# Verslag van het college van geneesheren
# RADIOTHERAPIE-ONCOLOGIE
# contract 1 januari 2015 – 31 december 2015

# Rapport du collège de médecins
# RADIOTHERAPIE- ONCOLOGIE
# contrat 1 janvier 2015– 31 décembre 2015

**Prof. Yolande Lievens**
**Voorzitter-Président**

**Inhoudstafel**

**Deel 1: Werking van het college van radiotherapeuten**



**Deel 2: Resultaten**

# DEEL 1

# WERKING VAN HET COLLEGE VAN RADIOTHERAPIE-ONCOLOGIE

## A/ Inleiding

De commissie Peer Review voor Radiotherapie-oncologie werd, op initiatief van het Ministerie van Volksgezondheid, in 1995 opgericht en bestaat uit radiotherapeuten en fysici. De doelstelling van deze commissie is de kwaliteit van de bestralingsbehandelingen trachten te verbeteren door het organiseren van peer review activiteiten.
In mei 2000 werd het college van geneesheren radiotherapie geïnaugureerd.
In september 2000 werd overgegaan tot een formele integratie van het door het ministerie benoemde college enerzijds en de reeds sinds 1995 bestaande commissie Peer Review voor Radiotherapie-oncologie anderzijds.
In juli 2003 werd een nieuw college geïnstalleerd, na verschijnen in het staatsblad (KB 30-7-2003).
In 2006 werd opnieuw een nieuw college samengesteld na verschijnen in het staatsblad (KB 15-12-2006).
Eind 2012 werd een nieuw college samengesteld (KB 26/11/2012), de samenstelling vindt u onder B/.

In **2015** is aan verschillende projecten gewerkt:

1. **Quality Indicators**
   a. **Structure**
   b. **Process**
   c. **Outcome**
2. **Beldart I & II resultats – Beldart II future**
3. **Procab**
4. **Audits**

De stand van zaken van deze verschillende projecten vindt U in deel 2 van dit verslag.

In februari 2016 ging de jaarlijkse vergadering van het college en de diensthoofden van alle Belgische radiotherapie centra door. Feedback werd gegeven over de uitgevoerde projecten, en de planning voor 2016-2017 werd voorgesteld en besproken.

## B/ Samenstelling van het college van radiotherapeuten-oncologen

**Leden van het college in de periode 2000-2003 (KB 10/6/1999):**

Prof. P. Vanhoutte (voorzitter)
Dr. P. Huget (ondervoorzitter)
Prof. C. Weltens (contactpersoon en secretaris)
Dr. G. Demeestere
Dr. W. Deneve
Dr. D. Marchal
Prof. P. Scalliet
Dr. K. Vandeputte

**Leden van het college in de periode 2003-2006 (KB 30/7/2003)**

Dr. P. Huget (voorzitter)
Prof. P. Scalliet (ondervoorzitter)
Prof. C. Weltens (contactpersoon en secretaris)
Prof. J.M. Deneufbourg
Dr. D. Marchal
Dr. P. Spaas
Dr. K. Vandeputte
Dr. L. Vanuytsel

**Leden van het college in de periode 2006-2012 (KB 15/12/2006)**

Prof. P. Scalliet (voorzitter)
Dr. P. Spaas (ondervoorzitter)
Prof. C. Weltens (contactpersoon en secretaris)
Dr. C. Mitine
Dr. K. Vandeputte
Dr. D. Van den Weyngaert
Dr. L. Vanuytsel († 30-8-2008)

**Huidige samenstelling van het college sinds eind 2012 (KB 26/11/2012)**

Prof. Y. Lievens (voorzitter)
Dr. V. Remouchamps (ondervoorzitter)
Prof. C. Weltens (contactpersoon en secretaris)
Prof. D. Van den Weyngaert (tot december 2015)
Dr. R. Burette
Dr. L. Moretti
Dr. N. Jansen
Dr. K. Stellamans

Naast de door het ministerie aangestelde leden, wordt het college sinds zijn installatie vervoegd door experten (fysici, verpleegkundigen en radiotherapeuten).

Vanaf begin 2013 is de samenstelling van de commissie van experten als volgt:

radiotherapeuten
Prof. P. Scalliet
Dr. P. Spaas
Dr. P. Huget
Dr. O. De Hertogh (voorzitter BVRO) opgevolgd door dr. M. Brosens

physici
A. Rijnders
F. Vanneste
M. Van Dycke
Prof. D. Verellen
K. Feyen (voorzitter BVZF/BSPH)

verpleegkundigen
G. Vandevelde
P. Bijdekerke
W. Hontoir

## C/ Plenaire vergaderingen

Volgende plenaire vergaderingen werden gehouden in 2015:

| **DATUM** |
|---|
| |
| 26-02-2015 |
| 09-04-2015 |
| 13-10-2015 |

De verslagen van bovenstaande vergaderingen zijn in dit jaarverslag geïncludeerd, u vindt ze op de volgende pagina's.

# Minutes of the meeting of 26-02-2015

***provisional report***

College:
N. Jansen, Y. Lievens, L. Moretti, V. Remouchamps, K. Stellamans, D. Van den Weyngaert, C. Weltens

Experts:
Radiation Oncologists: P. Spaas, P. Scalliet
Physicist: F. Vanneste, M. Van Dycke

Invited:
Representatives VVRO/French speaking nurses: P. Bijdekerke
Representative of the QMS: F. Van Houtte
Representatives of the Ministry of Health: S. Van den Bogaert

Apologized:
R. Burette, P. Huget, A. Rijnders, O. De Hertogh, D. Verellen, K. Feyen, G. Vandevelde, W. Hontoir

## Approval of the minutes of the meeting of 20-11-2014

No remarks.

## Quality indicators

Three working groups reported on work that was done with respect to **the selection** of a set of indicators.
The set proposed below will be shown at the national meeting of the college. Since limited funding for data acquisition, handling and storage from the FOD/SPF is available, a pilot project will be started in 2015. Based on the outcome of this project funding for an extended Quality Indicator project in 2016 will be requested.

**Pilot project of 2015: indicators for structure, process and outcome:**

### STRUCTURE

1. Uptake RT: RT utilisation (courses/cancer incidence)
2. Workload (courses/RTO; courses/RTT, courses/phycisist, fractions/RTT)
3. Courses/MV equipment
4. Subspecialistion/RT
5. Number of 3D treatments, number of IMRT treatments
6. MV units/centre, MV units/inhabitants

### PROCESS

Timing: total treatment time

1. Extract data from the patient file
2. 30 consecutive patients treated for H&N tumors
3. Items to be collected: see presentation Nico Janssen

## OUTCOME

Acute side effects gr 3-4, measured during RT and up to 4 weeks after RT

For 20 patients per department and per pathology:

1. FOR: Breast cancer with nodal irradiation
2. FOR: Prostate
3. FOR: H&N

Vincent Remouchamps emphasizes that it is of major importance to link the indicators and to look for causal relationships between process-structure and outcome measurements. However, no consensus in the group exists on this proposal since this will substantially increase the workload while the validity of these causal relations remains questionable.

