date was set (numerator).

Figure 23. Flowchart of indicator TC2.



7.5.2.5 Data source(s)

Source database(s)

- BCR for source population
- IMA for interventions

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Contrast-enhanced CT*: nomenclature codes (IMA) for CT (Table 56), CNK codes for contrast (Table 57)
- *MRI*: nomenclature codes (IMA) (Table 58)

7.5.2.6 Results

Primary staging for testicular cancer encompasses contrast-enhanced CT thorax, abdomen and pelvis or, in particular cases, MRI abdomen and pelvis and CT thorax. However, no specific nomenclature codes were available for CT thorax, abdomen or pelvis, or MRI abdomen or pelvis. Moreover, the identification of contrast-enhanced CT was difficult, since the available codes were not consistently used (the combination of the nomenclature codes for CT and the CNK codes for contrast resulted in zero records). As a result, this indicator was not measurable.

Nevertheless, some results can be calculated using the available administrative data. Of all patients with testicular cancer, 94.8% underwent a CT (of the neck and/or thorax and/or abdomen) and/or a MRI (of the neck and/or thorax and/or abdomen) within 1 month before incidence date and 3 months after incidence date (see also Chapter 4: Descriptive statistics).

7.5.3 TC3: Proportion of patients with testicular cancer discussed at the MDT meeting

7.5.3.1 Rationale

Testicular cancer is a rare cancer and asks for a specialised approach. Discussion of the therapeutic approach in a multidisciplinary setting is necessary, at least involving urologists, medical oncologists, radiotherapists and pathologists. Specific nomenclature codes for a multidisciplinary oncologic consultation are available since February 1st 2003.

7.5.3.2 Numerator

All patients diagnosed with testicular cancer in a given year discussed at the MDT meeting within 6 months after incidence date.

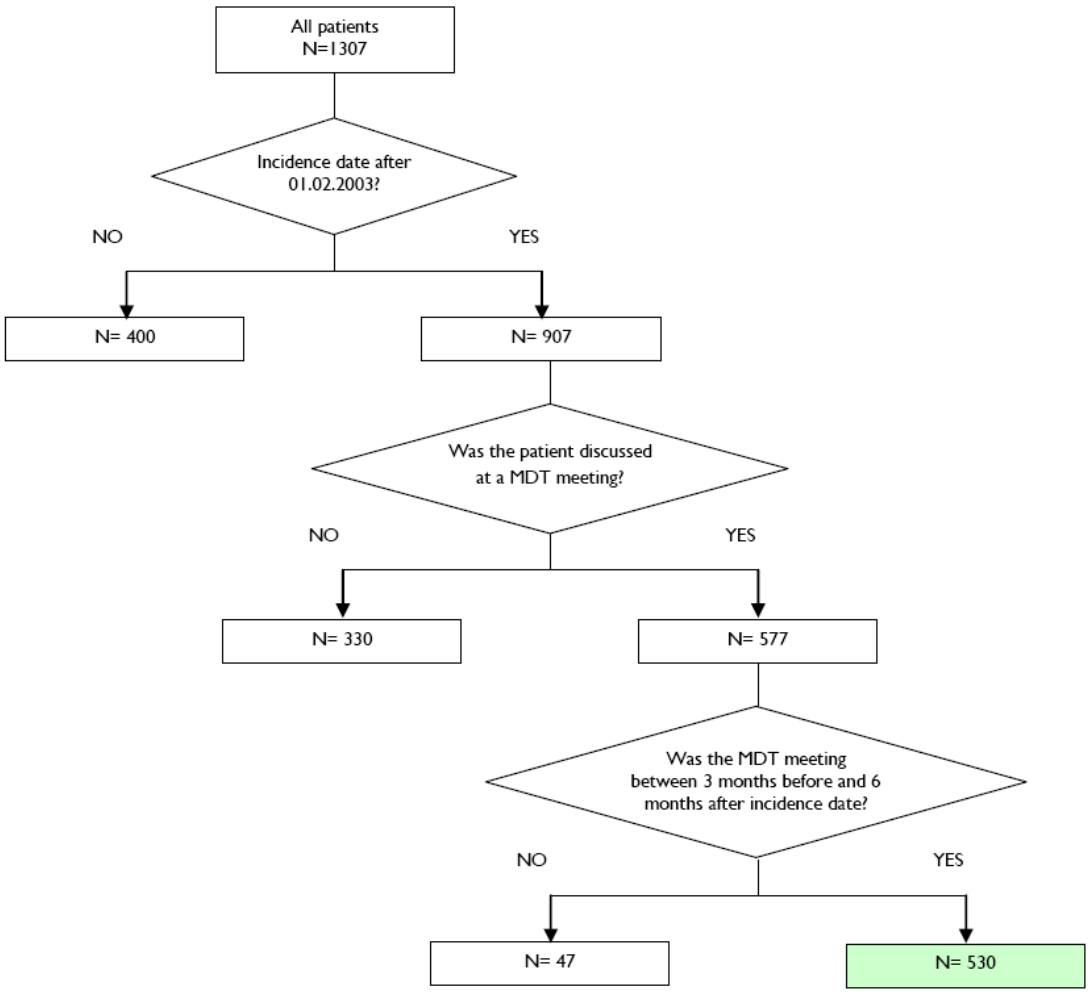
7.5.3.3 Denominator

All patients diagnosed with testicular cancer in a given year.

7.5.3.4 Elaboration

Since a specific code for a MDT meeting only became available since February 1st 2003, patients with incidence date before are excluded (Figure 24). Since there is always a possibility of more than one primary tumour (other than the testicular tumour) and in order to increase the likelihood that the MDT was linked to the testicular tumour, a timeframe of 6 months after the incidence date was chosen.

Figure 24. Flowchart of indicator TC3.



7.5.3.5 *Data source(s)*

Source database(s)

- BCR for source population
- IMA for interventions

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *MDT meeting*: nomenclature code (IMA) (Table 59)

7.5.3.6 *Results*

Of the 907 patients with testicular cancer diagnosed after February 1st 2003, 63.6% (577/907) was discussed at a MDT meeting. In 58.4% of the patients (530/907), the discussion was held within 1 month before and 6 months after the incidence date (Figure 24 and Table 38).

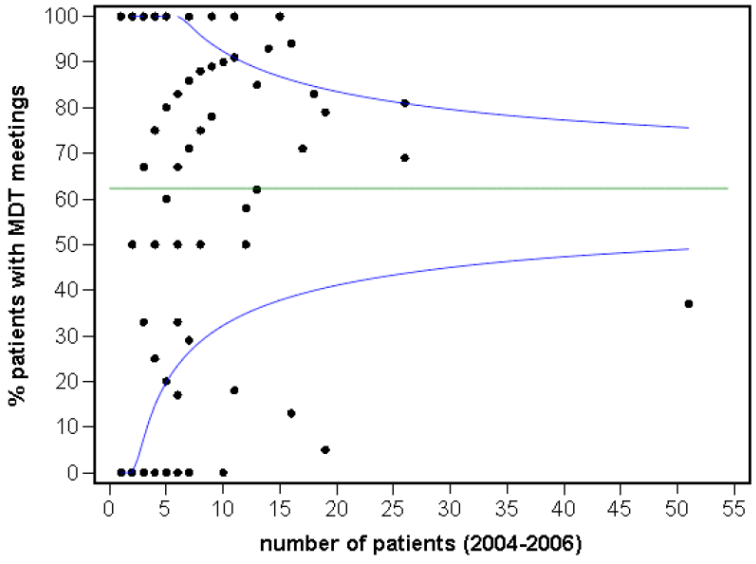
The proportion of patients discussed at a MDT meeting increased over time. In the first year the MDT nomenclature codes were introduced, only about 44% of the patients were discussed in a multidisciplinary setting. In 2006, already more than 67% of the patients were discussed at a MDT meeting, suggesting that the multidisciplinary approach is gaining interest in testicular cancer treatment.

Table 38. Proportion of patients with testicular cancer discussed during a multidisciplinary team meeting, BCR-IMA data, 2003 – 2006.

	Numerator	Denominator	Proportion
2003	88	198	44.4
2004	110	207	53.1
2005	165	254	65.0
2006	167	248	67.3
Total	530	907	58.4

The analysis per centre for the years 2004-2006 shows that for a number of centres no patients could be identified who were discussed at a MDT meeting (using the IMA data) (Figure 25). In total, the number of outliers below the lower limit was 15. Importantly, the absence of a nomenclature code for a MDT meeting for a particular patient does not necessarily mean that no MDT was held. Some centres might not charge MDT meetings and in turn, they do not appear in the IMA database.

Figure 25. Proportion of patients with testicular cancer discussed during a multidisciplinary team meeting, analysis by centre (N=97), period 2004-2006 (BCR-IMA data only).



7.5.4 TC4: Number of annually surgically treated patients with testicular cancer per centre

7.5.4.1 Rationale

Several studies indicate a relationship between volume and outcome for testicular cancer [13, 19, 20]. However, since testicular cancer is a rare cancer, and the number of diagnosed patients in Belgium is low, the calculation of a volume-outcome relationship was considered not feasible. Therefore, it was opted to present the surgical cases by centre.

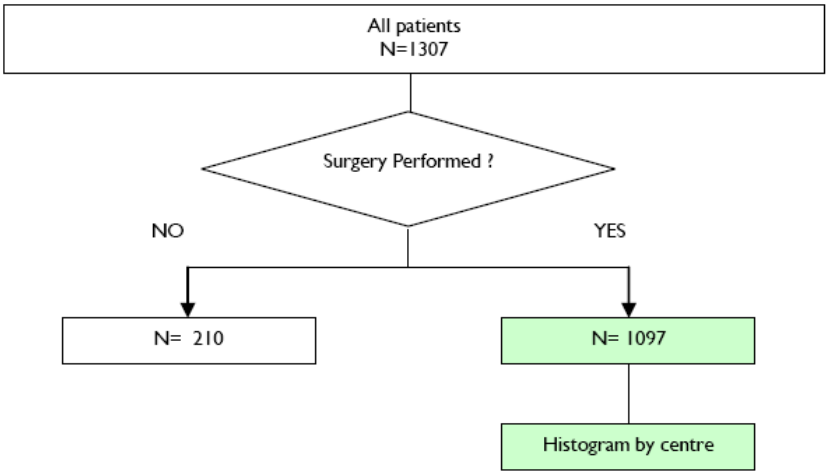
7.5.4.2 Definition

Number of orchidectomies for cancer per centre in a given year.

7.5.4.3 Elaboration

Patients undergoing surgery are selected from the testicular cancer population (Figure 26). The analysis is done per centre.

Figure 26. Flowchart of indicator TC4.



7.5.4.4 Data source(s)

Source database(s)

- BCR for source population
- IMA and MCD for interventions

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Surgical treatment*: nomenclature codes (IMA) (Table 60) or ICD-9-CM codes (MCD) (Table 61)

7.5.4.5 Results

In a first attempt to analyse this indicator, only the specific nomenclature codes for testicular surgery were considered, revealing only 923 patients (70.6%) treated with surgery. However, this number seemed to be an underestimation of the real percentage of surgical interventions for testicular cancer. More detailed analyses showed that for a remarkable proportion of patients (N=174), a code for hernia operation (241113, 241124, 241161, 241150) was recorded between one month before and six months after testicular cancer diagnosis. In these cases, because of the time relation between the 'hernia operation' and the diagnosis of testicular cancer, these surgical interventions were considered to be an orchidectomy. As a result, taking both testicular surgery and hernia surgery codes into account, 1097 patients (83.9%) with testicular cancer underwent surgery according to the IMA data (Table 39).

When evaluating the coupled BCR-IMA-MCD data for the available years, a higher proportion of surgically treated patients was observed (Table 40). This higher proportion may be explained by patients for whom either a wrong or no nomenclature code was registered, despite having undergone a surgical intervention for testicular cancer.

Table 39. Proportion of surgically treated patients, BCR-IMA data only (2001-2006).

	Numerator	Denominator	Proportion
2001	170	209	81.3
2002	145	175	82.9
2003	186	214	86.9
2004	173	207	83.6
2005	222	254	87.4
2006	201	248	81.0
Total	1097	1307	83.9

Table 40. Proportion of surgically treated patients, BCR-IMA-MCD data (2002-2004).

	Numerator	Denominator	Proportion
2002	107	122	87.7
2003	137	150	91.3
2004	131	145	90.3
Total	375	417	89.9

In the period 2001-2003, only 6 centres performed more than 10 orchidectomies (Figure 27). This number increased to 13 centres for the period 2004-2006 (Figure 28).

Figure 27. Number of surgically treated patients with testicular cancer by centre, BCR-IMA data (2001-2003).

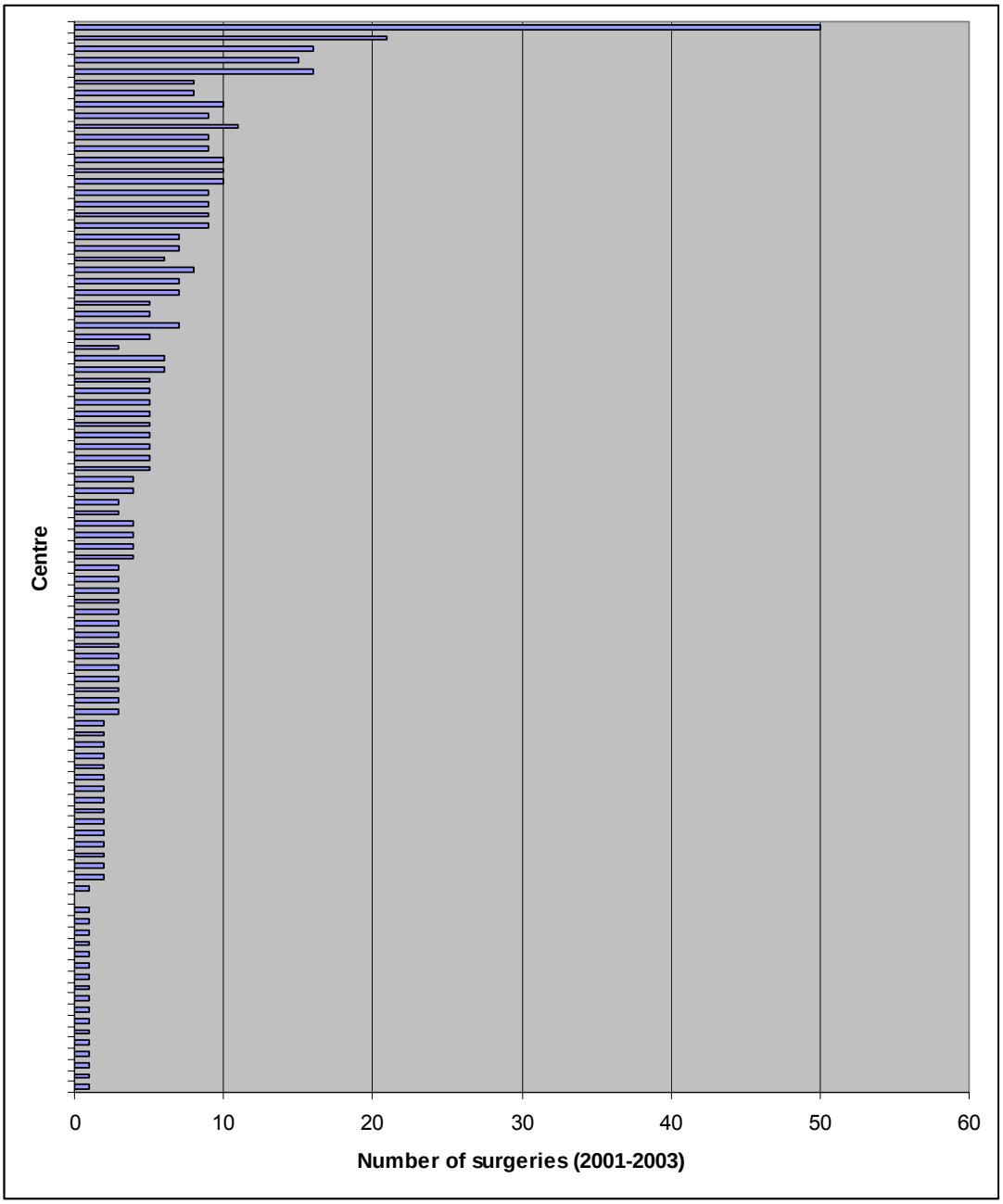
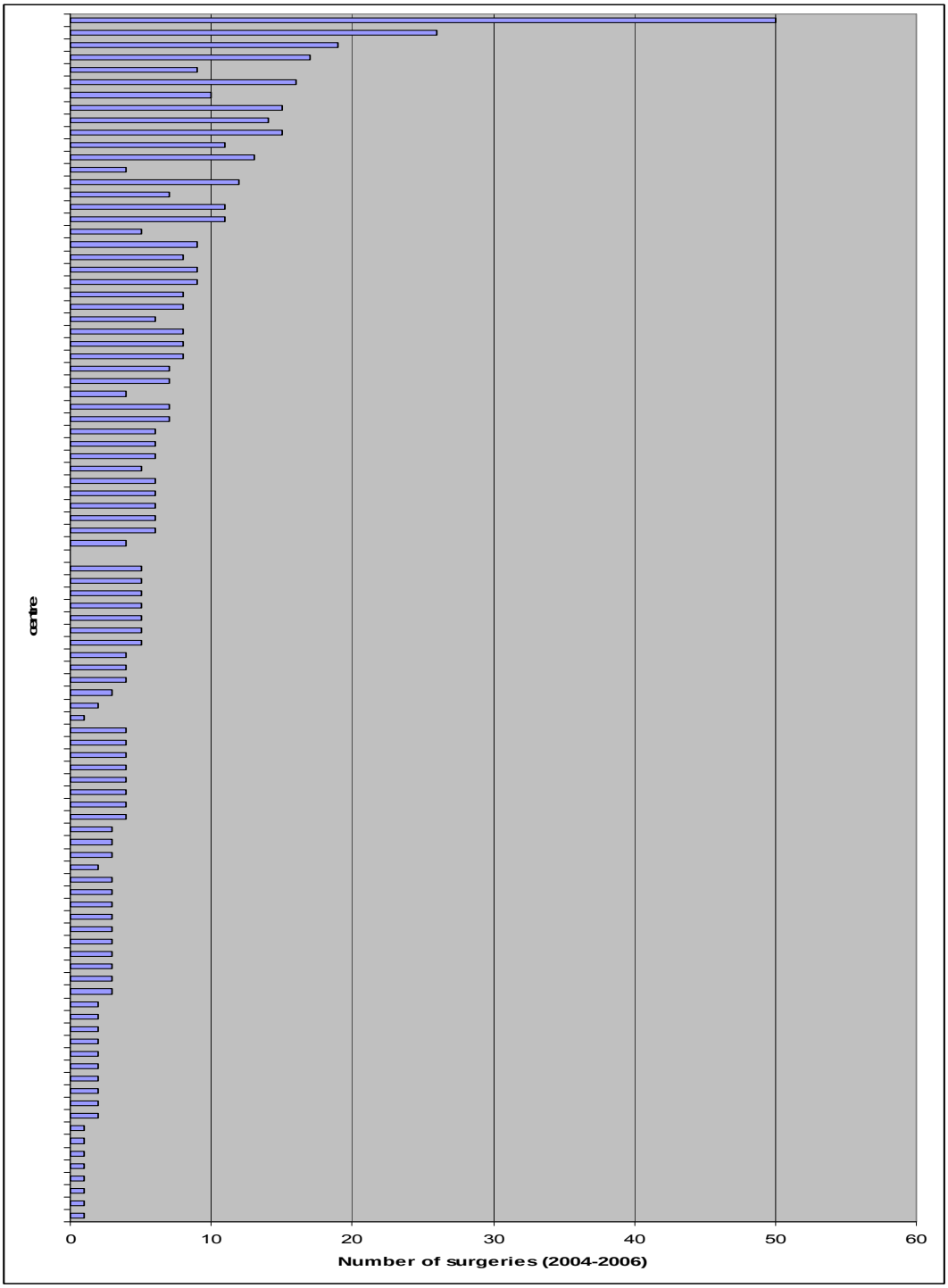


Figure 28. Number of surgically treated patients with testicular cancer by centre, BCR-IMA data (2004-2006).



7.5.5 TC5: Radiation dose and field in patients with testicular cancer treated with radiotherapy by stage

7.5.5.1 Rationale

An overview of the recommendations that relate to radiotherapy in patients with testicular cancer is provided below [7]:

In patients with stage I seminoma post-orchidectomy, radiotherapy can be considered as a management option (2B evidence);

Patients with stage IIA or IIB seminoma should be treated with chemotherapy or radiotherapy (2C);

In patients with seminoma previously treated with chemotherapy, and who have a residual mass > 3 cm and/or positive PET findings, radiotherapy can be considered (expert opinion).

Depending on the stage, specific radiation schedules and fields are used.

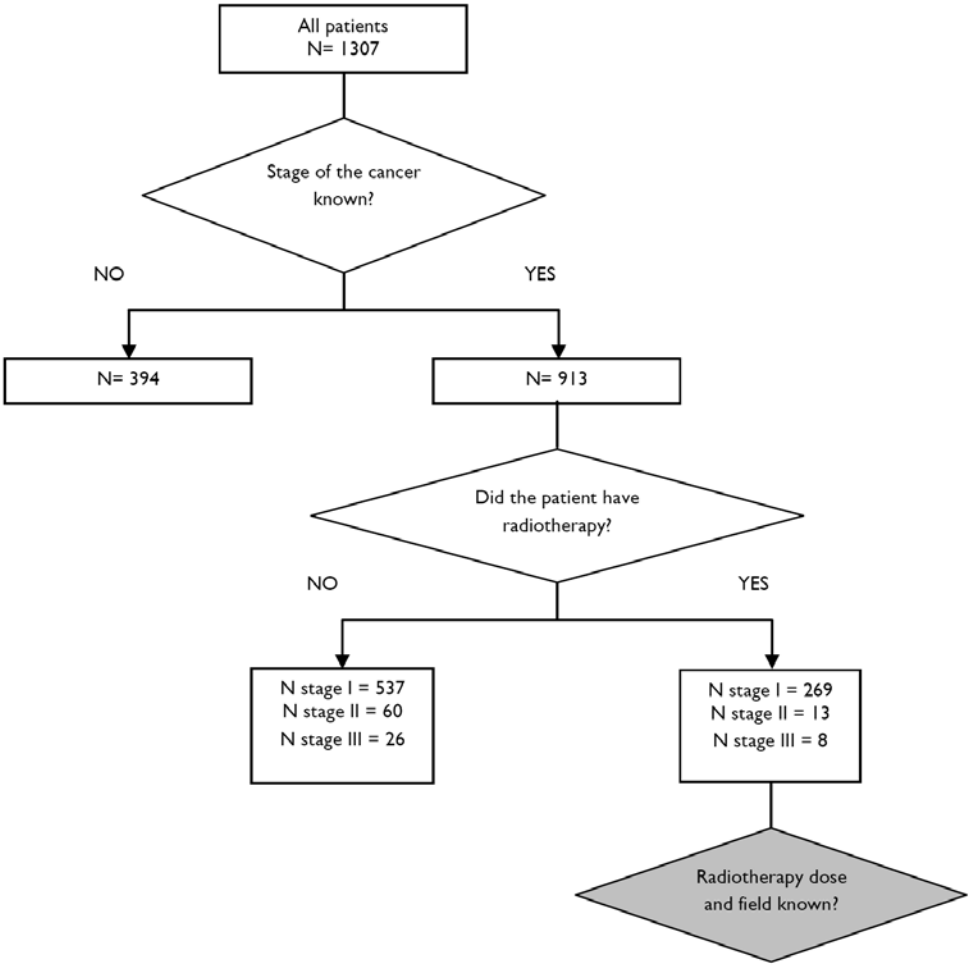
7.5.5.2 Definition

Distribution of radiation doses and fields in patients with testicular cancer treated with radiotherapy in a given year, by stage.

7.5.5.3 Elaboration

From all patients with testicular cancer, only patients with a known stage are selected to allow a calculation by stage (Figure 29). From these, patients receiving radiotherapy are selected. However, in the absence of administrative data containing technical details on the radiation dose and/or field, the indicator is not measurable.

Figure 29. Flowchart of indicator TC5.



7.5.5.4 Data source(s)

Source database(s)

- BCR for source population
- IMA for interventions

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Stage*: BCR
- *Radiotherapy*: nomenclature codes (IMA) (Table 62). However, no dose and field available in administrative databases

7.5.5.5 Results

As stated above, the indicator is not measurable in the absence of administrative data containing information on the radiation dose and field. Nevertheless, an indication can be given on the percentage of patients receiving radiotherapy by stage. Of all 913 patients with a known stage (between 2001 and 2006), 31.8% received radiotherapy (Figure 29). Radiotherapy was most often given in stage I patients (33.7%), and less in stage III (23.5%) or stage II patients (17.8%).

7.5.6 TC6: Proportion of patients with stage I non-seminoma treated with active surveillance

7.5.6.1 Rationale

According to the guidelines, primary surveillance is recommended for patients with stage I non-seminoma post-orchidectomy, with treatment at relapse (2B evidence) [7].

7.5.6.2 Numerator

All patients diagnosed with stage I non-seminoma testicular cancer in a given year, treated with active surveillance.

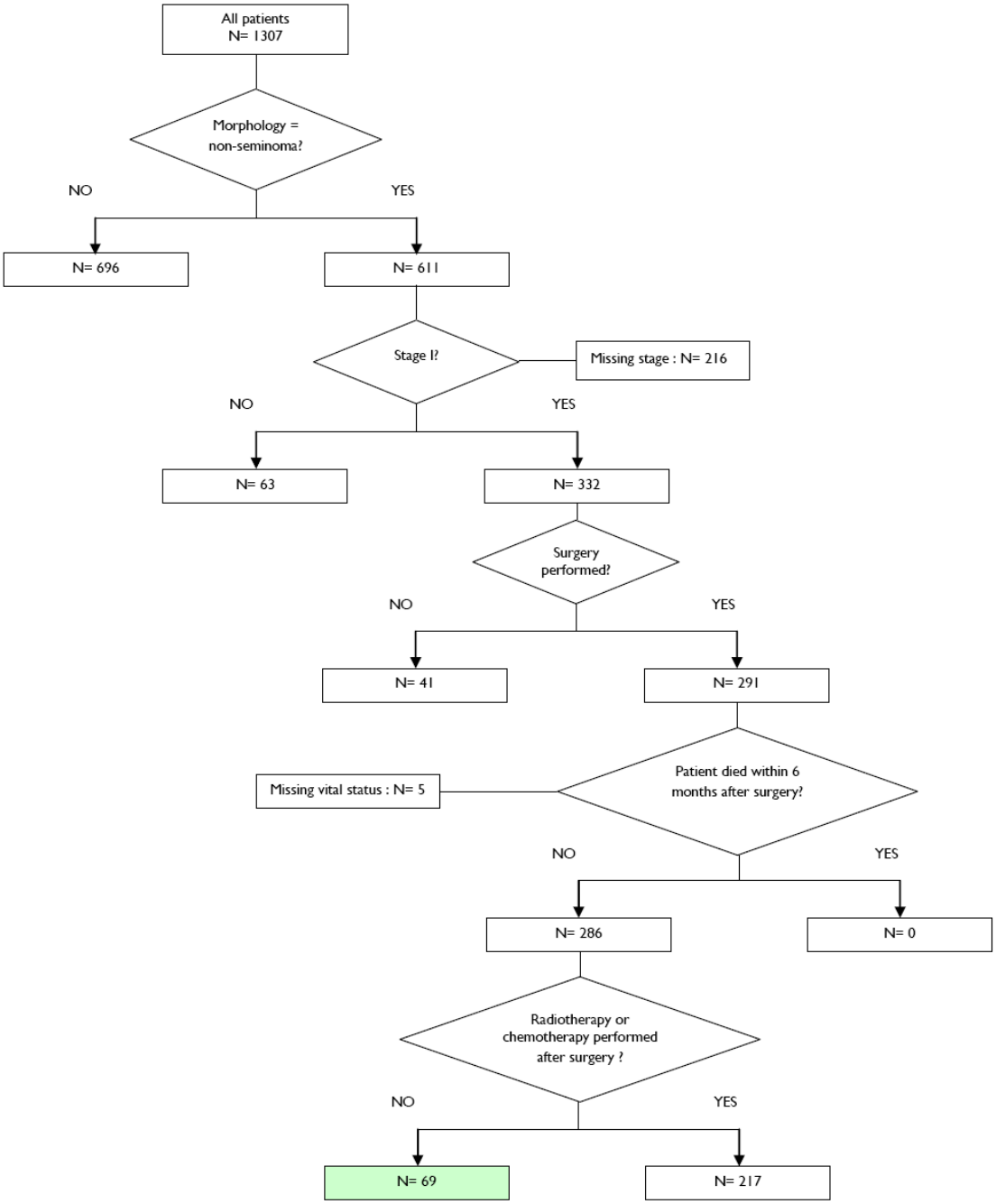
7.5.6.3 Denominator

All patients diagnosed with stage I non-seminoma testicular cancer in a given year.

7.5.6.4 Elaboration

In principle, this indicator is calculated by exclusion (Figure 30). From all testicular cancer patients, all patients with non-seminoma morphology and known stage I are selected. From these, all patients not undergoing surgical resection are excluded. From all surgically treated stage I non-seminomata, patients dying within 6 months after surgery are excluded (denominator). Finally, within this group, patients not undergoing chemotherapy and/or radiotherapy within 6 months after surgery are considered to be treated with active surveillance (numerator).

Figure 30. Flowchart of indicator TC6.



7.5.6.5 Data source(s)

Source database(s)

- BCR for source population
- IMA for interventions

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Stage*: BCR
- *Non-seminoma histology*: BCR
- *Surgical treatment*: nomenclature codes (IMA) (Table 60) or ICD-9-CM codes (MCD) (Table 61)
- *Radiotherapy*: nomenclature codes (IMA) (Table 62)
- *Chemotherapy*: CNK codes (IMA) (Table 63)
- *Tumour markers*: nomenclature codes (IMA) (Table 55)
- *CT*: nomenclature codes (IMA) (Table 56)

7.5.6.6 Results

Of all patients with testicular cancer, 46.7% (611/1307) were found to have a non-seminoma morphology. Of these, 54.3% (332/611) had known stage I disease. Of all patients with stage I non-seminoma, 87.6% (291/332) were treated with orchidectomy. Within six months after surgery, no deaths were recorded, but for five patients the vital status could not be retrieved. Of the remaining 286 patients, 69 (24.1%) were not treated with chemotherapy or radiotherapy within 6 months after surgical treatment, and can be considered to be treated with active surveillance (Table 41).

The proportion of patients entering an active surveillance program was relatively stable over time, apart from a peak in 2003. Data for 2006 need to be interpreted with caution, because nomenclature data after 2006 were not included in this study. Therefore, an overestimation of patients treated with active surveillance may be possible for 2006.

When evaluating the coupled BCR-IMA-MCD data for the available years, a slightly higher proportion of patients treated with active surveillance was observed for the years 2002 and 2003 (Table 42).

Table 41. Proportion of patients with stage I non-seminoma on active surveillance, BCR-IMA data (2001-2006).

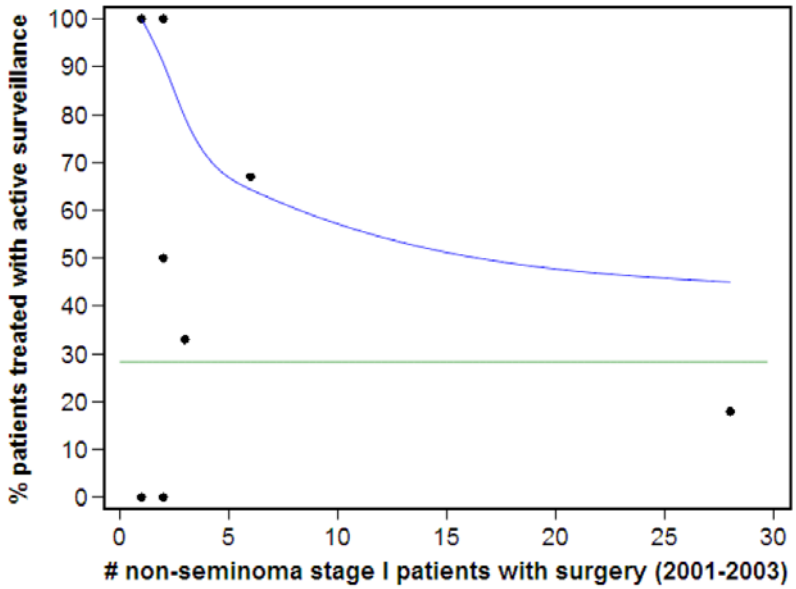
	Numerator	Denominator	Proportion
2001	7	26	28.0
2002	6	36	17.1
2003	17	46	37.0
2004	11	51	22.0
2005	16	69	23.5
2006	12	58	20.0
Total	69	286	24.1

Table 42. Proportion of patients with stage I non-seminoma on active surveillance, BCR-IMA-MCD data (2002-2004).

	Numerator	Denominator	Proportion
2002	8	29	27.6
2003	16	39	41.0
2004	9	40	22.5
Total	33	108	30.6

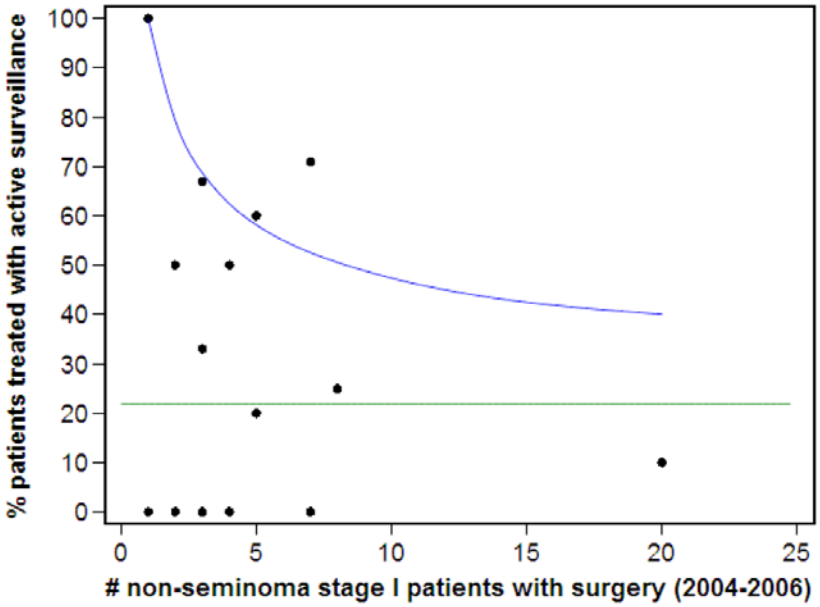
The analyses per centre were comparable for the two investigated time frames (Figure 31 and Figure 32). A high variability was found, with centres achieving 0% and 100% active surveillance practice.