## VARIA

Work done with the Cancer Registry (YL)

1) Radiotherapy utilization
2) SBRT and APBI

First results are available but still under analysis, hence **will not be shown nor discussed** today or at the meeting tomorrow. At the national meeting of the college tomorrow, Harlinde De Schutter and Nancy Van Damme (Kanker Register) will only give an overview of the data collection and the methodology used. The aim is to report and discuss results after further analysis during the next meeting of the College.

## Next meeting

Next meeting 09-04-2015.

Weltens Caroline, 30-3-2015

# Minutes of the meeting of 09-04-2015

***provisional report***

College:
N. Jansen, Y. Lievens, L. Moretti, V. Remouchamps, D. Van den Weyngaert, C. Weltens

Experts:
Radiation Oncologists: P. Huget, P. Spaas, P. Scalliet
Physicist: D. Verellen, F. Vanneste, M. Van Dycke

Invited:
Representatives VVRO/French speaking nurses: /
Representative of the QMS: A. Vaandering
Representatives of the Ministry of Health: S. Van den Bogaert,
Representatives of the Cancer Registry: L. Van Eyken, Nancy Van Damme, M. Rosskamp
Representatives of the RIZIV: H. Engels

Apologized:
R. Burette, K. Stellamans, A. Rijnders, O. De Hertogh, K. Feyen, G. Vandevelde, W. Hontoir, F. Van Houtte

## Approval of the minutes of the meeting of 26-2-2015

No remarks.

## Quality indicators

Three working groups (structure, process and outcome) report on work that was done with respect to **the finalization** of a set of indicators.
The set was first shown at the national meeting of the college. Based on the feedback given by the heads of the radiotherapy departments, some (minor) adaptations were applied.
L. Moretti reports on the research done with respect to the setup of a database. For the pilot study of the QI, a server is available at the Bordet Institute at a cost of 1.500 €/year.
Dr. Van den Bogaert confirms that in 2015 no budget is available for a nationwide database, and that in the future we will have to fit our project in the WIV ISP healthdata.be project.

*Healthdata.be is een dienst binnen de rechtspersoon van het Wetenschappelijk Instituut Volksgezondheid (WIV) die zich richt op het technisch en procesmatig faciliteren van registers aangaande gezondheid en gezondheidszorg in België. Concreet stelt healthdata.be applicaties, processen en kennis ter beschikking, zodat de datacollectie en de dataverspreiding van de wetenschappelijke gegevensbanken op een efficiënte en veilige manier gebeurt.*
*Le service Healthdata.be fait partie intégrante de la personne juridique de l'Institut scientifique de Santé publique (ISP). Healthdata.be a pour objectif de faciliter l'enregistrement de données relatives à la santé et aux soins de santé en Belgique, grâce à la mise en œuvre de processus simples. Concrètement, Healthdata.be propose un savoir et des solutions techniques permettant d'assurer la collecte et la diffusion efficaces et sûres de données issues de banques de données scientifiques.*

It is decided to use the database proposed by Luigi for the pilot project and to investigate further the possibilities of collaboration with healthdata.be, Aquilab and Prisma RT.
YL, LM, VR, NJ and FV will organize a meeting to come up with a practical proposal. The start of prospective data acquisition is planned in 2015 for the QI on structure. The collection of QI linked to process and outcome will start in 01/2016.

## Cancer Registry Data

Liesbeth Van Eyken shows the data on radiotherapy utilization rate and Nancy Van Damme shows the results of the SBRT Registry.

## Next meeting

Next meeting 13-10-2015.

Weltens Caroline, 12-10-2015

# Minutes of the meeting of 13-10-2015

***provisional report***

College:
N. Jansen, Y. Lievens, L. Moretti, V. Remouchamps, K. Stellamans, C. Weltens

Experts:
Radiation Oncologists: P. Huget, P. Scalliet
Physicist: D. Verellen, A. Rijnders, F. Vanneste, M. Van Dycke, F. Van Houtte

Invited:
Representatives VVRO/French speaking nurses: /
Representative of the QMS: A. Vaandering
Representative of BelDART: B. Reniers

Apologized:
R. Burette, O. De Hertogh, K. Feyen, G. Vandevelde, W. Hontoir, D. Van den Weyngaert, P. Spaas
Representatives of the Ministry of Health: S. Van den Bogaert

## Approval of the minutes of the meeting of 9-4-2015

No remarks.

## Remarks on the agenda

Will not be handled in this meeting :

- RT uptake
- SBRT/APBI

## BelDART

*BelDART 2 :*

Brigitte Reniers shows the update of the Basic Audit (also for TOMO).
27 centers were audited (Varian, TOMO, Siemens, Elekta). The basic dosimetry is very good. The audit shows good results with alanine. There were no problems seen with high dose regions.

*BelDART 3 :*

Brigitte Reniers shows the proposal of the audit of :

- Head and Neck
- Stereotaxie/SBRT lung
- Brachytherapie

The budget is estimated for 200.000 € each year for material, staff, expandable, overhead + Basic dosimetry.

Needed material :

- Lung phantom -> UZ Brussel/Leuven
- Head and Neck phantom -> needs new phantom

Timing : 2015 – 2020
Milan Tomsej can also look at the results (to replace Karen Feyen as the representative of BHPA). He can be delegated from BHPA in the steering committee BelDART.

## FINAL STATUS AND LAUNCH QI PROJECT

The project is ready to be launched. The documents can be sent on paper and by email.
The data will go to the "platform independent de Bordet".
There is a meeting planned with Johan Van Bussel of Healthdata.be and N. Jansen, V. Remouchamps, F. Van Houtte and Y. Lievens.

## QUATRO AUDITS

The last audit is planned in 2015 and the Cancer Plan advices to start a new audit cycle. So there will be no audits organized in 2016. The audit will be re organized into modified version, using new methodology, to a light version that is shorter, part by QM and flexible (+/- brachy, +/- satellites).
The light version has to be :

- Shorter, a **re**-audit (modified)
- + QM
- + satellite
- + brachy
- With new auditors

Aude Vaandering shows the presentation concerning Quality Management and the QMRT.be tool.

## PROCAB

An overview on PROCAB was given by C. Weltens.
A proposal to evaluate the indicators of nodal irradiation was presented by V. Remouchamps.
The next project (lung) after PROCARE and PROCAB was proposed by Y. Lievens : PROCAL (or ProcaLU or …).
PROCAL : locally advanced lung cancer. Quid collaboration with ESTRO, ACROP.
Y. Lievens is responsible and will plan a meeting with V. Remouchamps, Ph. Spaas, Xavier Geets and Stéphanie Peeters.
The next project after Lung will be Brain Metastase (N. Jansen).

## Next meeting

Next meeting 12-01-2016

Weltens Caroline, 20-10-2015

# DEEL 2:

## RESULTATEN

## 1. QUALITY INDICATORS : Structure

**L. Van Eyken, Y. Lievens**

Preliminaire data : publication in preparation.

# Background: optimal utilization proportion

- **Estimated 'Optimal utilization proportion' (OUP) for Belgium: 53,2%**
  - Calculated by the ESTRO-HERO project
    - Borras JM et al., 2015 Radiotherapy and Oncology
    - External beam radiotherapy, at least one course
  - Using: The evidence based decision analytic model developed by CCORE: Collaboration for Cancer Outcome Research and Evaluation Barton M et al.