Figure 31. Proportion of patients with stage I non-seminoma on active surveillance, analysis per centre (N=56), period 2001-2003 (BCR-IMA data only)*.



* Several centres only treated 1 or 2 patients with stage I non-seminoma, resulting in overlapping point estimates for these centres.

Figure 32. Proportion of patients with stage I non-seminoma on active surveillance, analysis per centre (N=67), period 2004-2006 (BCR-IMA data only)*.



* Several centres only treated 1 or 2 patients with stage I non-seminoma, resulting in overlapping point estimates for these centres.

Because of the somewhat surprisingly low number of stage I non-seminoma patients treated with active surveillance, the calculation of this indicator was repeated using an adapted definition. As many recurrences already occur within 6 months after orchidectomy, treatment started at least 3 months after orchidectomy was considered to be because of a recurrence, while treatment started within 3 months after orchidectomy was considered to be adjuvant.

Using this adapted definition, the proportion of stage I non-seminoma patients treated with active surveillance was found to be 28.7% for the period 2001-2006 (using BCR-IMA data only), which is only slightly higher than the original result. The funnel plots did not change importantly and are therefore not shown.

7.5.7 TC7: Proportion of patients receiving CE-CT or MRI for residual disease assessment at the end of systemic treatment

7.5.7.1 Rationale

According to the guidelines, contrast-enhanced CT scan is recommended for the imaging of residual masses after systemic treatment of testicular cancer (expert opinion) [7]. However, CT is a high radiation-dose examination, and every effort should be made to avoid unnecessary scanning, particularly in young patients. Furthermore, adequate precautions should be taken in order to avoid iodine allergy or nephrotoxicity. For these patients, magnetic resonance imaging (MRI) could be an alternative staging technique (expert opinion). In case a MRI is performed, a CT thorax is also necessary.

7.5.7.2 Numerator

All patients diagnosed with metastatic testicular cancer in a given year (stage II or higher), having received systemic treatment, undergoing assessment for residual disease with CE-CT or MRI.

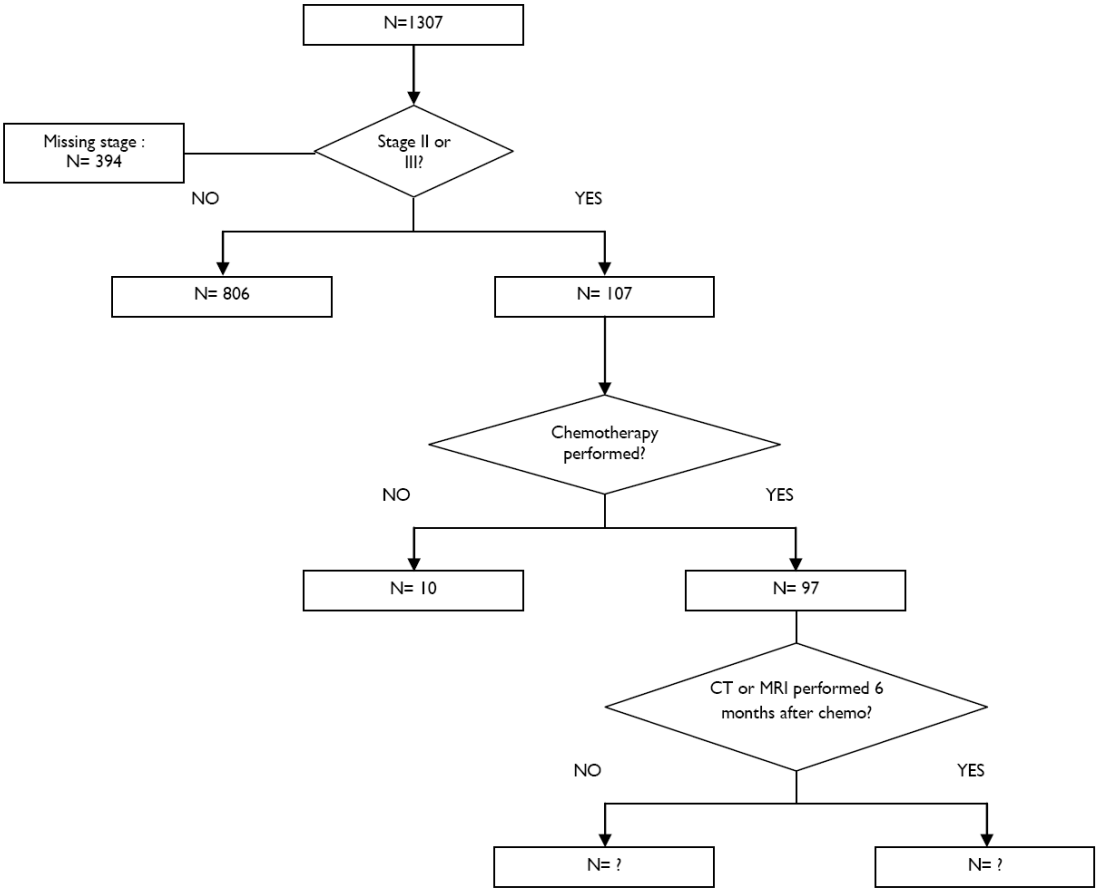
7.5.7.3 Denominator

All patients diagnosed with metastatic testicular cancer in a given year (stage II or higher), having received systemic treatment.

7.5.7.4 Elaboration

From all patients with testicular cancer, all patients with metastatic disease (stage II or III) are selected (Figure 33). Within this group, patients treated with chemotherapy are selected. Finally, patients undergoing CE-CT thorax/abdomen/pelvis or (MRI abdomen/pelvis + CT thorax) within 6 months after the end of systemic treatment are selected. However, since the nomenclature codes for CT and MRI do not specify the anatomical location, the indicator is not measurable.

Figure 33. Flowchart of indicator TC7.



7.5.7.5 *Data source(s)*

Source database(s)

- BCR for source population
- IMA

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Stage*: BCR
- *Chemotherapy*: CNK codes (IMA) (Table 63)
- *CT*: nomenclature codes (IMA) (Table 56)
- *MRI*: nomenclature codes (IMA) (Table 58)

7.5.7.6 *Results*

Of the 1307 patients with testicular cancer, 8.2% (107/1307) were found to have known stage II or III disease. Of these, 90.7% (97/107) were treated with chemotherapy. Restaging after chemotherapy is ideally performed with contrast-enhanced CT thorax, abdomen and pelvis or, in case of contra-indications, MRI abdomen-pelvis and CT thorax. However, no specific nomenclature codes were available for CT thorax or abdomen or pelvis, or MRI abdomen-pelvis. Moreover, the identification of contrast-enhanced CT was difficult, since the available codes for contrast were not consistently used (the combination of the nomenclature codes for CT and the CNK codes for contrast resulted in zero records). As a result, this indicator could not be assessed.

Nevertheless, some results can be calculated using the available administrative data. Of the stage II/III patients treated with chemotherapy, 53.6% (52/97) underwent a CT (of the neck and/or thorax and/or abdomen) and/or a MRI (of the neck and/or thorax and/or abdomen) within 6 months after the end of the chemotherapy.

7.5.8 TC8: Degree and duration of active surveillance in patients with stage I NSGCT or SGCT

7.5.8.1 Rationale

The guidelines on testicular cancer contain the following recommendations on the use of tumour markers during active surveillance in patients with stage I NSGCT or SGCT[7]:

In patients with stage I non-seminoma under primary surveillance, physical examination and blood serum marker tests (AFP, HCG, LDH) should be conducted every month in the first year, every two months in the second year, every three months in the third year, and every six months in the fourth and fifth years (expert opinion);

Although the evidence is insufficient to propose a standard scheme for CT follow-up in patients with stage I non-seminoma under primary surveillance, at least an abdomino-pelvic CT at 3 and 12 months is recommended (2B);

In patients with stage I seminoma under primary surveillance, physical examination and blood serum marker tests (AFP, HCG, LDH) should be conducted every 3 months in the first and second years, and every six months in the third, fourth and fifth years (expert opinion);

Although the evidence is insufficient to propose a standard scheme for CT follow-up in patients with stage I seminoma under primary surveillance, at least an abdomino-pelvic CT every 6 months during the 2 first years post-orchidectomy is desirable (expert opinion).

7.5.8.2 Numerator

Number of patients from the denominator with:

- 12 measurements of AFP and HCG in the first year post-orchidectomy for NSGCT and 4 measurements for SGCT (+ frequency tables)
- 2 CT or MRI in the first year post-orchidectomy (+ frequency tables)

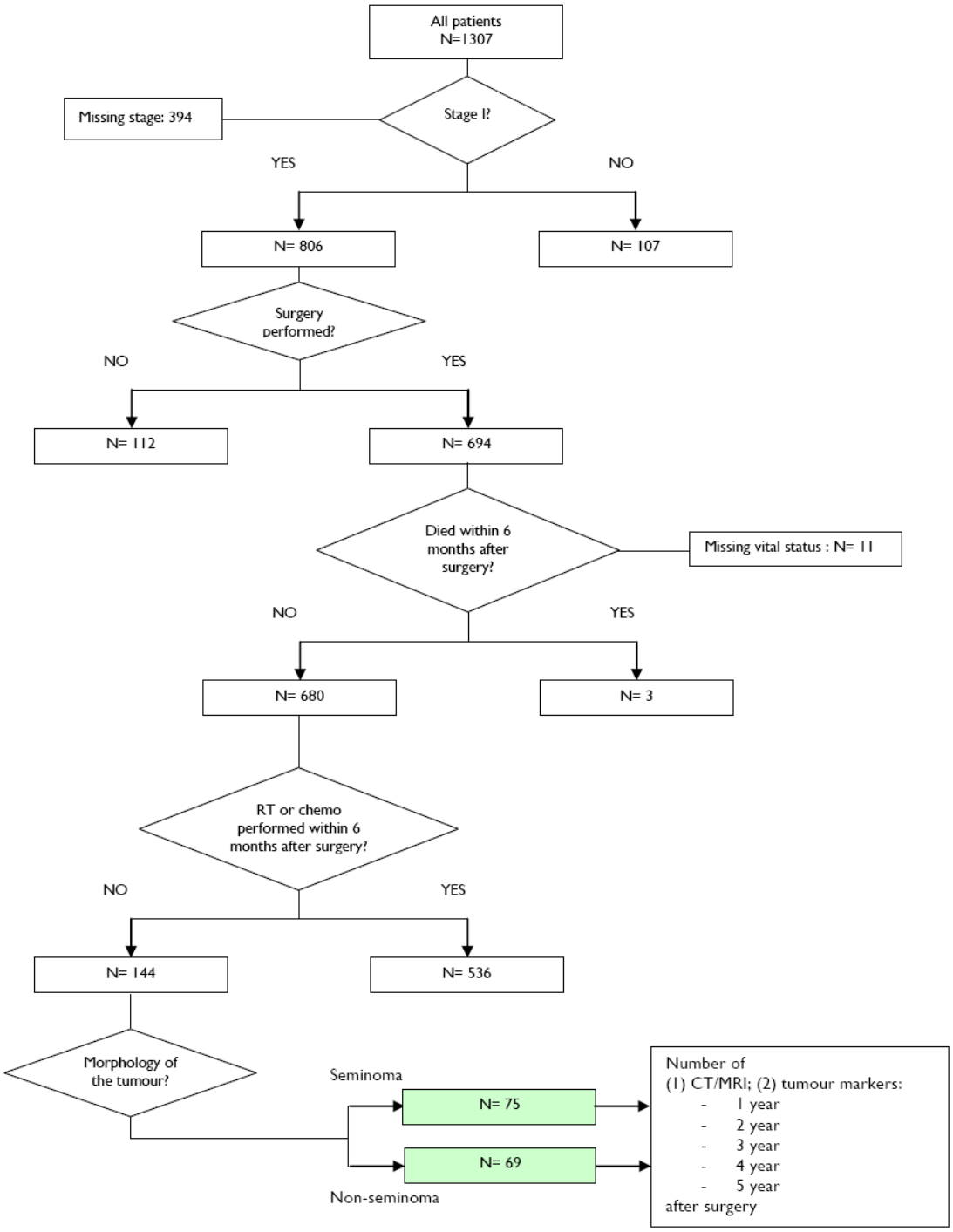
7.5.8.3 Denominator

All patients diagnosed with stage I testicular cancer in a given year, not treated with chemotherapy or radiotherapy within 6 months post-orchidectomy.

7.5.8.4 Elaboration

The algorithm of the present indicator follows the same logic as that of indicator TC6 (Figure 30). First, all patients with stage I disease are selected (Figure 34). Next, patients undergoing surgery are selected. From this selection, patients dying within 6 months after surgery and/or receiving radio- and/or chemotherapy within 6 months after surgery are excluded. The resulting selection are stage I patients undergoing primary surveillance. In this selection, a distinction is made between seminoma and non-seminoma morphology. Finally, frequency tables are constructed for the number of CE-CT thorax/abdomen/pelvis or (MRI abdomen/pelvis + CT thorax) on the one hand and tumour markers (AFP and HCG) on the other hand.

Figure 34. Flowchart of indicator TC8.



7.5.8.5 Data source(s)

Source database(s)

- BCR for source population
- IMA for interventions

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Stage*: BCR
- *Non-seminoma and seminoma histology*: BCR
- *Surgical treatment*: nomenclature codes (IMA) (Table 60) or ICD-9-CM codes (MCD) (Table 61)
- *Radiotherapy*: nomenclature codes (IMA) (Table 62)
- *Chemotherapy*: CNK codes (IMA) (Table 63)
- *Tumour markers*: nomenclature codes (IMA) (Table 55)
- *CT*: nomenclature codes (IMA) (Table 56)
- *MRI*: nomenclature codes (IMA) (Table 58)

7.5.8.6 Results

Of all patients with testicular cancer, 61.7% (806/1307) had known stage I disease. Of these, 86.1% (694/806) underwent surgery. Of the 680 patients who were still alive within 6 months after surgery, 144 (21.2%) were treated with active surveillance. Of these, 75 had seminoma and 69 had non-seminoma (Figure 34).

According to the national guidelines, active surveillance should encompass regular tumour marker assessment and imaging. Concerning imaging, the lack of specificity of the codes for CT and MRI prevented the determination of this indicator (see also above). On the other hand, the degree and duration of tumour marker assessment after surgery could be determined.

The results show that the mean number of tumour marker assessments decreases by follow-up period, as expected (Table 43, Table 44, Figure 14 and Figure 15). However, the mean number of tumour marker assessments by follow-up period fluctuated between 2001 and 2005. For seminomas, the mean number of tumour marker assessments during the first year after surgery approached the recommended number of 4 in 2002 (mean 3.89, SD 3.55), and started to increase since than (Table 43). For non-seminomas, the mean number of tumour marker assessments during the first year after surgery fluctuated between 10.5 and 14.6 during the time period 2001-2004 (Table 44). In 2005, it dropped to 8.9 (SD 8.4).

Table 43. Tumour marker assessment during active surveillance of patients with seminoma, BCR-IMA data only (2001-2006).

	Mean	SD	Median	25th Pctl	75th Pctl
Year of surgery: 2001 (N=13)					
1st year after surgery	5.54	5.24	4	2	7
2nd year after surgery	3.08	2.47	3	0	5
3rd year after surgery	2.77	3.19	2	0	4
4th year after surgery	2.69	4.27	2	0	3
5th year after surgery	1.77	1.83	2	0	2
Year of surgery: 2002 (N=9)					
1st year after surgery	3.89	3.55	4	0	5
2nd year after surgery	2.78	2.05	2	2	4
3rd year after surgery	2.33	3.50	1	0	2
4th year after surgery	1.67	2.60	1	0	2
Year of surgery: 2003 (N=14)					
1st year after surgery	4.14	4.80	2	0	7
2nd year after surgery	5.00	10.34	2	0	5
3rd year after surgery	3.64	5.47	2	0	4
Year of surgery: 2004 (N=14)					
1st year after surgery	6.07	7.76	4	3	6
2nd year after surgery	4.07	5.01	2.5	2	4
Year of surgery: 2005 (N=15)					
1st year after surgery	6.47	5.72	5	2	11

Figure 35. Number of tumour marker assessments per patient according to follow-up period, seminoma, 2001-2005.

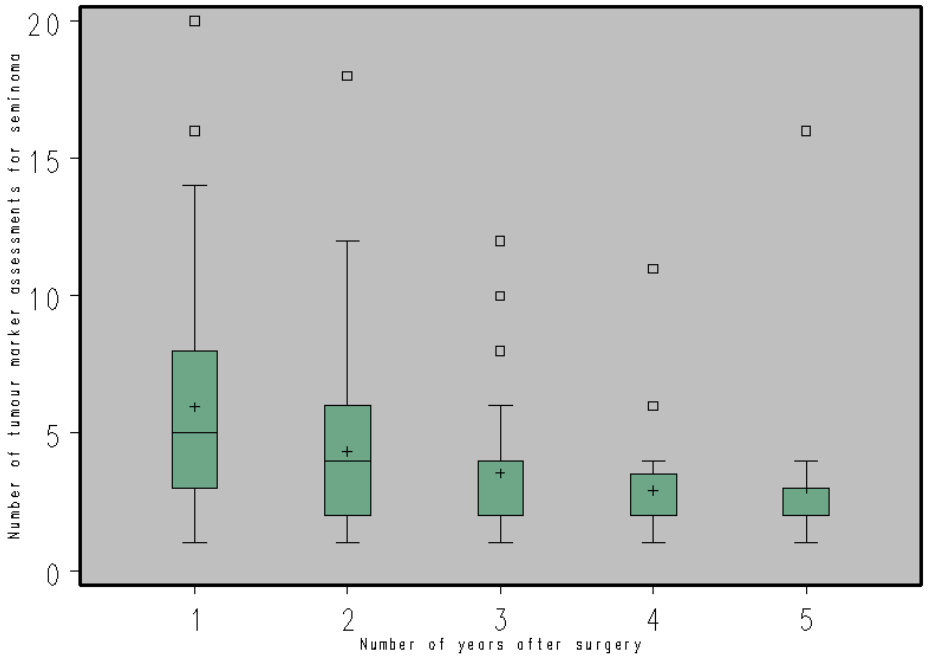
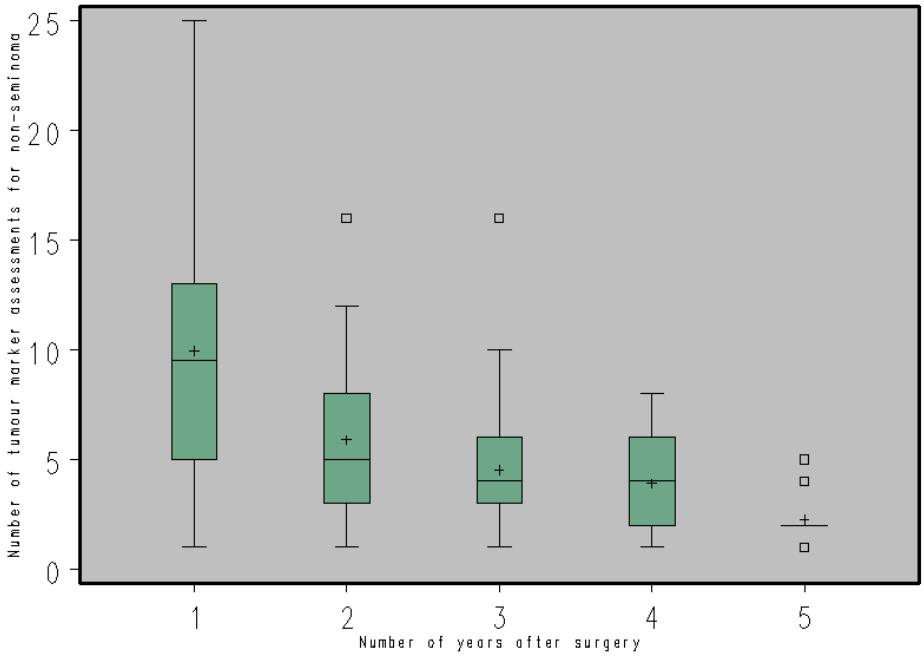


Table 44. Tumour marker assessment during active surveillance of patients with non-seminoma, BCR-IMA data only (2001-2006).

	Mean	SD	Median	25th Pctl	75th Pctl
Year of surgery: 2001 (N=6)					
1st year after surgery	10.50	6.19	10.5	6	16
2nd year after surgery	8.00	4.60	7	5	10
3rd year after surgery	5.50	2.95	4.5	4	8
4th year after surgery	5.67	2.34	6	4	8
5th year after surgery	2.17	2.04	2	0	4
Year of surgery: 2002 (N=6)					
1st year after surgery	13.33	9.14	11	11	12
2nd year after surgery	7.50	2.17	8	5	9
3rd year after surgery	5.00	2.10	4.5	3	7
4th year after surgery	3.17	2.04	3.5	2	4
Year of surgery: 2003 (N=11)					
1st year after surgery	14.64	8.41	15	6	19
2nd year after surgery	5.55	3.05	6	3	8
3rd year after surgery	3.73	2.20	3	2	6
Year of surgery: 2004 (N=18)					
1st year after surgery	11.94	10.32	9.5	3	22
2nd year after surgery	8.06	11.02	4.5	2	8
Year of surgery: 2005 (N=19)					
1st year after surgery	8.89	8.39	6	2	12

Figure 36. Number of tumour marker assessments per patient according to follow-up period, non-seminoma, 2001-2005.



As for indicator TC6, the analysis of this indicator was repeated using an adapted definition of active surveillance (i.e. no treatment within 3 months after orchidectomy). Using this adapted definition, 27% of the patients with known stage I disease (seminoma and non-seminoma) and with a surgical nomenclature code and information on vital status available were considered to be on active surveillance between 2001 and 2006. With this adapted definition, the mean number of tumour marker assessments by follow-up period only slightly changed for seminomas (first year after surgery: between 3.86 in 2003 and 6.79 in 2005) (Table 45). However, for non-seminomas clearly higher mean numbers were found in comparison with the first analysis (first year after surgery: between 9.60 in 2005 and 15.88 in 2001) and a decreasing trend became more clearly apparent (Table 46).

Table 45. Tumour marker assessment during active surveillance of patients with seminoma, BCR-IMA data only (2001-2006). Adapted definition.

	Mean	SD	Median	25th Pctl	75th Pctl
Year of surgery: 2001 (N=14)					
1st year after surgery	5.43	5.05	4	2	7
2nd year after surgery	3.43	2.71	3.5	0	6
3rd year after surgery	3.00	3.19	2.5	0	4
4th year after surgery	2.00	1.96	2	0	3
5th year after surgery	2.64	4.11	2	0	3
Year of surgery: 2002 (N=14)					
1st year after surgery	4.00	2.91	4	2	5
2nd year after surgery	3.50	2.14	4	2	4
3rd year after surgery	2.57	3.13	1.5	0	4
4th year after surgery	2.64	3.03	2	0	4
Year of surgery: 2003 (N=21)					
1st year after surgery	3.86	3.95	2	1	5
2nd year after surgery	4.05	8.51	2	0	4
3rd year after surgery	3.19	4.52	2	0	4
Year of surgery: 2004 (N=21)					
1st year after surgery	4.76	6.62	3	2	6
2nd year after surgery	3.57	4.52	2	0	4
Year of surgery: 2005 (N=19)					
1st year after surgery	6.79	5.46	6	2	11

Table 46. Tumour marker assessment during active surveillance of patients with non-seminoma, BCR-IMA data only (2001-2006). Adapted definition.

	Mean	SD	Median	25th Pctl	75th Pctl
Year of surgery: 2001 (N=6)					
1st year after surgery	15.88	11.69	14.5	7	22
2nd year after surgery	8.38	4.03	8	5.5	10.5
3rd year after surgery	8.75	10.96	4.5	3	9
4th year after surgery	5.75	2.55	6	3.5	8
5th year after surgery	9.63	20.44	3	1	4.5
Year of surgery: 2002 (N=6)					
1st year after surgery	13.75	8.05	11	11	15.5
2nd year after surgery	7.00	2.20	7	5	9
3rd year after surgery	5.50	2.07	5.5	3.5	7.5
4th year after surgery	3.13	1.81	3.5	2	4
Year of surgery: 2003 (N=11)					
1st year after surgery	15.07	7.45	15.5	9	18
2nd year after surgery	6.00	3.23	6	4	8
3rd year after surgery	3.79	2.08	3.5	2	6
Year of surgery: 2004 (N=18)					
1st year after surgery	14.35	12.29	10	3.5	23
2nd year after surgery	9.40	11.21	6	2.5	9.5
Year of surgery: 2005 (N=19)					
1st year after surgery	9.60	8.75	7.5	2.5	15

7.5.9 TC9: Proportion of patients with relapsing testicular cancer after curative treatment that are included in a clinical trial

7.5.9.1 Rationale

The evidence on the treatment of relapsing or refractory disease is mainly limited to observational studies. Some RCTs exist on the use of high-dose chemotherapy, but this treatment is not recommended outside a clinical trial [7].

7.5.9.2 Numerator

All patients with relapsing testicular cancer after curative treatment in a given year, included in a clinical trial.

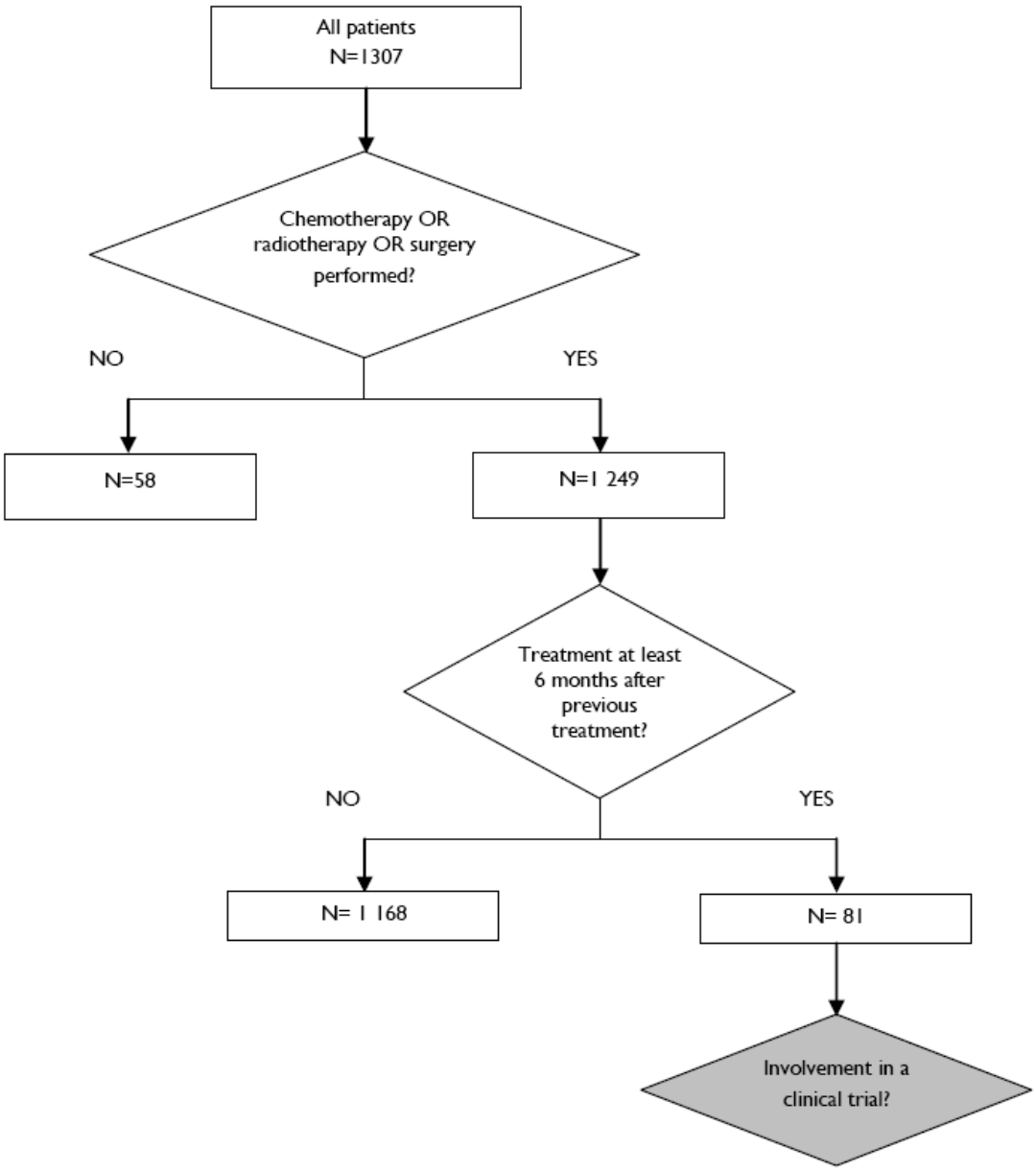
7.5.9.3 Denominator

All patients with relapsing testicular cancer after curative treatment in a given year.

7.5.9.4 Elaboration

From all patients with testicular cancer, all patients undergoing treatment are selected. Since no administrative code exists for recurrence, patients are considered to have a recurrence if new treatment is started at least 6 months after the first treatment. Within this group, patients included in a clinical trial are identified.

Figure 37. Flowchart of indicator TC9.



7.5.9.5 Data source(s)

Source database(s)

- BCR for source population
- IMA: relapse (defined as re-treatment at least 6 months after previous treatment)

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Surgical treatment*: nomenclature codes (IMA) (Table 60) or ICD-9-CM codes (MCD) (Table 61)
- *Radiotherapy*: nomenclature codes (IMA) (Table 62)
- Chemotherapy: CNK codes (IMA) (Table 63)
- *Inclusion in clinical trial*: no data available

7.5.9.6 Results

For the period 2001 – 2006, 95.5% (1249/1307) of all patients with testicular cancer underwent treatment. Of the treated patients, 6.5% (81/1249) received new treatment at least 6 months after the first treatment. However, no code exists to identify those patients who are included in a clinical trial.

7.5.10 TC10: Overall 5-year survival by stage

7.5.10.1 Rationale

Numerous clinical studies have conclusively demonstrated the effectiveness of testicular cancer treatment in improving survival [21, 22].

7.5.10.2 Numerator

All patients diagnosed with testicular cancer in a given year, surviving 5 years after diagnosis, by stage.

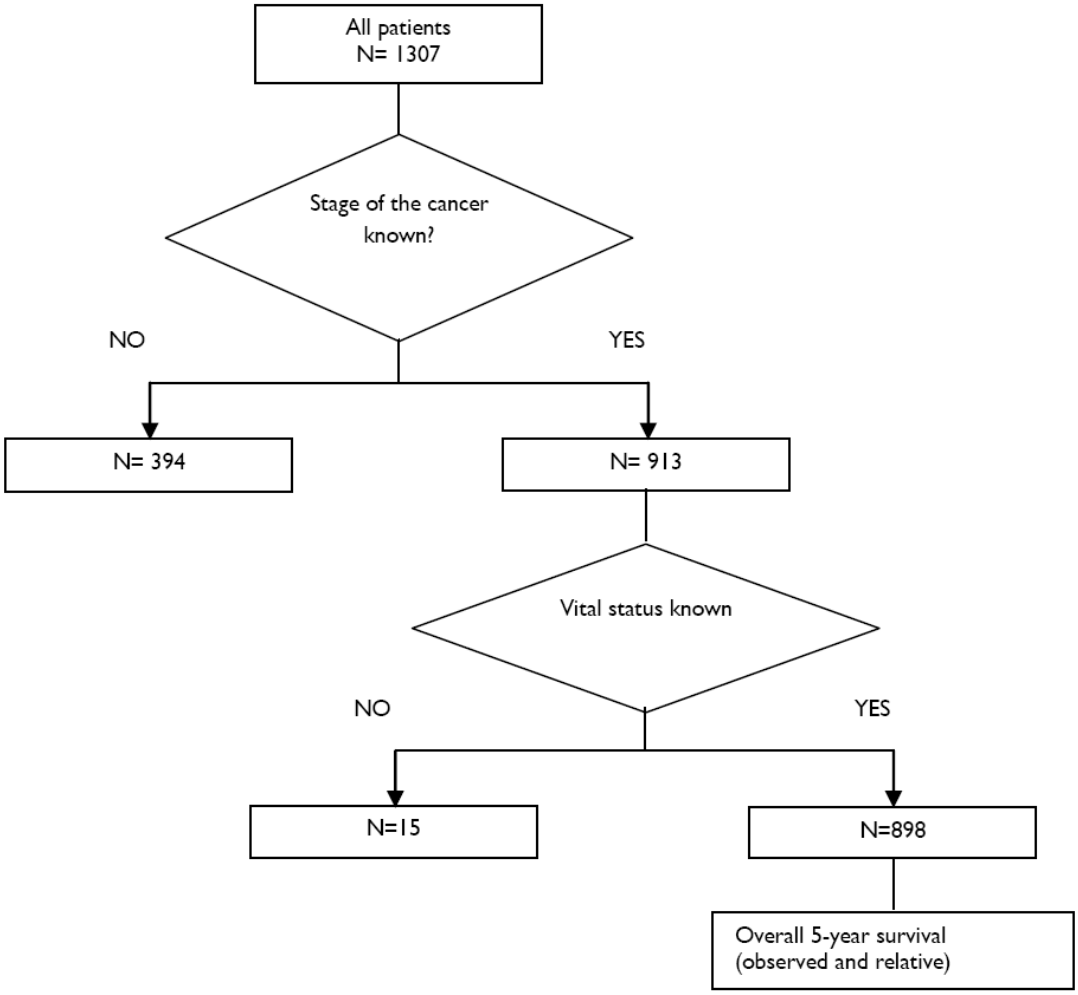
7.5.10.3 Denominator

All patients diagnosed with testicular cancer in a given year, by stage.