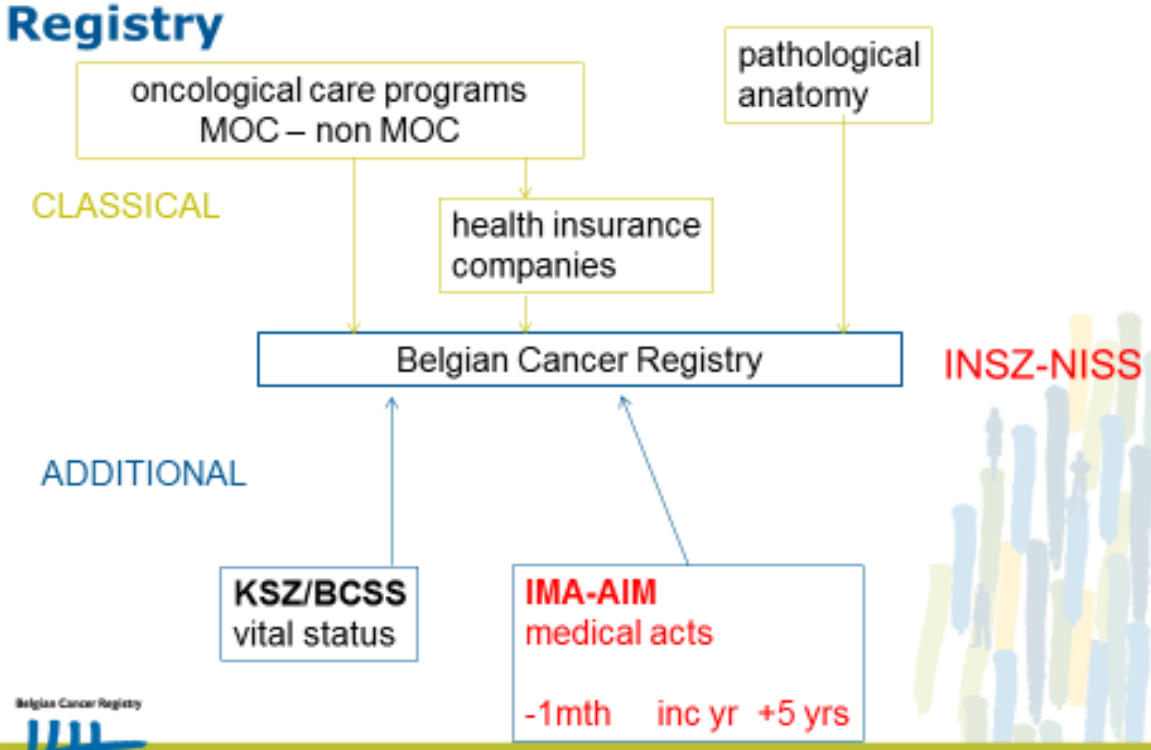
# Objectives

Belgium, 2009-2010

1. To compare the actual utilization of RT with the estimated optimal utilization proportion
   1. and retreatment
2. To compare the actual utilization of RT with the advised utilization proportion (MOC-CMO)
3. To analyze the impact of different tumor types and socio-demographic parameters on the actual utilization of RT

Collaborative study between the Belgian Doctors' College for Radiotherapy and the Belgian Cancer Registry

## Background: Sources used at the Cancer Registry






## Materials and methods

For tumours diagnosed in **2009-2010**, Belgium:

1. Optimal utilization proportion (<CCORE methodo –ESTRO-HERO)
2. Advised: as defined during 'MDT (MOC-COM)'
3. Actual utilization: reimbursed radiotherapy (IMA/AIM)
   - Category RT: 1-8
   - Full period: -1 month => +5 years (min 4 years)
   - Re-treatment rate: any episode, after an initial RT episode

**n= 120,244 tumours; 113,153 patients**

Analyses by cancer type, stage or histology group & region

# Materials and methods: real RUR (IMA)

| ambulant_code | hospital_code | libel_fr | libel_nl | RT_type |
|---|---|---|---|---|
| 444113 | 444124 | Honoraires forfaitaires pour une série d'irradiations externes simples de 1 à 10 fractions chez un patient qui répond aux critères ou pathologie repris en catégorie 1 | 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 | EBRT |
| 444135 | 444146 | Honoraires forfaitaires pour une série d'irradiations externes simples de 11 à 35 fractions chez un patient qui répond aux critères ou pathologie repris en catégorie 2 | Forfaitair honorarium voor een eenvoudige uitwendige bestralingsreeks van minstens 11 tot 35 fracties voor een patiënt die beantwoordt aan de criteria of lijdt aan een aandoening opgenomen in categorie 2 | EBRT |
| 444150 | 444161 | Honoraires forfaitaires pour une série d'irradiations externes complexes chez un patient qui répond aux critères ou pathologie repris en catégorie 3 | Forfaitair honorarium voor een complexe uitwendige bestralingsreeks voor een patiënt die beantwoordt aan de criteria of lijdt aan een aandoening opgenomen in categorie 3 | EBRT |
| 444172 | 444183 | Honoraires forfaitaires pour une série d'irradiations externes complexes chez un patient qui répond aux critères ou pathologie repris en catégorie 4 | Forfaitair honorarium voor een complexe uitwendige bestralingsreeks voor een patiënt die beantwoordt aan de criteria of lijdt aan een aandoening opgenomen in categorie 4 | EBRT |
| 444216 | 444220 | Honoraires forfaitaires pour curiethérapie exclusive chez un patient qui répond aux critères ou pathologie repris en catégorie 7 | Forfaitair honorarium voor exclusieve curietherapie voor een patiënt die beantwoordt aan de criteria of lijdt aan een aandoening opgenomen in categorie 7 | Brachy |
| 444253 | 444264 | Honoraires forfaitaires pour curiethérapie exclusive chez un patient qui répond aux critères ou pathologie repris en catégorie 8 | Forfaitair honorarium voor exclusieve curietherapie voor een patiënt die beantwoordt aan de criteria of lijdt aan een aandoening opgenomen in categorie 8 | Brachy |
| 444290 | 444301 | Honoraires forfaitaires pour curiethérapie combinée à une série d'irradiations externes chez un patient qui répond aux critères ou pathologie repris en catégorie 5 | Forfaitair honorarium voor curietherapie gecombineerd met uitwendige bestralingsreeks voor een patiënt die beantwoordt aan de criteria of lijdt aan een aandoening opgenomen in categorie 5 | Combined RT |
| 444312 | 444323 | Honoraires forfaitaires pour curiethérapie combinée à une série d'irradiations externes chez un patient qui répond aux critères ou pathologie repris en catégorie 6 | Forfaitair honorarium voor curietherapie gecombineerd met uitwendige bestralingsreeks voor een patiënt die beantwoordt aan de criteria of lijdt aan een aandoening opgenomen in categorie 6 | Combined RT |