7.5.10.4 Elaboration

For the calculation of survival statistics, it is essential to include only those patients with a follow-up of the date of death (Figure 38). Mortality data are collected from the mortality database of the sickness funds, and are available until December 31st 2009 for the present study. To calculate the period between the incidence and mortality date, it is of course essential to have the incidence date.

Figure 38. Flowchart of indicator TC10 and TC11.



7.5.10.5 Data source(s)

Source database(s)

- BCR for source population
- IMA
- Kruispuntbank for mortality data

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Stage*: BCR
- *Incidence date*: algorithm BCR
- *Mortality date*: Kruispuntbank

7.5.10.6 Results

For almost 70% of the patients (913/1307) the pStage was known. Of these, the majority (898/913) had a known vital status. These patients formed the population to calculate the survival statistics by stage. Especially for stage I and II, the observed survival is high, with a 5-year survival of 97% and 95% respectively (Table 47). For pStage III patients, 5-year survival was found to be 71%. In pStage X, 43 patients died within 5 years after diagnosis, resulting in a 1-year survival of 93%, a 3-year survival of 91% and a 5-year survival of 90%.

Table 47. Observed survival by pStage.

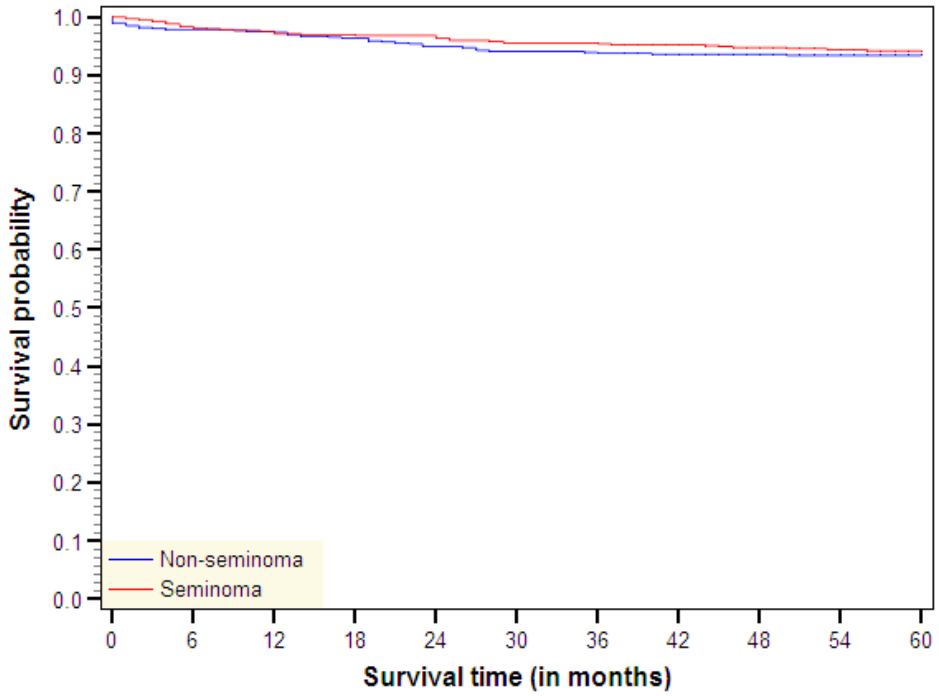
		N	Deaths	Overall survival (%)				
				1 year	2 year	3 year	4 year	5 year
pStage	I	793	27	0.99	0.98	0.97	0.97	0.97
	II	72	3	0.97	0.96	0.95	0.95	0.95
	III	33	10	0.91	0.76	0.74	0.71	0.71

When considering the morphology, no obvious differences were found between the 5-year observed survival of seminomas and non-seminomas (94% vs. 93%) (Table 48 and Figure 39).

Table 48. Observed survival by morphology (pStage X included).

	N	Deaths	Overall survival (%)				
			1 year	2 year	3 year	4 year	5 year
Seminoma	685	41	0.97	0.96	0.95	0.94	0.94
Non-seminoma	603	42	0.96	0.94	0.94	0.93	0.93

Figure 39. Kaplan-Meier curve for observed survival, N=1288.



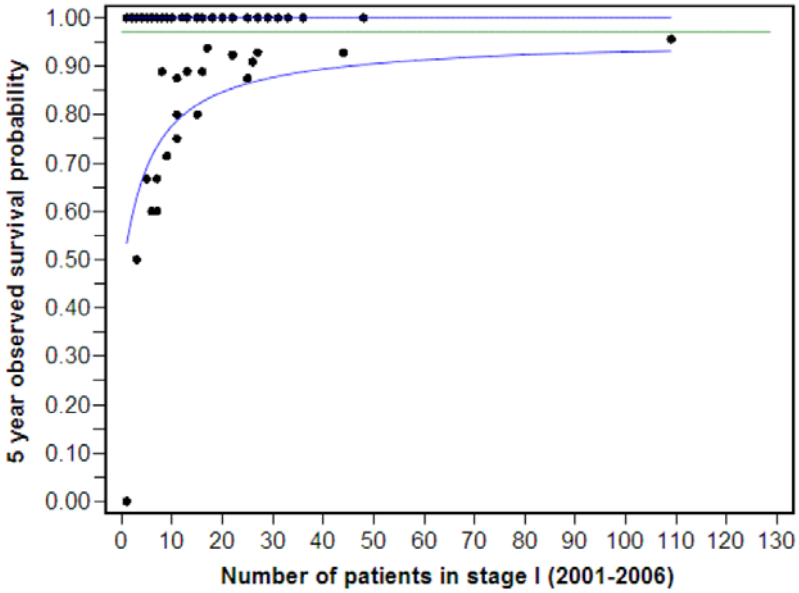
Overall, the observed survival slightly increased between 2001 (91%) and 2004 (94%) (Table 49).

Table 49. Evolution of observed survival, 2001-2004, N=1288.

2001	2002	2003	2004
0.91	0.93	0.95	0.94

The analysis by centre shows a high proportion of centres achieving a 5-year survival of 100% for pStage I patients (Figure 40). Nevertheless, some centres clearly achieved worse survival rates (9 centres below the lower limit). The number of patients and events in pStage II and III were too small for the analysis by centre.

Figure 40. Observed 5-year survival by centre, N=1288.



7.5.11 TC11: Disease-specific 5-year survival by stage

7.5.11.1 Rationale

See indicator TC10.

7.5.11.2 Numerator

All patients diagnosed with testicular cancer in a given year, surviving 5 years after diagnosis or dying due to a non-testicular-cancer-related cause, by stage and by re-treatment.

7.5.11.3 Denominator

All patients diagnosed with testicular cancer in a given year, by stage.

7.5.11.4 Elaboration

The calculation of the disease-specific survival is impossible at present, because of the absence of national data on reasons of death. Therefore, the relative survival (i.e. observed survival / expected survival) is calculated as a proxy. Expected survival rates were retrieved from the mortality tables of 20046(http://statbel.fgov.be/pub/home_nl.asp#3) and were linked to the individual patient, taking into account age, gender and region.

The same algorithm as for indicator TC10 is followed (Figure 38).

7.5.11.5 Data source(s)

Source database(s)

- BCR for source population
- IMA
- Kruispuntbank for mortality data

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Stage*: BCR
- *Incidence date*: algorithm BCR
- *Mortality date*: Kruispuntbank
- *Expected survival*: mortality tables (StatBel)

7.5.11.6 Results

In parallel to the observed survival, the relative survival is also high (Table 50). Even in patients with pStage III disease the relative 5-year survival is 76%. As for the observed survival, no difference in relative survival was found between seminomas and non-seminomas (Table 51). Also for relative survival a slight increase was found between 2001 and 2004 (Table 52).

Table 50. Relative survival by pStage.

		N	Deaths	Overall survival (%)				
				1 year	2 year	3 year	4 year	5 year
pStage	I	793	27	0.99	0.98	0.98	0.97	0.97
	II	72	3	0.99	0.96	0.96	0.95	0.95
	III	33	10	0.91	0.91	0.76	0.76	0.76

Table 51. Relative survival by morphology (pStage X included).

	N	Deaths	Overall survival (%)				
			1 year	2 year	3 year	4 year	5 year
Seminoma	685	41	0.98	0.97	0.96	0.95	0.95
Non-seminoma	603	42	0.98	0.97	0.94	0.94	0.94

Table 52. Evolution of relative survival, 2001-2004, N=1288.

2001	2002	2003	2004
0.92	0.94	0.95	-

7.5.12 TC12: Disease-free 5-year survival by stage

7.5.12.1 Rationale

Numerous clinical studies have conclusively demonstrated the effectiveness of testicular cancer treatment in improving disease-free survival [21].

7.5.12.2 Numerator

All patients diagnosed with testicular cancer in a given year, surviving 5 years after diagnosis and free of disease, by stage.

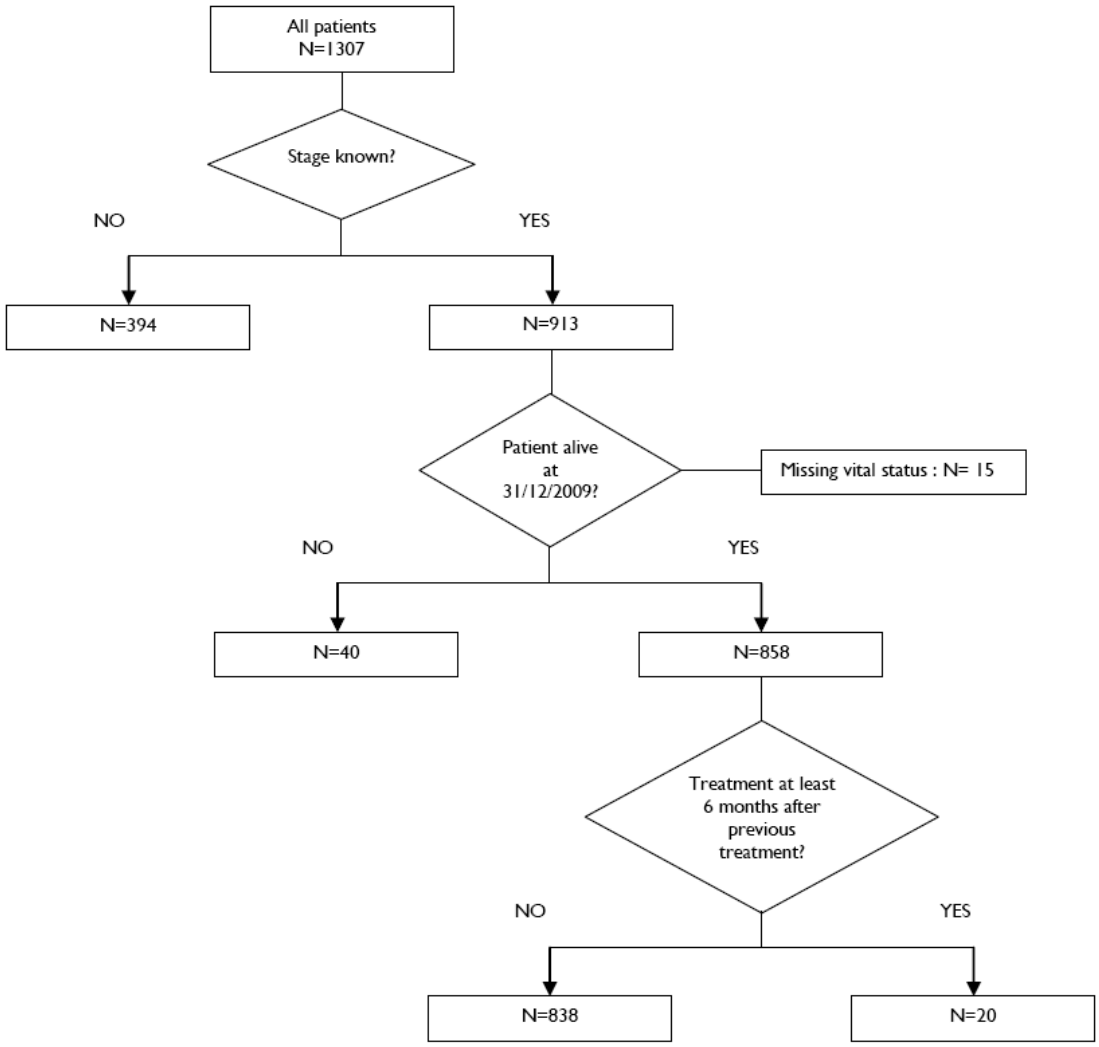
7.5.12.3 Denominator

All patients diagnosed with testicular cancer in a given year, by stage.

7.5.12.4 Elaboration

The same logic is followed as for indicators TC10 and TC11 (Figure 41). However, to calculate the disease-free survival, the disease status is a necessary parameter. As previously stated, patients are considered to have a recurrence if new treatment is started at least 6 months after the first treatment. These patients, together with deceased patients are censored from the survival analysis.

Figure 41. Flowchart of indicator TC12.



7.5.12.5 Data source(s)

Source database(s)

- BCR for source population
- IMA for interventions
- Kruispuntbank for mortality data

Administrative codes

- *Diagnosis of testicular cancer*: ICD-10 code C62 (BCR)
- *Stage*: BCR
- *Incidence date*: algorithm BCR
- *Mortality date*: Kruispuntbank
- *Disease activity*: re-treatment is considered a proxy for relapse

7.5.12.6 Results

In the absence of a code for recurrence in the BCR database, the number of patients with a re-treatment 6 months after first treatment was chosen as a proxy measure. For all patients, in which the pStage was known (N=913) and who were alive at December 31st 2009 (N=858), disease-free survival was calculated. Re-treatment occurred in 20 patients (2.4%) (Figure 41). However, the number of events by pStage was too small to allow a calculation of the disease-free survival by pStage. Therefore, the calculation was done for the entire population (with a known vital status, N=1288).

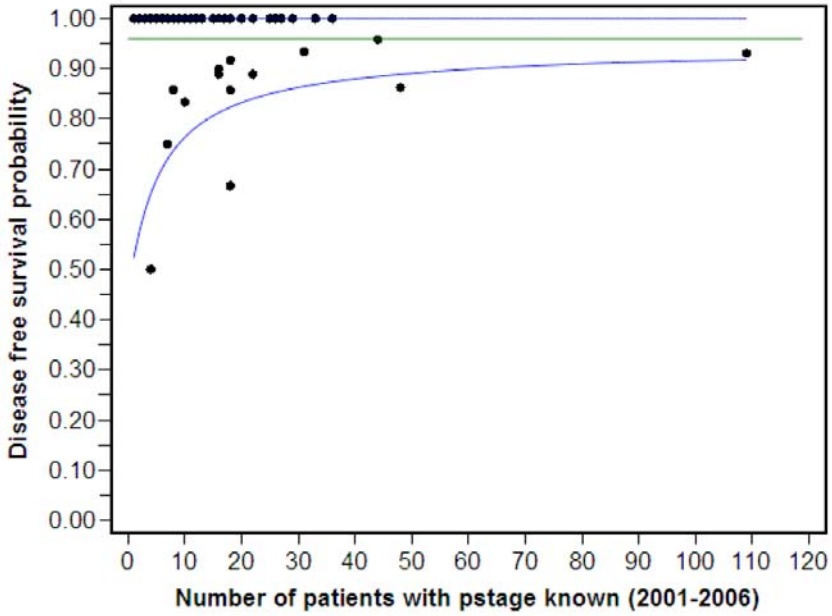
In alignment with the observed and relative survival rates, the disease-free survival was high (96% after 5 years) (Table 53). For some smaller centres, lower disease-free survival rates were detected (Figure 42). Three centres were found to be below the lower limit.

Table 53. Disease-free survival, 2001-2004, N=1288.

	1 year	2 year	3 year	4 year	5 year
Disease-free survival*	0.99	0.98	0.98	0.97	0.96

* pX stage included.

Figure 42. Disease-free 5-year survival by centre, N=1288.



Using the adapted definition of recurrence as discussed above, the disease-free survival slightly worsened as expected (Table 54). However, the variability across the centres did not change importantly (data not shown).

Table 54. Disease-free survival, 2001-2004, N=1288. Adapted definition.

	1 year	2 year	3 year	4 year	5 year
Disease-free survival*	0.99	0.98	0.97	0.96	0.94

7.6 ADMINISTRATIVE CODES

7.6.1 Diagnosis and staging

Table 55. Nomenclature codes for tumour markers.