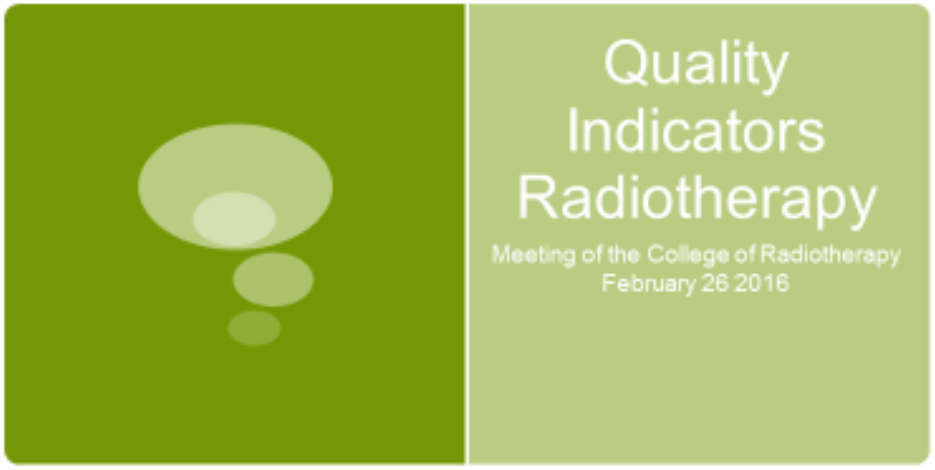
# Results discussed during the meeting and will be communicated later

# Future analysis

- From 'global' results to…
  - Uptake for specific guidelines
  - Time between incidence date and RT as 1st treatment
  - Difference between RT centre or not? CAVE: case mix!
  - …

# 1. QUALITY INDICATORS : Process

## N. Jansen




In the framework of the College of radiotherapy Quality Indicators Project for 2015, working groups were established for indicators relative to STRUCTURE (1), PROCESS (2) and OUTCOME (3). This paragraph concerns the PROCESS indicators.

The working group did consist of radiation oncologists and College members Luigi Moretti and Nicolas Jansen, and the strong involvement of College advisors from medical physics, radiation technologists and quality managers (Michel Van Dycke, John Vercauteren, Frederik Vanhoutte). Based on discussions by email and in person at a Brussels radiation oncology department, a detailed list of possible 'process indicators' was analyzed. The list was based on brainstorming by the team members and available scientific litterature in this domain. Mainly Dutch, French and Canadian experience was available.

Two categories of process quality indicators were identified :

(1) The definition of a optimal exemplary process ('good practice') and then indicate in a binary way (yes/no) if a given department of radiation oncology does comply with this good practice
(2) The definition of a similar but more quantitative pocess, and then the quantification of the deviation from this parameter by a given department OR for a given treatment.

It was decided to start the process quality indicators project with a category (2) like analysis of the 'timely delivery' of radiotherapy. There is indeed litterature available on the possibly negative influence of

starting a radiotherapy scheme late relative to the time of diagnosis or after a previous treatment lie surgery, and the same goes for protracting the treatment (interruptions of the treatment). Without already defining an optimum, it was decided to measure this timely delivery based on individual patient treatment data. This data will allow to compare the performance of a given department to the national mean, which can already serve as an eyeopener fo specific outlyers. At a later stage, for as far as litterature can give guidance, an optimum or a goal might be defined.

In the absence of a national platform for registering this information, the workgroup collaborated with the Collegevand more specifically the outcome indicatorsworkgroup, to use a common registration form to register individual patient and treatment related data. It was decided to do this as a pilot project, to test the feasability. The pilot project had some limitations :

(a) Only 3 pathologies (primary prostate radiotherapy, adjuvant breat radiotherapy, and primary radiotherapy for head&neck cancer excluding T1 laryngeal cancer)
(b) For these 3 pathologies, only 5 patients per department per pathology
(c) Per patient, a limited set of data items describing the patient and the treatment. Thee data items do include the DATES describing the patient itinerary, from the tumorboard decision in favor of a RT treatment, via the initial consultation and simulation dates, to the actual start end end date of the treatment itself

The quality managers were to retrieve these data items per patient in each department, using or not the paper form. The data were then to be filled in in a simple database, ofline, which was then to be send to the central collection point. The aggregated data from all departments was then exported to a exel worksheet for further analysis. During this whole process, no data was to be registered identifying individual patients (anonymous procedure).
The data collection went ahead according to the above explained methodology in the last quarter of 2015, and analysis was started late january 2016. The goal of the analysis was to :

(a) Very the feasibility
(b) Learn from problems encountered
(c) Give a first feedback to participating centers and other stajeholders to show the potential of this type of project

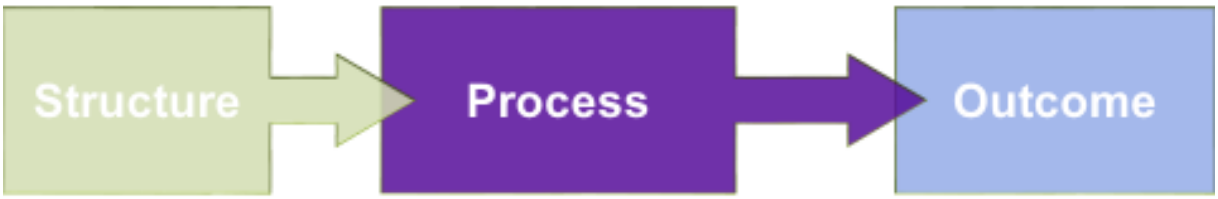
Because of limited ressources and time available between the end of the data collection period, and the first presentation at the yearly meeting of the College with the head of departments (february 2016), the first results presented below are just a taste of the possible future analysis, once the above explained limitations will be dealt wth. It is indeed the plan to repeat this analysis in 2016, based on the same 3 pathologies, but with a substantialy higher number of patients per pathology. The methodology will also be adapted, and the list of data-items registered by patients will be reviewed to be able to better interpret the timely delivery (eg, the addition of the use of adjuvant chemotherapy, and the end date of this treatment for breast cancer patients).

Below you will find the slides of the powerpoint presentation given on february 26th 2016 in Brussels explaining the above detailed approach, and also including some tables with preliminary results. The results only focus on the national means for most timely delivery related indicators. Because of the limitations explained above, it was decided too early to communicate on outlyers or to give individual feedback to departments on their own results relative to the national mean. This will however be discussed during future College meetings.

In conclusion, the project does donfirm the feasibility of a national process quality indicator project.

For the College and the process QI team,
Nicolas Jansen, MD

## Quality Indicators




College members and advisors
- Nicolas Jansen
- Luigi Moretti
- Michel Van Dycke
- Frederik Vanhoutte
- John Vercauteren