Codes	Omschrijving
AFP	
433031 – 433042	Doseren van alfa foetoproteïne (Maximum 1) (Cumulregel 302, 64) Klasse 14
433716 – 433720	Doseren van alfa foetoproteïne (Maximum 1) (Cumulregel 52) Klasse 15
541413 – 541424	Doseren van alfa foetoproteïne met niet isotopen-methode (Maximum 1) (Cumulregel 302, 64) Klasse 14
545156 – 545160	Doseren van alfa foetoproteïne (Maximum 1) (Cumulregel 52) Klasse 15
HCG	
434630 – 434641	Doseren van humane choriogonadotrofines (hCG) (Maximum 1) (Cumulregel 37, 322) (Diagnoseregel 6) Klasse 16
436111 – 436122	Exclusief en specifiek doseren van de vrije Beta-subeenheid van humane choriogonadotrofines(HCG) (Maximum 1) (Cumulregel 37, 201, 124, 125) (Diagnoseregel 45, 46) Klasse 20
546195 – 546206	Doseren van humane choriogonadotrofines (hCG) (Maximum 1) (Cumulregel 37, 322) (Diagnoseregel 6) Klasse 16
548472 – 548483	Exclusief en specifiek doseren van de vrije beta-subeenheid van humane choriogonadotrofines (hCG) (Maximum 1) (Cumulregel 37, 201, 124, 125) (Diagnoseregel 45, 46) Klasse 20

Table 56. Nomenclature codes for CT.

Codes	Omschrijving
458813 – 458824	Computergestuurde tomografie van de hals (weke delen) of van de thorax of van het abdomen, met en/of zonder contrastmiddel, met registreren en clichés, minimum 15 coupes, voor het hele onderzoek

Table 57. CNK codes for contrast.

ATC code	Pack name	CNK
V08AA01	angiografine amp inj 1 x 10ml 65%	18945
V08AA01	angiografine 10 fl 65% 50 ml	19646
V08AA01	angiografine perf 1 x 100 ml 65%	19679
V08AA01	gastrografine 1 fl 100 ml	43380
V08AA01	gastrografine 100/660 5x 100ml oploss.	43471
V08AA01	urografine 76 % 10 flac 50 ml	91546
V08AA01	urografine a.iv 30% 10ml	92981
V08AA01	urografine 30% pro perfus 1x 250ml	93021
V08AA01	urografine 76% pro perfus 1x 200ml	93138
V08AA01	urografine 76% fl amp 1 x 50 ml	93963
V08AA01	DIATRIZOIC ACID	135152
V08AA01	DIATRIZOIC ACID	198069
V08AA01	DIATRIZOIC ACID	700872
V08AA01	DIATRIZOIC ACID	700898
V08AA01	DIATRIZOIC ACID	700906
V08AA01	DIATRIZOIC ACID	700914
V08AA01	DIATRIZOIC ACID	707885
V08AA01	DIATRIZOIC ACID	720458

ATC code	Pack name	CNK
V08AA01	DIATRIZOIC ACID	720466
V08AA01	DIATRIZOIC ACID	720474
V08AA01	DIATRIZOIC ACID	720482
V08AA01	DIATRIZOIC ACID	720490
V08AA01	DIATRIZOIC ACID	720508
V08AA01	DIATRIZOIC ACID	720516
V08AA01	DIATRIZOIC ACID	720599
V08AA01	DIATRIZOIC ACID	720607
V08AA01	DIATRIZOIC ACID	720615
V08AA01	DIATRIZOIC ACID	880088
V08AA01	DIATRIZOIC ACID	880096
V08AA01	DIATRIZOIC ACID	880104
V08AA01	DIATRIZOIC ACID	880302
V08AA01	DIATRIZOIC ACID	880310
V08AA01	DIATRIZOIC ACID	880328
V08AA01	DIATRIZOIC ACID	880344
V08AA01	DIATRIZOIC ACID	880351
V08AA01	DIATRIZOIC ACID	880369
V08AA01	DIATRIZOIC ACID	880377
V08AA02	isopaque cysto fl inj 1 x 300 ml	50690
V08AA02	METRIZOIC ACID	132449
V08AA02	METRIZOIC ACID	132480
V08AA02	METRIZOIC ACID	709527
V08AA02	METRIZOIC ACID	709535
V08AA02	METRIZOIC ACID	709543
V08AA02	METRIZOIC ACID	709550
V08AA02	METRIZOIC ACID	709568
V08AA02	METRIZOIC ACID	709576
V08AA02	METRIZOIC ACID	709584
V08AA02	METRIZOIC ACID	709600
V08AA02	METRIZOIC ACID	709618
V08AA02	METRIZOIC ACID	844001
V08AA02	METRIZOIC ACID	844035
V08AA04	contrix '28' fl inj 1 x 140 ml	14225
V08AA04	IOTALAMIC ACID	703520
V08AA05	telebrix 30 meglumine flac 30ml 660mg/ml	84988
V08AA05	telebrix 30 meglumine flac 100ml 660mg/ml	84996
V08AA05	telebrix 38 fl inj 1 x 100 ml	85043
V08AA05	telebrix 38 fl inj 1 x 60 ml	85662
V08AA05	telebrix 38 fl inj 1 x 80 ml	85670
V08AA05	telebrix 38 amp inj 1 x 40 ml	85803
V08AA05	telebrix 12 sodium flac 250ml 210mg/ml	85837

ATC code	Pack name	CNK
V08AA05	telebrix 38 amp inj 1 x 20 ml	85969
V08AA05	vasobrix 32 amp 1 x 20 ml	93732
V08AA05	IOXITALAMIC ACID	198044
V08AA05	IOXITALAMIC ACID	444141
V08AA05	IOXITALAMIC ACID	458091
V08AA05	IOXITALAMIC ACID	458109
V08AA05	IOXITALAMIC ACID	600304
V08AA05	IOXITALAMIC ACID	600312
V08AA05	IOXITALAMIC ACID	600320
V08AA05	IOXITALAMIC ACID	718726
V08AA05	IOXITALAMIC ACID	718734
V08AA05	IOXITALAMIC ACID	718742
V08AA05	IOXITALAMIC ACID	718759
V08AA05	IOXITALAMIC ACID	718767
V08AA05	IOXITALAMIC ACID	718775
V08AA05	IOXITALAMIC ACID	718783
V08AA05	IOXITALAMIC ACID	718791
V08AA05	IOXITALAMIC ACID	718809
V08AA05	IOXITALAMIC ACID	727545
V08AA05	IOXITALAMIC ACID	730465
V08AA05	IOXITALAMIC ACID	730473
V08AA05	IOXITALAMIC ACID	730481
V08AA05	IOXITALAMIC ACID	734244
V08AA05	IOXITALAMIC ACID	735001
V08AA05	IOXITALAMIC ACID	735019
V08AA05	IOXITALAMIC ACID	743047
V08AA05	IOXITALAMIC ACID	850255
V08AA05	IOXITALAMIC ACID	1156520
V08AA07	vasurix polyvidone amp 1 x 20 ml	94292
V08AA07	ACETRIZOIC ACID	720813
V08AB02	omnipaque 180 fl 1x 10ml 180mg i/ml	12278
V08AB02	omnipaque 180 fl 1x 15ml 180mg i/ml	12310
V08AB02	omnipaque 240 fl 1x 10ml 240mg i/ml	12369
V08AB02	omnipaque 240 fl 1x 20ml 240mg i/ml	12401
V08AB02	omnipaque 240 flac 50ml 518mg/ml	12443
V08AB02	omnipaque 240 flac 200ml 518mg/ml	12500
V08AB02	omnipaque 300 fl 1x 10ml 300mg i/ml	12534
V08AB02	omnipaque 300 fl 1x 20ml 300mg i/ml	12542
V08AB02	omnipaque 300 flac 50ml 647mg/ml	12872
V08AB02	omnipaque 300 flac 100ml 647mg/ml	12930
V08AB02	omnipaque 350 fl 1x 20ml 350mg i/ml	12955
V08AB02	omnipaque 350 flac 50ml 755mg/ml	12971

ATC code	Pack name	CNK
V08AB02	omnipaque 350 flac 100ml 755mg/ml	13144
V08AB02	IOHEXOL	727255
V08AB02	IOHEXOL	727263
V08AB02	IOHEXOL	727271
V08AB02	IOHEXOL	727289
V08AB02	IOHEXOL	727297
V08AB02	IOHEXOL	727305
V08AB02	IOHEXOL	727313
V08AB02	IOHEXOL	727321
V08AB02	IOHEXOL	727339
V08AB02	IOHEXOL	727347
V08AB02	IOHEXOL	727354
V08AB02	IOHEXOL	727362
V08AB02	IOHEXOL	727370
V08AB02	IOHEXOL	728931
V08AB02	IOHEXOL	743104
V08AB02	IOHEXOL	743112
V08AB02	IOHEXOL	783126
V08AB02	IOHEXOL	783134
V08AB02	IOHEXOL	783142
V08AB02	IOHEXOL	783159
V08AB02	IOHEXOL	783167
V08AB02	IOHEXOL	783175
V08AB02	IOHEXOL	783183
V08AB02	IOHEXOL	790154
V08AB02	IOHEXOL	790162
V08AB02	IOHEXOL	790170
V08AB02	IOHEXOL	790188
V08AB02	IOHEXOL	859652
V08AB02	IOHEXOL	859660
V08AB02	IOHEXOL	859678
V08AB02	IOHEXOL	1199645
V08AB02	IOHEXOL	1199660
V08AB02	IOHEXOL	2274322
V08AB02	IOHEXOL	2274330
V08AB02	IOHEXOL	2274348
V08AB02	IOHEXOL	2274355
V08AB02	IOHEXOL	2274363
V08AB02	IOHEXOL	2274371
V08AB02	IOHEXOL	2274389
V08AB02	IOHEXOL	2494508
V08AB02	IOHEXOL	2494516

ATC code	Pack name	CNK
V08AB02	IOHEXOL	2494524
V08AB02	IOHEXOL	2494532
V08AB03	hexabrix 320 393/196,5 200ml flac	22939
V08AB03	hexabrix 320 393/196,5 10ml amp.	45575
V08AB03	hexabrix 160 fl 1 x 50 ml	95034
V08AB03	hexabrix 160 fl 1 x 100 ml	95075
V08AB03	hexabrix 200 245,4/122,7 50ml flac	95083
V08AB03	hexabrix 200 fl 1 x 100 ml	95232
V08AB03	hexabrix 200 fl 1 x 200 ml	95620
V08AB03	IOXAGLIC ACID	726539
V08AB03	IOXAGLIC ACID	726547
V08AB03	IOXAGLIC ACID	726554
V08AB03	IOXAGLIC ACID	726562
V08AB03	IOXAGLIC ACID	728113
V08AB03	IOXAGLIC ACID	728766
V08AB03	IOXAGLIC ACID	728774
V08AB03	IOXAGLIC ACID	728782
V08AB03	IOXAGLIC ACID	728790
V08AB03	IOXAGLIC ACID	728808
V08AB03	IOXAGLIC ACID	740860
V08AB03	IOXAGLIC ACID	740878
V08AB03	IOXAGLIC ACID	787549
V08AB03	IOXAGLIC ACID	808444
V08AB03	IOXAGLIC ACID	808451
V08AB03	IOXAGLIC ACID	808469
V08AB03	IOXAGLIC ACID	1077940
V08AB03	IOXAGLIC ACID	1077957
V08AB05	ultravist 300 amp. 20ml 623mg/ml	66134
V08AB05	ultravist 300 flac 50ml 623mg/ml	66159
V08AB05	ultravist 370 flac 50ml 769mg/ml	66167
V08AB05	ultravist 370 flac 200ml 769mg/ml	83964
V08AB05	IOPROMIDE	728964
V08AB05	IOPROMIDE	728972
V08AB05	IOPROMIDE	728980
V08AB05	IOPROMIDE	730168
V08AB05	IOPROMIDE	730176
V08AB05	IOPROMIDE	730184
V08AB05	IOPROMIDE	730192
V08AB05	IOPROMIDE	730986
V08AB05	IOPROMIDE	741264
V08AB05	IOPROMIDE	741272
V08AB05	IOPROMIDE	741280

ATC code	Pack name	CNK
V08AB05	IOPROMIDE	741298
V08AB05	IOPROMIDE	745166
V08AB05	IOPROMIDE	773630
V08AB05	IOPROMIDE	784181
V08AB05	IOPROMIDE	784199
V08AB05	IOPROMIDE	833269
V08AB05	IOPROMIDE	833285
V08AB05	IOPROMIDE	833327
V08AB05	IOPROMIDE	833699
V08AB05	IOPROMIDE	1082825
V08AB05	IOPROMIDE	1082833
V08AB05	IOPROMIDE	1082841
V08AB05	IOPROMIDE	1082858
V08AB05	IOPROMIDE	1280494
V08AB05	IOPROMIDE	1280502
V08AB05	IOPROMIDE	1415884
V08AB05	IOPROMIDE	1415892
V08AB06	IOTROLAN	633917
V08AB06	IOTROLAN	633925
V08AB07	IOVERSOL	242669
V08AB07	IOVERSOL	242685
V08AB07	IOVERSOL	242693
V08AB07	IOVERSOL	242719
V08AB07	IOVERSOL	242735
V08AB07	IOVERSOL	242743
V08AB07	IOVERSOL	492223
V08AB07	IOVERSOL	492231
V08AB07	IOVERSOL	735928
V08AB07	IOVERSOL	735936
V08AB07	IOVERSOL	735944
V08AB07	IOVERSOL	735951
V08AB07	IOVERSOL	735969
V08AB07	IOVERSOL	735977
V08AB07	IOVERSOL	736397
V08AB07	IOVERSOL	736405
V08AB07	IOVERSOL	736413
V08AB07	IOVERSOL	736421
V08AB07	IOVERSOL	736439
V08AB07	IOVERSOL	736447
V08AB07	IOVERSOL	736454
V08AB07	IOVERSOL	736462
V08AB07	IOVERSOL	736470

ATC code	Pack name	CNK
V08AB07	IOVERSOL	736488
V08AB07	IOVERSOL	746933
V08AB07	IOVERSOL	746941
V08AB07	IOVERSOL	746958
V08AB07	IOVERSOL	746966
V08AB07	IOVERSOL	746974
V08AB07	IOVERSOL	746982
V08AB07	IOVERSOL	749143
V08AB07	IOVERSOL	749150
V08AB07	IOVERSOL	787556
V08AB07	IOVERSOL	787564
V08AB07	IOVERSOL	1303841
V08AB07	IOVERSOL	1303858
V08AB07	IOVERSOL	1303874
V08AB07	IOVERSOL	1303882
V08AB07	IOVERSOL	1303890
V08AB07	IOVERSOL	1303908
V08AB07	IOVERSOL	1303916
V08AB09	IODIXANOL	764621
V08AB09	IODIXANOL	764639
V08AB09	IODIXANOL	764647
V08AB09	IODIXANOL	764654
V08AB09	IODIXANOL	764662
V08AB09	IODIXANOL	783191
V08AB09	IODIXANOL	783209
V08AB09	IODIXANOL	787127
V08AB09	IODIXANOL	787135
V08AB09	IODIXANOL	1563725
V08AB09	IODIXANOL	1563733
V08AB09	IODIXANOL	1563741
V08AB09	IODIXANOL	1563758
V08AB09	IODIXANOL	1563766
V08AB09	IODIXANOL	2274462
V08AB09	IODIXANOL	2274470
V08AB09	IODIXANOL	2430742
V08AB09	IODIXANOL	2430759
V08AB10	IOMEPROL	746263
V08AB10	IOMEPROL	746271
V08AB10	IOMEPROL	746289
V08AB10	IOMEPROL	746297
V08AB10	IOMEPROL	746396
V08AB10	IOMEPROL	746404

ATC code	Pack name	CNK
V08AB10	IOMEPROL	746412
V08AB10	IOMEPROL	746420
V08AB10	IOMEPROL	746438
V08AB10	IOMEPROL	746446
V08AB10	IOMEPROL	746453
V08AB10	IOMEPROL	746461
V08AB10	IOMEPROL	746479
V08AB10	IOMEPROL	746487
V08AB10	IOMEPROL	781286
V08AB10	IOMEPROL	792002
V08AB10	IOMEPROL	792010
V08AB10	IOMEPROL	792028
V08AB10	IOMEPROL	1177211
V08AB10	IOMEPROL	1177229
V08AB10	IOMEPROL	1177237
V08AB10	IOMEPROL	1177245
V08AB10	IOMEPROL	1177252
V08AB10	IOMEPROL	1177260
V08AB10	IOMEPROL	1177278
V08AB10	IOMEPROL	1177286
V08AB10	IOMEPROL	1177302
V08AB10	IOMEPROL	1177328
V08AB10	IOMEPROL	1177336
V08AB10	IOMEPROL	1233055
V08AB10	IOMEPROL	1259837
V08AB10	IOMEPROL	1259845
V08AB10	IOMEPROL	2177624
V08AB11	IOBITRIDOL	748137
V08AB11	IOBITRIDOL	748145
V08AB11	IOBITRIDOL	748152
V08AB11	IOBITRIDOL	748160
V08AB11	IOBITRIDOL	748178
V08AB11	IOBITRIDOL	748186
V08AB11	IOBITRIDOL	748194
V08AB11	IOBITRIDOL	748202
V08AB11	IOBITRIDOL	748210
V08AB11	IOBITRIDOL	748228
V08AB11	IOBITRIDOL	748269
V08AB11	IOBITRIDOL	748277
V08AB11	IOBITRIDOL	748285
V08AB11	IOBITRIDOL	748293
V08AB11	IOBITRIDOL	748301