## Quality Indicators

**Process**

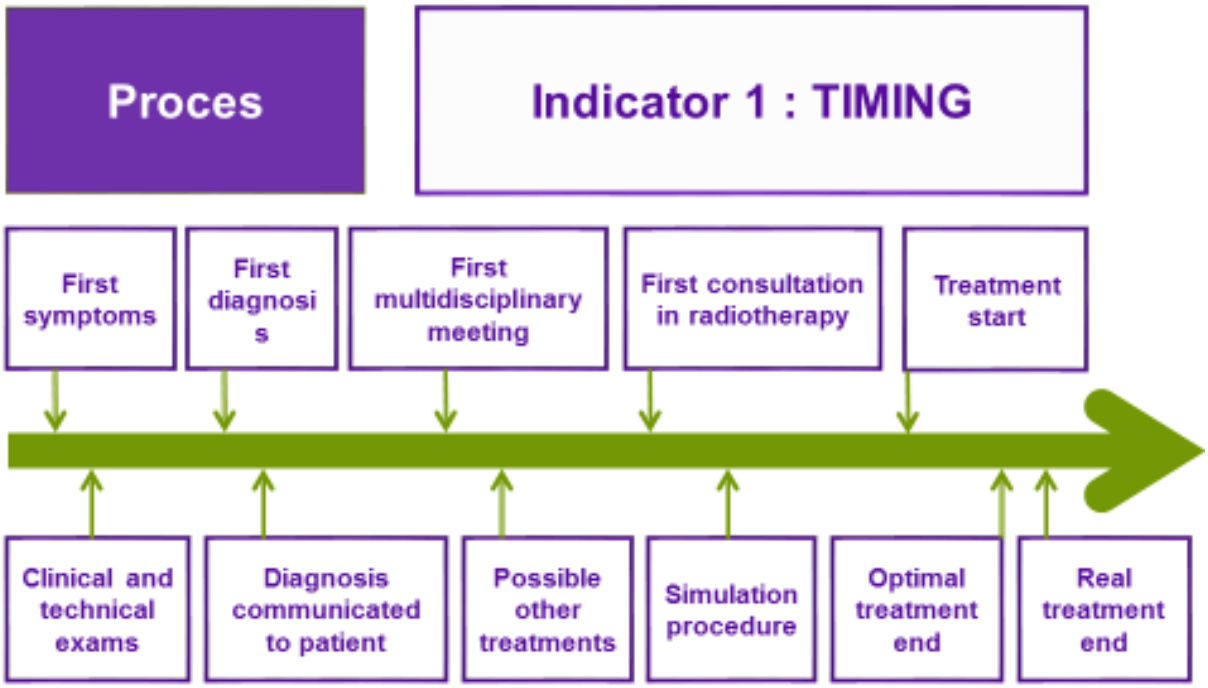
**Test phase**

**Literature search : large number of possible process indicators identified**

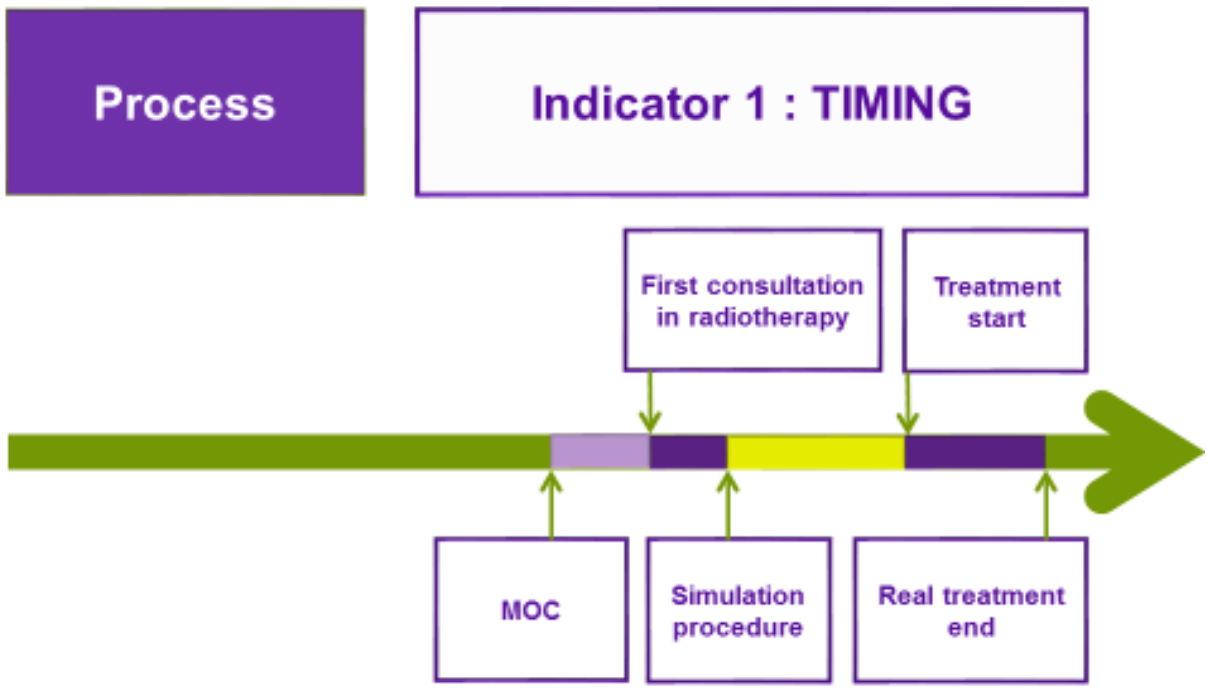
**PILOT PROJECT :**
- **focus on timely delivery**
- **data acquisition linked to the questionnaires for outcome**

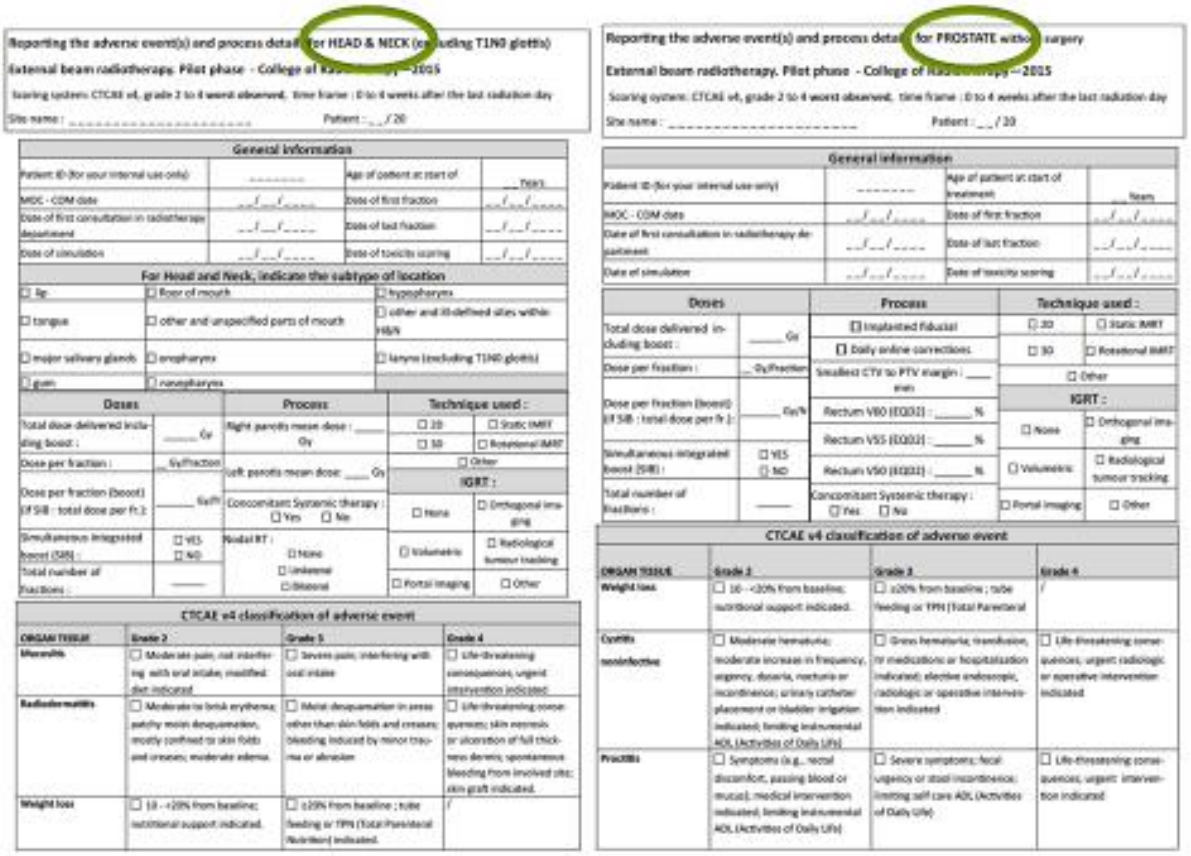
**PILOT because :**
- **only 3 pathologies**
  - Adjuvant external breast radiotherapy
  - First line head&neck radiotherapy except larynxT1N0
  - First line prostate radiotherapy
- **only 5 patients per department**
- **need to establish methodology and IT platform**