ATC code	Pack name	CNK
V08AB11	IOBITRIDOL	777854
V08AB11	IOBITRIDOL	785394
V08AB11	IOBITRIDOL	785402
V08AB11	IOBITRIDOL	785410
V08AB11	IOBITRIDOL	785428
V08AB11	IOBITRIDOL	785436
V08AB11	IOBITRIDOL	785444
V08AB11	IOBITRIDOL	785451
V08AB11	IOBITRIDOL	785469
V08AB11	IOBITRIDOL	787572
V08AB11	IOBITRIDOL	787580
V08AB11	IOBITRIDOL	788349
V08AB11	IOBITRIDOL	788356
V08AB11	IOBITRIDOL	788364
V08AB11	IOBITRIDOL	788372
V08AB11	IOBITRIDOL	1294537
V08AB11	IOBITRIDOL	1294545
V08AB11	IOBITRIDOL	1294560
V08AB11	IOBITRIDOL	1294578
V08AB11	IOBITRIDOL	1294586
V08AB11	IOBITRIDOL	1294594
V08AB11	IOBITRIDOL	1294602
V08AB11	IOBITRIDOL	1294610
V08AB11	IOBITRIDOL	1294628
V08AB11	IOBITRIDOL	1294636
V08AB11	IOBITRIDOL	1294644
V08AB11	IOBITRIDOL	1294651
V08AB11	IOBITRIDOL	1294669
V08AB11	IOBITRIDOL	1294677
V08AB11	IOBITRIDOL	1395771
V08AB11	IOBITRIDOL	2162444
V08AB11	IOBITRIDOL	2393056
V08AB11	IOBITRIDOL	2393064
V08AB11	IOBITRIDOL	2393072
V08AB11	IOBITRIDOL	2393080
V08AB11	IOBITRIDOL	2393098
V08AB11	IOBITRIDOL	2393106
V08AB11	IOBITRIDOL	2411262
V08AC03	IOGLYCAMIC ACID	701862
V08AC03	IOGLYCAMIC ACID	701870
V08AC03	IOGLYCAMIC ACID	880146
V08AC04	transbilix perf 1 x 250 ml	90548

ATC code	Pack name	CNK
V08AC04	ADIPIODONE	719682
V08AC06	IOPANOIC ACID	132191
V08AC08	biloptine caps 12 x 500 mg	25676
V08AC08	SODIUM IOPODATE	701888
V08AC10	solu-biloptine pulv or 1x8g 37,5%	81117
V08AD01	lipiodol ultra fluide amp 1 x 5 ml	54403
V08AD01	ETHYL ESTERS OF IODISED FATTY ACIDS	710731
V08AD01	ETHYL ESTERS OF IODISED FATTY ACIDS	2064194
V08AD02	hytrast fl inj 1 x 20 ml	48652
V08AD02	IOPYDOL	708909
V08BA01	microtrast pasta oraal 800g 700mg/ g	61028
V08BA01	polibar lav. 397g 973mg/ g	82883
V08BA01	polibar lav. 570g 973mg/ g	82925
V08BA01	micropaque oploss. 2 1 1 g/ml	119636
V08BA01	BARIUM SULFATE WITH SUSPENDING AGENTS	197939
V08BA01	BARIUM SULFATE WITH SUSPENDING AGENTS	465666
V08BA01	BARIUM SULFATE WITH SUSPENDING AGENTS	465674
V08BA01	BARIUM SULFATE WITH SUSPENDING AGENTS	670240
V08BA01	BARIUM SULFATE WITH SUSPENDING AGENTS	877019
V08BB30	DOUBLE CONTRAST ADDITIVES	825794
V08CA01	GADOPENTETIC ACID	245621
V08CA01	GADOPENTETIC ACID	245639
V08CA01	GADOPENTETIC ACID	666750
V08CA01	GADOPENTETIC ACID	733469
V08CA01	GADOPENTETIC ACID	737684
V08CA01	GADOPENTETIC ACID	737692
V08CA01	GADOPENTETIC ACID	744243
V08CA01	GADOPENTETIC ACID	749051
V08CA01	GADOPENTETIC ACID	749069
V08CA01	GADOPENTETIC ACID	749077
V08CA01	GADOPENTETIC ACID	749556
V08CA01	GADOPENTETIC ACID	784090
V08CA01	GADOPENTETIC ACID	789081
V08CA01	GADOPENTETIC ACID	790436
V08CA01	GADOPENTETIC ACID	790444
V08CA01	GADOPENTETIC ACID	790451
V08CA01	GADOPENTETIC ACID	790469
V08CA01	GADOPENTETIC ACID	1198753
V08CA01	GADOPENTETIC ACID	1198803
V08CA01	GADOPENTETIC ACID	1414580
V08CA01	GADOPENTETIC ACID	1414598
V08CA01	GADOPENTETIC ACID	1414606

ATC code	Pack name	CNK
V08CA01	GADOPENTETIC ACID	1430586
V08CA01	GADOPENTETIC ACID	2557932
V08CA01	GADOPENTETIC ACID	2571214
V08CA01	GADOPENTETIC ACID	2571222
V08CA01	GADOPENTETIC ACID	2571230
V08CA01	GADOPENTETIC ACID	2572626
V08CA02	GADOTERIC ACID	444117
V08CA02	GADOTERIC ACID	444125
V08CA02	GADOTERIC ACID	444133
V08CA02	GADOTERIC ACID	734285
V08CA02	GADOTERIC ACID	734293
V08CA02	GADOTERIC ACID	734301
V08CA02	GADOTERIC ACID	744227
V08CA02	GADOTERIC ACID	744235
V08CA02	GADOTERIC ACID	786178
V08CA02	GADOTERIC ACID	1121482
V08CA02	GADOTERIC ACID	1121490
V08CA02	GADOTERIC ACID	1663822
V08CA02	GADOTERIC ACID	2063519
V08CA03	GADODIAMIDE	743120
V08CA03	GADODIAMIDE	743138
V08CA03	GADODIAMIDE	743146
V08CA03	GADODIAMIDE	782748
V08CA03	GADODIAMIDE	782755
V08CA03	GADODIAMIDE	782763
V08CA03	GADODIAMIDE	788323
V08CA03	GADODIAMIDE	1182732
V08CA03	GADODIAMIDE	1182740
V08CA03	GADODIAMIDE	1182757
V08CA03	GADODIAMIDE	2314672
V08CA03	GADODIAMIDE	2314680
V08CA03	GADODIAMIDE	2314706
V08CA03	GADODIAMIDE	2493948
V08CA04	GADOTERIDOL	763524
V08CA04	GADOTERIDOL	763532
V08CA04	GADOTERIDOL	763540
V08CA04	GADOTERIDOL	763557
V08CA04	GADOTERIDOL	1446525
V08CA04	GADOTERIDOL	1446533
V08CA04	GADOTERIDOL	1446541
V08CA04	GADOTERIDOL	1446558
V08CA05	MANGAFODIPIR	764613

ATC code	Pack name	CNK
V08CA05	MANGAFODIPIR	1563782
V08CA06	GADOVERSETAMIDE	789651
V08CA06	GADOVERSETAMIDE	789669
V08CA06	GADOVERSETAMIDE	789677
V08CA06	GADOVERSETAMIDE	789685
V08CA06	GADOVERSETAMIDE	789693
V08CA06	GADOVERSETAMIDE	789701
V08CA06	GADOVERSETAMIDE	789719
V08CA06	GADOVERSETAMIDE	2494284
V08CA06	GADOVERSETAMIDE	2494318
V08CA06	GADOVERSETAMIDE	2494326
V08CA06	GADOVERSETAMIDE	2494342
V08CA06	GADOVERSETAMIDE	2494367
V08CA06	GADOVERSETAMIDE	2494375
V08CA06	GADOVERSETAMIDE	2494383
V08CA08	GADOBENIC ACID	764928
V08CA08	GADOBENIC ACID	764936
V08CA08	GADOBENIC ACID	764944
V08CA08	GADOBENIC ACID	764951
V08CA08	GADOBENIC ACID	793737
V08CA08	GADOBENIC ACID	793745
V08CA08	GADOBENIC ACID	793752
V08CA08	GADOBENIC ACID	1478122
V08CA08	GADOBENIC ACID	1478510
V08CA08	GADOBENIC ACID	1478528
V08CA08	GADOBENIC ACID	1478536
V08CA09	GADOBUTROL	781922
V08CA09	GADOBUTROL	781930
V08CA09	GADOBUTROL	781948
V08CA09	GADOBUTROL	781955
V08CA09	GADOBUTROL	2041283
V08CA09	GADOBUTROL	2312759
V08CA09	GADOBUTROL	2312767
V08CA09	GADOBUTROL	2312775
V08CA11	GADOFOSVESET	789073
V08CA11	GADOFOSVESET	2510451
V08CB03	IRON OXIDE, NANOPARTICLES	745695
V08CB03	IRON OXIDE, NANOPARTICLES	774091
V08CB03	IRON OXIDE, NANOPARTICLES	774810
V08CB03	IRON OXIDE, NANOPARTICLES	1114750
V08CB03	IRON OXIDE, NANOPARTICLES	1753607
V08CB03	IRON OXIDE, NANOPARTICLES	2079671

ATC code	Pack name	CNK
V08DA02	MICROPARTICLES OF GALACTOSE	1280510
V08DA05	SULFUR HEXAFLUORIDE	780312
V08DA05	SULFUR HEXAFLUORIDE	1663798

Table 58. Nomenclature codes for MRI.

Codes	Omschrijving
459410 – 459421	NMR-onderzoek van de hals of van de thorax of van het abdomen of van het bekken, minstens drie sequenties, met of zonder contrast, met registratie op optische of elektromagnetische drager

Table 59. Nomenclature codes for multidisciplinary team meeting.

Codes	Omschrijving
350372 – 350383	Schriftelijk verslag van een multidisciplinair oncologisch consult met deelname van minstens drie geneesheren van verschillende specialismen onder leiding van een geneesheer-coördinator, met beschrijving van de diagnose en van het behandelingsplan
350394 – 350405	Deelname aan multidisciplinair oncologisch consult
350416 – 350420	Deelname aan multidisciplinair oncologisch consult door de behandelende arts die geen deel uitmaakt van de ziekenhuisstaf

7.6.2 Surgery

Table 60. Nomenclature codes for orchidectomy.

Codes	Omschrijving
261111 – 261122	Radicale orchidectomie voor primaire testistumour met inguinale en/of iliacale en/of lumbale lymfadenectomie
261096 – 261100	Bilaterale orchidectomie

Table 61. ICD-9-CM codes for orchidectomy.

ICD-9-CM Code	Omschrijving
62.3	Unilateral orchiectomy Orchidectomy (with epididymectomy) NOS
62.4	Bilateral orchiectomy Male castration Radical bilateral orchiectomy (with epididymectomy) Code also any synchronous lymph node dissection (40.3, 40.5)
62.41	Removal of both testes at same operative episode Bilateral orchidectomy NOS
62.42	Removal of remaining testis Removal of solitary testis

7.6.3 Radiotherapy

Table 62. Nomenclature codes for radiotherapy.

Codes	Commentaar
440016 – 440020	Behandeling (één of meer lokalisaties) met hoge energie of gammatherapie (betatron, lineaire accelerator, telekobalt) : In een dienst die beschikt over telekobalt én een een simulator én een dosimetriesysteem met computer (min 20 zittingen)
440053 – 440064	Behandeling (één of meer lokalisaties) met hoge energie of gammatherapie (betatron, lineaire accelerator, telekobalt) met maskers of individuele beschermingsmiddelen bij specifieke indicaties: In een dienst die beschikt over telekobalt én een een simulator én een dosimetriesysteem met computer (min 20 zittingen)
444113 – 444124	Forfaitair honorarium voor een eenvoudige uitwendige bestralingsreeks van 1 tot 10 fracties voor een patiënt die beantwoordt aan de criteria of lijdt aan een aandoening opgenomen in categorie 1 (zie KB 19APR2001)
444135 – 444146	Forfaitair honorarium voor een eenvoudige uitwendige bestralingsreeks van 11 tot 35 fracties voor een patiënt die beantwoordt aan de criteria of lijdt aan een aandoening opgenomen in categorie 2 (zie KB 19APR2001)
444150 – 444161	Forfaitair honorarium voor een complexe uitwendige bestralingsreeks voor een patiënt die beantwoordt aan de criteria of lijdt aan een aandoening opgenomen in categorie 3 (zie KB 19APR2001)

7.6.4 Chemotherapy

Table 63. CNK codes for chemotherapy used for testicular cancer.

ATC code	Name	Pack name	CNK
L01DC01	Bleomycine	bleomycine flac 15000 ie poeder	25825
L01DC01	Bleomycine	BLEOMYCINE amp. inj. 1 x 15 mg	701979
L01DC01	Bleomycine	BLEOMIN 15 fl. pulv. inj. 15 I.U.	763664
L01DC01	Bleomycine	bleomin flac 15000 ie poeder	1555697
L01XA02	Carboplatinum	paraplatin fiole 1 x 150 mg	56283
L01XA02	Carboplatinum	PARAPLATIN fl. I.V. lyoph. 1 x 150 mg	730242
L01XA02	Carboplatinum	CARBOPLATINE 150 DAVID BULL fl. I.V./perf. lyoph. 1 x 15 ml 10 mg/ml	742114
L01XA02	Carboplatinum	CARBOPLATINE 450 DAVID BULL fl. I.V./perf. lyoph. 1 x 45 ml 10 mg/ml	742122
L01XA02	Carboplatinum	PARAPLATIN sol. I.V. 1 x 5 ml 10 mg/ml	743005
L01XA02	Carboplatinum	CARBOPLATINE MAYNE 50 mg/5 ml ONCO-TAIN sol. I.V. 1 x 5 ml 10 mg/ml	743195
L01XA02	Carboplatinum	PARAPLATIN sol. I.V. 1 x 45 ml 10 mg/ml	743203
L01XA02	Carboplatinum	PARAPLATIN sol. I.V. 1 x 15 ml 10 mg/ml	743211
L01XA02	Carboplatinum	CARBOSIN 150 mg vial I.V. 1 x 15 ml 10 mg/ml	744581
L01XA02	Carboplatinum	CARBOSIN 500 mg vial I.V. 1 x 50 ml 10 mg/ml	744599
L01XA02	Carboplatinum	CARBOSIN 50 mg vial I.V. 1 x 5 ml 10 mg/ml	744607
L01XA02	Carboplatinum	CARBOPLATINUM PHARMACIA 150 mg vial 1 x 15 ml 10 mg/ml	746040
L01XA02	Carboplatinum	CARBOPLATINUM PHARMACIA 450 mg vial 1 x 45 ml 10 mg/ml	746057
L01XA02	Carboplatinum	CARBOPLATINUM PHARMACIA 50 mg vial 1 x 5 ml 10 mg/ml	746065
L01XA02	Carboplatinum	CARBOPLATINE MAYNE 150 mg/15 ml Onco-Vial fl. I.V./perf. 1 x 15 ml 10 mg/ml	761445
L01XA02	Carboplatinum	CARBOPLATINE MAYNE 450 mg/45 ml Onco-Vail fl. I.V./perf. 1 x 45 ml 10 mg/ml	761452
L01XA02	Carboplatinum	CARBOPLATINE MAYNE 150 mg/15 ml Onco-Tain fl.	779488
L01XA02	Carboplatinum	CARBOPLATINE MAYNE 450 mg/45 ml Onco-	779496

ATC code	Name	Pack name	CNK
		Tain fl.	
L01XA02	Carboplatinum	CARBOSIN 450 mg 1 flacon injectable x 10 mg/ml Carboplatine	783639
L01XA02	Carboplatinum	CARBOSIN 600 mg 1 flacon injectable x 10 mg/ml Carboplatine	783647
L01XA02	Carboplatinum	CARBOPLATINE MAYNE 600 mg/60 ml Onco-Tain 1 flacon injectable x 10 mg/ml Carboplatine	787499
L01XA02	Carboplatinum	CARBOPLATINE MYLAN 50 mg/5 ml	792473
L01XA02	Carboplatinum	CARBOPLATINE MYLAN 150 mg/15 ml	792481
L01XA02	Carboplatinum	CARBOPLATINE MYLAN 450 mg/45 ml	792499
L01XA02	Carboplatinum	CARBOPLATINE MYLAN 600 mg/60 ml	792911
L01XA02	Carboplatinum	carboplatine fl iv 15ml 10mg/ml	1149871
L01XA02	Carboplatinum	carboplatine vial 1x45ml 450mg/45ml	1149889
L01XA02	Carboplatinum	paraplatin sol iv 1x 5ml 10mg/ml	1174184
L01XA02	Carboplatinum	paraplatin sol iv 1x15ml 10mg/ml	1174192
L01XA02	Carboplatinum	paraplatin sol iv 1x45ml 10mg/ml	1174200
L01XA02	Carboplatinum	carboplatin fl iv/perf 10mg/1ml 5ml	1182476
L01XA02	Carboplatinum	carbosin flac inf. 150mg/15ml	1226083
L01XA02	Carboplatinum	carbosin flac inf. 50mg/5ml	1226091
L01XA02	Carboplatinum	carbosin 500mg vial iv 50ml 10mg/ml	1226109
L01XA02	Carboplatinum	carboplatinum flac inf. 50mg	1287671
L01XA02	Carboplatinum	carboplatinum flac inf. 150mg	1287697
L01XA02	Carboplatinum	carboplatinum flac inf. 450mg	1287705
L01XA02	Carboplatinum	carboplatine iv perf 1x15ml 10mg/ml	1484823
L01XA02	Carboplatinum	carboplatine iv perf 1x45ml 10mg/ml	1484831
L01XA02	Carboplatinum	carboplatine hospira flac onco-tain 150mg/15ml	2210888
L01XA02	Carboplatinum	carboplatine hospira flac onco-tain 450mg/45ml	2210896
L01XA02	Carboplatinum	carbosin flac inf. 600mg/60ml	2322576
L01XA02	Carboplatinum	carbosin flac inf. 450mg/45ml	2322584
L01XA02	Carboplatinum	carboplatine hospira flac onco-tain 600mg/60ml	2459071
L01XA02	Carboplatinum	carboplatine fl inj 1 x 5ml 10mg/ml	2601888
L01XA02	Carboplatinum	carboplatine fl inj 1 x 15ml 10mg/ml	2601896
L01XA02	Carboplatinum	carboplatine fl inj 1 x 45ml 10mg/ml	2601904
L01XA02	Carboplatinum	carboplatine 600 mg/60 ml fl inj 1 x 60ml 10mg/ml	2612836
L01XA01	Cisplatinum	platosin vial iv 1 x 10 mg/20 ml	17368
L01XA01	Cisplatinum	platosin vial iv 1 x 50 mg/100 ml	17434
L01XA01	Cisplatinum	platinol fl iv lyoph 1 x 10 mg	66035
L01XA01	Cisplatinum	platinol fl inj iv 1 x 10 mg/20 ml	66217
L01XA01	Cisplatinum	platosin vial 10 x 20 ml 10 mg	324152
L01XA01	Cisplatinum	platosin vial 5 x 100 ml 50 mg	324160
L01XA01	Cisplatinum	PLATINOL Lyophilized 10 mg fl. I.V. lyoph. 1 x 10 mg	715094
L01XA01	Cisplatinum	PLATINOL Ready to Use 10 mg/20 ml fl. I.V. 1 x 10 mg/20 ml	715102
L01XA01	Cisplatinum	PLATINOL READY TO USE fl. I.V. 1 x 50 mg/100 ml	715110
L01XA01	Cisplatinum	PLATISTINE 10 mg fl. I.V. lyoph. 1 x 10 mg	715128
L01XA01	Cisplatinum	PLATISTINE 50 mg fl. I.V. lyoph. 1 x 50 mg	715136
L01XA01	Cisplatinum	PLATINOL Lyophilized 50 mg fl. I.V. lyoph. 1 x 50 mg	725945
L01XA01	Cisplatinum	PLATOSIN vial I.V. 1 x 10 mg/20 ml	729327
L01XA01	Cisplatinum	PLATOSIN vial I.V. 1 x 50 mg/100 ml	729335
L01XA01	Cisplatinum	PLATOSIN fl. inj. 1 x 10 mg/20 ml	742833
L01XA01	Cisplatinum	PLATOSIN fl. inj. 1 x 50 mg/100 ml	742841
L01XA01	Cisplatinum	PLATOSIN fl. I.V. pulv. 1 x 10 mg	743476

ATC code	Name	Pack name	CNK
L01XA01	Cisplatinum	CISPLATINE EFEKA fl. I.V. sol. 1 x 10 mg	743484
L01XA01	Cisplatinum	PLATOSIN fl. I.V. pulv. 1 x 50 mg	743492
L01XA01	Cisplatinum	CISPLATINE EFEKA fl. I.V. sol. 1 x 50 mg	743500
L01XA01	Cisplatinum	CISPLATINUM DELTA WEST vial inj. 1 x 10 mg/10 ml	746818
L01XA01	Cisplatinum	CISPLATINUM DELTA WEST vial inj. 1 x 50 mg/50 ml	746826
L01XA01	Cisplatinum	CISPLATINUM DELTA WEST vial inj. 1 x 100 mg/100 ml	746834
L01XA01	Cisplatinum	PLATOSIN fl. inj. 1 x 10 mg/10 ml	748368
L01XA01	Cisplatinum	PLATOSIN fl. inj. 1 x 50 mg/50 ml	748376
L01XA01	Cisplatinum	PLATOSIN fl. inj. 1 x 100 mg/100 ml	748509
L01XA01	Cisplatinum	PLATINOL Ready to Use 50 mg/50 ml fl. I.V. 1 x 50 mg/50 ml	766600
L01XA01	Cisplatinum	PLATINOL Ready to Use 100 mg/100 ml fl. I.V. 1 x 100 mg/100 ml	768192
L01XA01	Cisplatinum	CISPLATINE MAYNE 50 mg/50 ml Onco-Tain fl. inj. 1 x 50 mg/50 ml	770198
L01XA01	Cisplatinum	CISPLATINE MAYNE 100 mg/100 ml Onco-Tain fl. inj. 1 x 100 mg/100 ml	770206
L01XA01	Cisplatinum	platinol fl inj iv 1 x 50 mg/100 ml	865246
L01XA01	Cisplatinum	platistine fl lyoph iv 1 x 10 mg	891341
L01XA01	Cisplatinum	platistine fl lyoph iv 1 x 50 mg	891358
L01XA01	Cisplatinum	platinol fl iv lyoph 1 x 50 mg	895623
L01XA01	Cisplatinum	cisplatine fl iv pulv 10mg	1182815
L01XA01	Cisplatinum	cisplatine fl pulv iv 1x50mg	1182823
L01XA01	Cisplatinum	cisplatine fl iv sol 10mg	1182831
L01XA01	Cisplatinum	cisplatine fl iv sol 50mg	1182849
L01XA01	Cisplatinum	platosin fl lyoph 1x10mg/ 20ml	1200633
L01XA01	Cisplatinum	platosin fl lyoph 1x50mg/100ml	1200641
L01XA01	Cisplatinum	cisplatinum vial 1x 10mg/ 10ml	1287739
L01XA01	Cisplatinum	cisplatinum vial 1x 50mg/ 50ml	1287747
L01XA01	Cisplatinum	cisplatinum vial 1x 100mg/100ml	1287754
L01XA01	Cisplatinum	platosin flac inf. 10mg/10ml	1402635
L01XA01	Cisplatinum	platosin flac inf. 50mg/50ml	1402643
L01XA01	Cisplatinum	platosin flac inf. 100mg/100ml	1402650
L01XA01	Cisplatinum	cisplatine hospira flac inf. 100mg/100ml	1466424
L01XA01	Cisplatinum	cisplatine hospira flac inf. 50mg/50ml	1466432
L01XA01	Cisplatinum	platinol 1 fiole 50mg/ 50ml	1586270
L01XA01	Cisplatinum	platinol 1 fiole 100mg/100ml	1586288
L01XA01	Cisplatinum	platosin 50 mg pulv	1670603
L01XA01	Cisplatinum	platosin 10 mg pulv	1670611
L01AA01	Cyclofosfamide	endoxan flac 5x 500mg poeder	39123
L01AA01	Cyclofosfamide	endoxan vial 10 x 200 mg	39131
L01AA01	Cyclofosfamide	endoxan vial 10 x 100 mg	39149
L01AA01	Cyclofosfamide	endoxan tab. 50x 50mg	110882
L01AA01	Cyclofosfamide	cycloblastine drag 50x50 mg	197996
L01AA01	Cyclofosfamide	cycloblastine fl lyoph 10 x 100 mg	198002
L01AA01	Cyclofosfamide	cycloblastine fl lyoph 10 x 500 mg	198010
L01AA01	Cyclofosfamide	cycloblastine fl lyoph 1 x 1 g	198028
L01AA01	Cyclofosfamide	endoxan flac 1g poeder	246942
L01AA01	Cyclofosfamide	CYCLOBLASTINE fl. inj. lyoph. 1 x 100 mg	703777
L01AA01	Cyclofosfamide	CYCLOBLASTINE fl. inj. lyoph. 1 x 200 mg	703785
L01AA01	Cyclofosfamide	CYCLOBLASTINE fl. inj. lyoph. 1 x 500 mg	703793
L01AA01	Cyclofosfamide	CYCLOBLASTINE fl. inj. lyoph. 1 x 1 g	703801
L01AA01	Cyclofosfamide	CYCLOBLASTINE drag. 1 x 50 mg	703819
L01AA01	Cyclofosfamide	ENDOXAN 500 mg vial inj. 1 x 500 mg	706234

ATC code	Name	Pack name	CNK
L01AA01	Cyclofosfamide	ENDOXAN drag. 1 x 50 mg	706242
L01AA01	Cyclofosfamide	ENDOXAN fl. inj. 1 x 100 mg	706259
L01AA01	Cyclofosfamide	ENDOXAN 200 mg fl. inj. 1 x 200 mg	706267
L01AA01	Cyclofosfamide	ENDOXAN 1 g vial inj. 1 x 1 g	736769
L01AA01	Cyclofosfamide	cycloblastine fl lyoph 10 x 200 mg	817411
L01DB01	Doxorubicine	adriblastina flac 5x 10mg poeder	16261
L01DB01	Doxorubicine	adriblastina flac 50mg/25ml	251454
L01DB01	Doxorubicine	adriblastina flac 10mg/5ml	288399
L01DB01	Doxorubicine	doxorubin fl lyoph. 10 x 10 mg	312256
L01DB01	Doxorubicine	doxorubin fl lyoph. 10 x 50 mg	312264
L01DB01	Doxorubicine	ADRIBLASTINA 10 mg fl. inj. 1 x 10 mg + solv.	700187
L01DB01	Doxorubicine	ADRIBLASTINA READY TO USE 50 mg fl. inj. 1 x 50 mg/25 ml	736785
L01DB01	Doxorubicine	ADRIBLASTINA READY TO USE 10 mg fl. inj. 1 x 10 mg/5 ml	737510
L01DB01	Doxorubicine	DOXORUBIN fl. I.V. lyoph. 1 x 10 mg	739243
L01DB01	Doxorubicine	DOXORUBIN fl. I.V. lyoph. 1 x 50 mg	739250
L01DB01	Doxorubicine	DOXORUBIN fl. I.V. sol. 1 x 10 mg/5 ml	743567
L01DB01	Doxorubicine	DOXORUBIN fl. I.V. sol. 1 x 50 mg/25 ml	743575
L01DB01	Doxorubicine	DOXORUBIN fl. I.V. sol. 1 x 200 mg/20 ml	743708
L01DB01	Doxorubicine	ADRIBLASTINA READY TO USE 200 mg fl. inj. 1 x 200 mg/100 ml	744409
L01DB01	Doxorubicine	CAELYX 2 mg/ml vial 1 x 10 ml 2 mg/ml	760546
L01DB01	Doxorubicine	DOXORUBICINE MAYNE 10 mg Onco-Tain fl. I.V. 1 x 10 mg	770172
L01DB01	Doxorubicine	DOXORUBICINE MAYNE 50 mg Onco-Tain fl. I.V. 1 x 50 mg	770180
L01DB01	Doxorubicine	CAELYX 2 mg/ml fl. inj. 1 x 25 ml 2 mg/ml	773614
L01DB01	Doxorubicine	MYOCET 1 flacon injectable x 50 mg Doxorubicine, chlorhydrate	782334
L01DB01	Doxorubicine	DOXORUBICINE "EBEWE" 2 mg/ml 1 flacon injectable x 2 mg/ml Doxorubicine, chlorhydrate	787713
L01DB01	Doxorubicine	DOXORUBICINE "EBEWE" 2 mg/ml 1 flacon injectable x 2 mg/ml Doxorubicine, chlorhydrate	787721
L01DB01	Doxorubicine	DOXORUBICINE "EBEWE" 2 mg/ml 1 flacon injectable x 2 mg/ml Doxorubicine, chlorhydrate	787739
L01DB01	Doxorubicine	DOXORUBICINE "EBEWE" 2 mg/ml 1 flacon injectable x 2 mg/ml Doxorubicine, chlorhydrate	787747
L01DB01	Doxorubicine	doxorubin flac inf. 10mg/5ml	1182856
L01DB01	Doxorubicine	doxorubin flac inf. 50mg/25ml	1182864
L01DB01	Doxorubicine	doxorubin flac inf. 200mg/100ml	1182872
L01DB01	Doxorubicine	doxorubin fl lyoph. 1 x 10mg	1182880
L01DB01	Doxorubicine	doxorubin fl lyoph. 1 x 50mg	1182898
L01DB01	Doxorubicine	adriblastina flac 200mg/100ml	1204379
L01DB01	Doxorubicine	caelyx flac inf. 20mg/10ml	1462522
L01DB01	Doxorubicine	doxorubicine 50 mg pulv lyoph	1466382
L01DB01	Doxorubicine	doxorubicine 10 mg pulv lyoph	1466622
L01DB01	Doxorubicine	caelyx flac inf. 50mg/25ml	1796192
L01DB01	Doxorubicine	myocet flac inf. 2x 50mg	2308153
L01DB01	Doxorubicine	doxorubicine ebewe flac 100mg/50ml	2454759
L01DB01	Doxorubicine	doxorubicine ebewe flac 10mg/5ml	2454767
L01DB01	Doxorubicine	doxorubicine ebewe flac 50mg/25ml	2454775
L01DB01	Doxorubicine	doxorubicine ebewe flac 200mg/100ml	2481190

ATC code	Name	Pack name	CNK
L01CB01	Etoposide	vepesid amp inj iv 10 x 100 mg/5 ml	198077
L01CB01	Etoposide	vepesid caps. 10x 100mg	198085
L01CB01	Etoposide	VEPESID fl. I.V. 1 x 100 mg/5 ml	720995
L01CB01	Etoposide	VEPESID caps. 1 x 100 mg	721001
L01CB01	Etoposide	EPOSIN fl. I.V. 1 x 100 mg/5 ml	744441
L01CB01	Etoposide	ETOPOSIDUM fl. perf. 1 x 100 mg/5 ml	747352
L01CB01	Etoposide	CELLTOP 100 mg amp. I.V. 1 x 100 mg	762195
L01CB01	Etoposide	CELLTOP 25 mg caps. 1 x 25 mg	762203
L01CB01	Etoposide	CELLTOP 50 mg caps. 1 x 50 mg	762211
L01CB01	Etoposide	CELLTOP 100 mg caps. 1 x 100 mg	762229
L01CB01	Etoposide	ETOPOSIDE MAYNE 200 mg/10 ml fl. I.V. 1 x 10 ml 20 mg/ml	774190
L01CB01	Etoposide	ETOPOSIDE EBEWE 20 mg/ml 1 flacon injectable x 20 mg/ml Etoposide	788695
L01CB01	Etoposide	ETOPOSIDE EBEWE 20 mg/ml 1 flacon injectable x 20 mg/ml Etoposide	788703
L01CB01	Etoposide	ETOPOSIDE EBEWE 20 mg/ml 1 flacon injectable x 20 mg/ml Etoposide	788711
L01CB01	Etoposide	ETOPOSIDE EBEWE 20 mg/ml 1 flacon injectable x 20 mg/ml Etoposide	788729
L01CB01	Etoposide	EPOSIN 20 mg/ml	791020
L01CB01	Etoposide	eposin flac inf. 100mg/5ml	1226125
L01CB01	Etoposide	eposin flac inf. 500mg/25ml	1232198
L01CB01	Etoposide	etoposidum sol perf 100ml vial 5ml	1349539
L01CB01	Etoposide	celltop caps. 40x 25mg	1524198
L01CB01	Etoposide	lastet caps 20x 50mg	1524206
L01CB01	Etoposide	celltop caps. 10x 100mg	1524214
L01CB01	Etoposide	lastet amp iv 10x100mg	1524222
L01CB01	Etoposide	etoposide 200 mg/10ml 5 vials	1768894
L01CB01	Etoposide	etoposide ebewe flac inf. 1000mg/50ml	2506657
L01CB01	Etoposide	etoposide ebewe flac inf. 100mg/5ml	2506665
L01CB01	Etoposide	etoposide ebewe flac inf. 200mg/10ml	2506673
L01CB01	Etoposide	etoposide ebewe flac inf. 400mg/20ml	2506699
L01AA06	Ifosfamide	holoxan flac 1g poeder	98202
L01AA06	Ifosfamide	HOLOXAN fl. inj. lyoph. 1 x 1 g	729533
V03AF01	Mesna	UROMITEXAN 400 mg amp. inj. 1 x 400 mg/4 ml	727578
V03AF01	Mesna	uromitexan amp. i.v. 15x 400mg/4ml	895730
L01CA01	Vinblastine	velbe amp inj 1 x 10 mg	135889
L01CA01	Vinblastine	VELBE amp. inj. 1 x 10 mg	720847
L01CA01	Vinblastine	VINBLASIN fl. inj. 1 x 10 mg	743534
L01CA01	Vinblastine	VINBLASTINE TEVA 1 mg/ml	793927
L01CA01	Vinblastine	vinblastine fl inj 10mg/1ml	1183060
L01CA01	Vinblastine	vinblasin flac 10mg poeder	1670595

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Wettelijk depot : D/2011/10.273/96

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1. Effectiviteit en kosten-effectiviteit van behandelingen voor rookstop. D/2004/10.273/1.
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