## Quality Indicators




## Quality Indicators





Reporting the adverse event(s) and process details for HEAD & NECK (excluding T1N0 glottis)

External beam radiotherapy. Pilot phase - College of Radiotherapy – 2015

Scoring system: CTCAE v4, grade 2 to 4 worst observed. time frame : 0 to 4 weeks after the last radiation day

Site name : _____ Patient : __ / 20

General information

| | | | |
|---|---|---|---|
| Patient ID (for your internal use only) | _____ | Age of patient at start of | __ Years |
| MOC - COM date | __/__/____ | Date of first fraction | __/__/____ |
| Date of first consultation in radiotherapy department | __/__/____ | Date of last fraction | __/__/____ |
| Date of simulation | __/__/____ | Date of toxicity scoring | __/__/____ |

For Head and Neck, indicate the subtype of location

| | | |
|---|---|---|
| ☐ lip | ☐ floor of mouth | ☐ hypopharynx |
| ☐ tongue | ☐ other and unspecified parts of mouth | ☐ other and ill-defined sites within H&N |
| ☐ major salivary glands | ☐ oropharynx | ☐ larynx (excluding T1N0 glottis) |
| ☐ gum | ☐ nasopharynx | |

| Doses | | Process | Technique used : | |
|---|---|---|---|---|
| Total dose delivered including boost : | _____ Gy | Right parotis mean dose : _____ Gy | ☐ 2D | ☐ Static IMRT |
| | | | ☐ 3D | ☐ Rotational IMRT |
| Dose per fraction : | __ Gy/fraction | Left parotis mean dose: _____ Gy | ☐ Other | |
| Dose per fraction (boost) (if SIB : total dose per fr.): | _____ Gy/fr | Concomitant Systemic therapy : ☐ Yes ☐ No | IGRT : | |
| | | | ☐ None | ☐ Orthogonal imaging |
| Simultaneous integrated boost (SIB) : | ☐ YES ☐ NO | Nodal RT : ☐ None ☐ Unilateral ☐ Bilateral | ☐ Volumetric | ☐ Radiological tumour tracking |
| Total number of fractions : | _____ | | ☐ Portal imaging | ☐ Other |

CTCAE v4 classification of adverse event

| ORGAN TISSUE | Grade 2 | Grade 3 | Grade 4 |
|---|---|---|---|
| Mucositis | ☐ Moderate pain; not interfering with oral intake; modified diet indicated | ☐ Severe pain; interfering with oral intake | ☐ Life-threatening consequences; urgent intervention indicated |
| Radiodermatitis | ☐ Moderate to brisk erythema; patchy moist desquamation, mostly confined to skin folds and creases; moderate edema | ☐ Moist desquamation in areas other than skin folds and creases; bleeding induced by minor trauma or abrasion | ☐ Life-threatening consequences; skin necrosis or ulceration of full thickness dermis; spontaneous bleeding from involved site; skin graft indicated. |
| Weight loss | ☐ 10 - <20% from baseline; nutritional support indicated. | ☐ ≥20% from baseline ; tube feeding or TPN (Total Parenteral Nutrition) indicated. | / |

Reporting the adverse event(s) and process details for PROSTATE without surgery

External beam radiotherapy. Pilot phase - College of Radiotherapy – 2015

Scoring system: CTCAE v4, grade 2 to 4 worst observed. time frame : 0 to 4 weeks after the last radiation day

Site name : _____ Patient : __ / 20

General information

| | | | |
|---|---|---|---|
| Patient ID (for your internal use only) | _____ | Age of patient at start of treatment | Years |
| MOC - COM date | __/__/____ | Date of first fraction | __/__/____ |
| Date of first consultation in radiotherapy department | __/__/____ | Date of last fraction | __/__/____ |
| Date of simulation | __/__/____ | Date of toxicity scoring | __/__/____ |

| Doses | | Process | Technique used : | |
|---|---|---|---|---|
| Total dose delivered including boost : | _____ Gy | ☐ Implanted fiducial | ☐ 3D | ☐ Static IMRT |
| | | ☐ Daily online corrections | ☐ 3D | ☐ Rotational IMRT |
| Dose per fraction : | __ Gy/fraction | Smallest CTV to PTV margin : ____ mm | ☐ Other | |
| Dose per fraction (boost) (if SIB : total dose per fr ): | _____ Gy/fr | Rectum V80 (EQD2) : _____ % | IGRT : | |
| | | Rectum V65 (EQD2) : _____ % | ☐ None | ☐ Orthogonal imaging |
| Simultaneous integrated boost (SIB) : | ☐ YES ☐ NO | Rectum V50 (EQD2) : _____ % | ☐ Volumetric | ☐ Radiological tumour tracking |
| Total number of fractions : | _____ | Concomitant Systemic therapy : ☐ Yes ☐ No | ☐ Portal imaging | ☐ Other |

CTCAE v4 classification of adverse event

| ORGAN TISSUE | Grade 2 | Grade 3 | Grade 4 |
|---|---|---|---|
| Weight loss | ☐ 10 - <20% from baseline; nutritional support indicated. | ☐ ≥20% from baseline ; tube feeding or TPN (Total Parenteral | / |
| Cystitis noninfective | ☐ Moderate hematuria; moderate increase in frequency, urgency, dysuria, nocturia or incontinence; urinary catheter placement or bladder irrigation indicated; limiting instrumental ADL (Activities of Daily Life) | ☐ Gross hematuria; transfusion, IV medications or hospitalization indicated; elective endoscopic, radiologic or operative intervention indicated | ☐ Life-threatening consequences; urgent radiologic or operative intervention indicated |
| Proctitis | ☐ Symptoms (e.g., rectal discomfort, passing blood or mucus); medical intervention indicated; limiting instrumental ADL (Activities of Daily Life) | ☐ Severe symptoms; fecal urgency or stool incontinence; limiting self care ADL (Activities of Daily Life) | ☐ Life-threatening consequences; urgent intervention indicated |

## Quality Indicators

**Process**

**Methodology**

**LIMITATIONS**

- data per department possibly not representatif because of only 5 patients
- missing data like no MOC dates
- difficult interpretation because of different fractionation schemes
- difficult interpretation because of different local habits; eg. :
  - initial MOC+consult. before chemo, no repeat MOC or consult. for RT start

## Quality Indicators

**Process**

**Results - response**

| | Number of participating departments | Min number of patients | Max number of patients | Overall total number of patients |
|---|---|---|---|---|
| head and neck | 21 | 2 | 5 | 100 |
| prostate | 21 | 3 | 5 | 96 |
| breast | 22 | 3 | 5 | 105 |

## Quality Indicators

**Process**

**Results - prostate**

| | Min | Max | Mean | Total (all dept) |
|---|---|---|---|---|
| | | | | |
| age | 66 | 78 | 73 | |
| use of markers (N° per dept) | 0 | 5 | | 47 = 49% |
| use of rotational IMRT (id) | 0 | 5 | | 55 = 57% |
| fractions | 5 | 42 | | |
| dose per fraction (Gy) | 1,47 | 7,25 | | |
| dose per fraction (boost) | 0 | 3,5 | | |
| CTV to PTV margin in mm | 5 | 10 | 7,2 | |
| Id, without daily IGRT | 8 | 10 | | |

## Quality Indicators

**Process**

**Results - prostate**

| IGRT | Total |
|---|---|
| *Some kind of IGRT* | *96* |
| Volumetric | 61 |
| Tracking | 1 |
| Orthogonal imaging | 21 |
| Portal imaging | 7 |
| Other | 6 |

| IGRT frequency | Total |
|---|---|
| Daily online | 83 |
| Not daily online | 28 |

| Non volumetric IGRT | Total |
|---|---|
| *All* | *35* |
| With fiducials | 28 |
| No fiducials | 7 |

No fiducials, no volumetric imaging, no daily control : 5

## Quality Indicators

**Process**

**Results – prostate - timing**

| Department | Moc to start | Consult to start | Sim to start | Start to end |
|---|---|---|---|---|
| 1 | 60 | 53 | 14 | 37 |
| 2 | 152 | 49 | 11 | 47 |
| 3 | 111 | 45 | 15 | 52 |
| 4 | 52 | 33 | 16 | 53 |
| 5 | 92 | 21 | 7 | 35 |
| 6 | 68 | 39 | 8 | 56 |
| 7 | 90 | 77 | 13 | 56 |
| 8 | 134 | 56 | 12 | 56 |
| 9 | 80 | 41 | 7 | 46 |
| 10 | 44 | 30 | 23 | 42 |
| 11 | 143 | 53 | 12 | 49 |
| 12 | 70 | 36 | 7 | 56 |
| 13 | 76 | 36 | 20 | 29 |
| 14 | 131 | 64 | 20 | 57 |
| 15 | 53 | 16 | 8 | 54 |
| 16 | 69 | 41 | 16 | 55 |
| 17 | No moc | 36 | 17 | 47 |
| 18 | No moc | 64 | 15 | 35 |
| 19 | 48 | 27 | 11 | 35 |
| 20 | 104 | 9 | 9 | 40 |
| 21 | 65 | 26 | 8 | 53 |
| *Mean* | *86* | *41* | *13* | *47* |
| *Min* | *48* | *9* | *7* | *29* |
| *Max* | *152* | *77* | *23* | *57* |
| *St Dev* | *34* | *17* | *4,5* | *9* |

## Quality Indicators

**Process**

**Results - breast**

| | Min | Max | Mean |
|---|---|---|---|
| age | 36 | 85 | 62 |
| fractions | 5 | 42 | 21,7 |
| dose per fraction | 1,8 | 6,2 | 2,5 |
| dose per fraction (boost) | 0 | 9 | 2,5 |

| number of patients treated | Bilateral | Left | Right | Total |
|---|---|---|---|---|
| supine | 1 | 57 | 40 | 98 |
| prone | 0 | 4 | 3 | 7 |
| total | 1 | 61 | 43 | 105 |

## Quality Indicators

**Process**

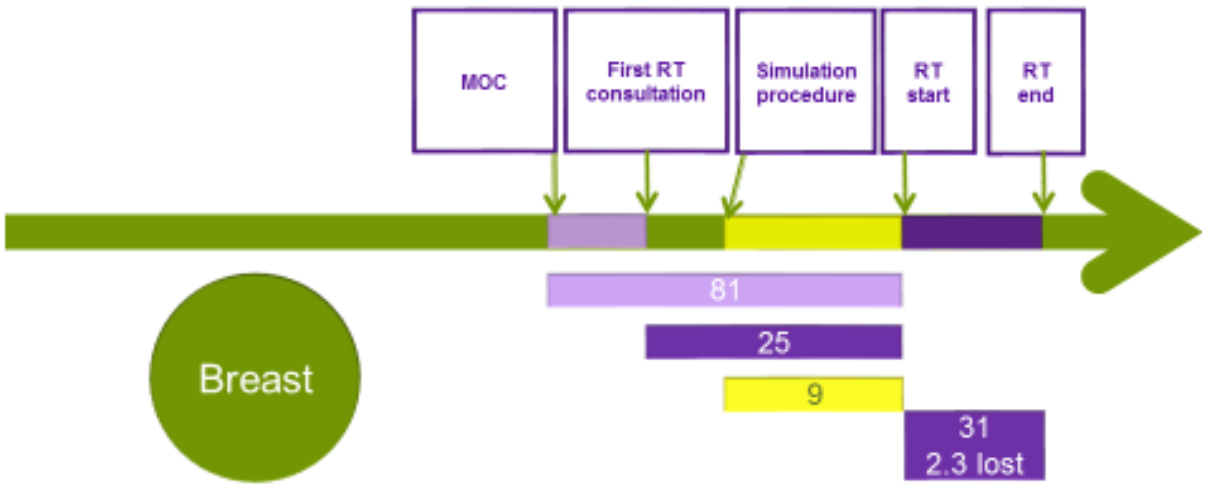
**Results – breast - timing**

| Department | Mean moc to start | Mean consult to start | Mean sim to start | Mean start to end | Mean lost days relative to best possible |
|---|---|---|---|---|---|
| 1 | 85 | 21 | 10 | 29 | 2,4 |
| 2 | 54 | 20 | 8 | 31 | 6,2 |
| 3 | 146 | 16 | 11 | 35 | 1,0 |
| 4 | 158 | 10 | 8 | 46 | 4,0 |
| 5 | 121 | 22 | 8 | 35 | 1,5 |
| 6 | 32 | 14 | 8 | 35 | 1,2 |
| 6 | 27 | 18 | 11 | 40 | 3,4 |
| 7 | 61 | 18 | 12 | 33 | 5,6 |
| 8 | 101 | 51 | 11 | 33 | 3,7 |
| 9 | 74 | 9 | 7 | 28 | 0,8 |
| 10 | 111 | 21 | 14 | 29 | 3,2 |
| 11 | 80 | 21 | 7 | 26 | 0,0 |
| 12 | 93 | 26 | 4 | 34 | 2,4 |
| 13 | 122 | 28 | 10 | 26 | 1,6 |
| 14 | 33 | 51 | 19 | 33 | 2,8 |
| 15 | 112 | 15 | 1 | 27 | 1,4 |
| 16 | 44 | 22 | 10 | 29 | 1,0 |
| 17 | 94 | 25 | 10 | 29 | 0,0 |
| 18 | 191 | 79 | 18 | 26 | 3,0 |
| 19 | 25 | 15 | 7 | 23 | 1,2 |
| 20 | 61 | 21 | 8 | 41 | 2,6 |
| 21 | 19 | 13 | 7 | 26 | 1,0 |
| | | | | | |
| **Mean** | **81** | **25** | **9** | **31** | **2,3** |
| Min | 19 | 9 | 1 | 23 | 0,0 |
| Max | 191 | 79 | 19 | 46 | 6,2 |
| St dev | 46 | 16 | 4 | 6 | 1,6 |

## Quality Indicators

**Process**

**Indicator 1 : TIMING**



## Quality Indicators

**Process**

**Results – breast - remarks**

**LIMITATIONS**

**-Range of fractionation schemes**

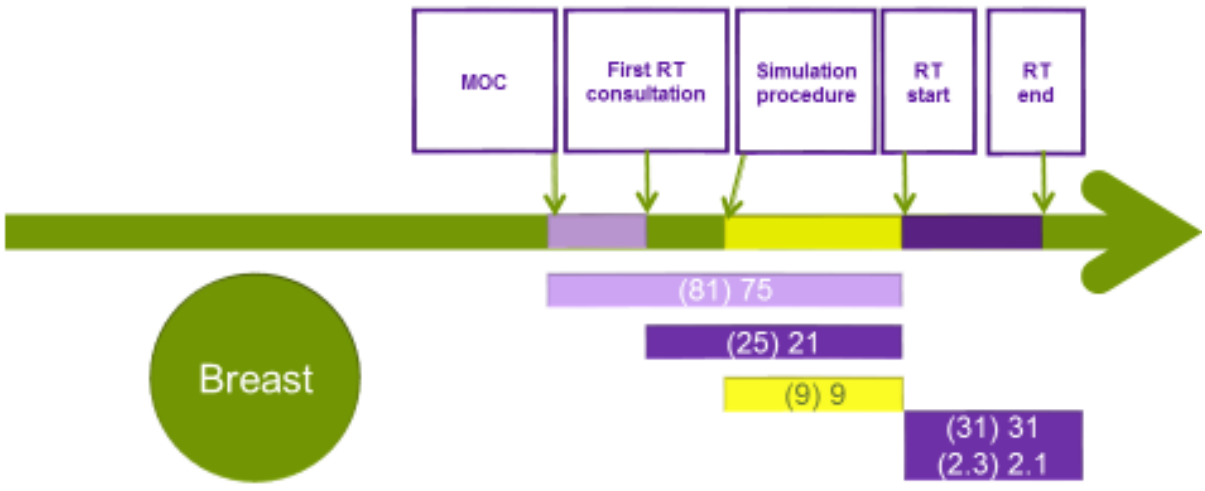
**-Range of habits : some departments do organize a MOC+consultation and then no further consultation until sim**

**-Knowing that chemo is ongoing, some departments organize the sim early, others later, without that this would influence the start date**

## Quality Indicators

**Process**

**Indicator 1 : TIMING**



## Quality Indicators

**Process**

**Results – head and neck**

| | Min | Max | Mean | Total |
|---|---|---|---|---|
| number of patients | 2 | 5 | | 100 |
| age | | | 72 | |

## Quality Indicators

**Process**

**Results – head and neck**

| IGRT and treatment technique | Orthogonal imaging | Other imaging | Portal imaging | Volumetric imaging | Total |
|---|---|---|---|---|---|
| Rotational IMRT | 23 | 10 | 3 | 22 | 58 |
| Static IMRT | 13 | 0 | 6 | 23 | 42 |
| Total | 36 | 10 | 9 | 45 | 100 |

## Quality Indicators

**Process**

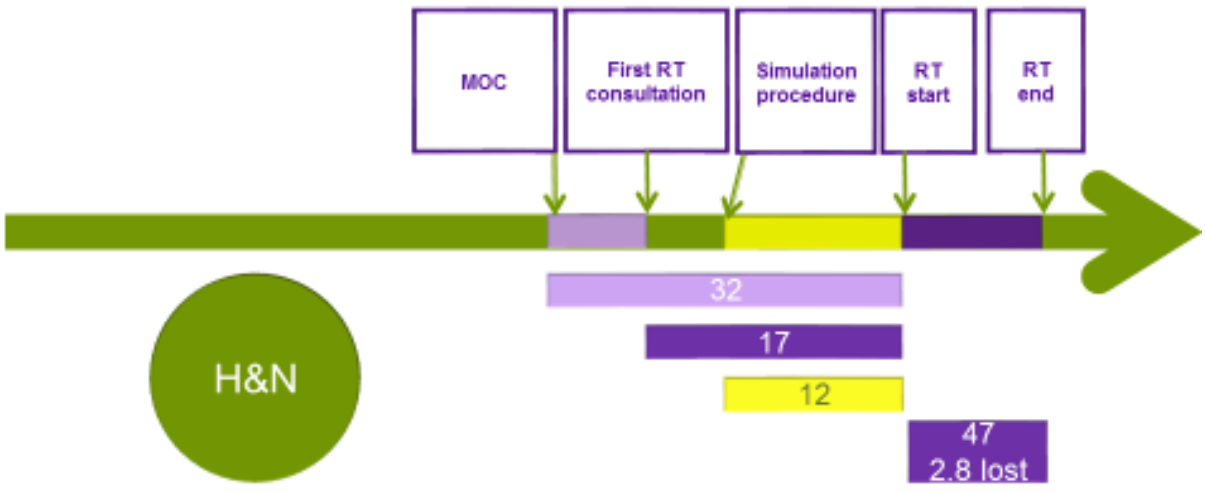
**Results – head and neck**

| | Mean MOC - start | Mean consult - start | Mean sim - start | Mean start - end | Relative to fastest possible |
|---|---|---|---|---|---|
| 1 | 36 | 20 | 12 | 46 | 2,0 |
| 2 | 22 | 20 | 15 | 49 | 5,5 |
| 3 | 22 | 18 | 12 | 51 | 4,3 |
| 4 | 36 | 19 | 21 | 51 | 3,8 |
| 5 | 48 | 17 | 9 | 48 | 2,0 |
| 6 | 36 | 15 | 14 | 49 | 4,0 |
| 7 | 26 | 19 | 14 | 50 | 3,0 |
| 8 | 31 | 24 | 13 | 41 | -3,3 |
| 9 | 51 | 10 | 9 | 45 | 2,6 |
| 10 | 30 | 24 | 16 | 46 | 4,4 |
| 11 | 7 | 15 | 11 | 47 | 0,2 |
| 12 | 26 | 14 | 4 | 49 | 2,8 |
| 13 | 37 | 15 | 12 | 44 | 2,0 |
| 14 | 46 | 25 | 15 | 48 | 1,2 |
| 15 | 35 | 12 | 8 | 49 | 3,8 |
| 16 | 31 | 17 | 13 | 47 | 2,6 |
| 17 | 29 | 12 | 12 | 42 | -7,8 |
| 18 | 29 | 20 | 13 | 42 | 1,8 |
| 19 | 17 | 12 | 11 | 44 | 0,8 |
| 20 | 26 | 9 | 9 | 49 | 3,6 |
| 21 | 22 | 18 | 12 | 44 | -2,6 |
| **Mean** | **30** | **17** | **12** | **47** | **1,8** |
| min | 7 | 9 | 4 | 41 | -7,8 |
| max | 51 | 24 | 21 | 51 | 5,5 |

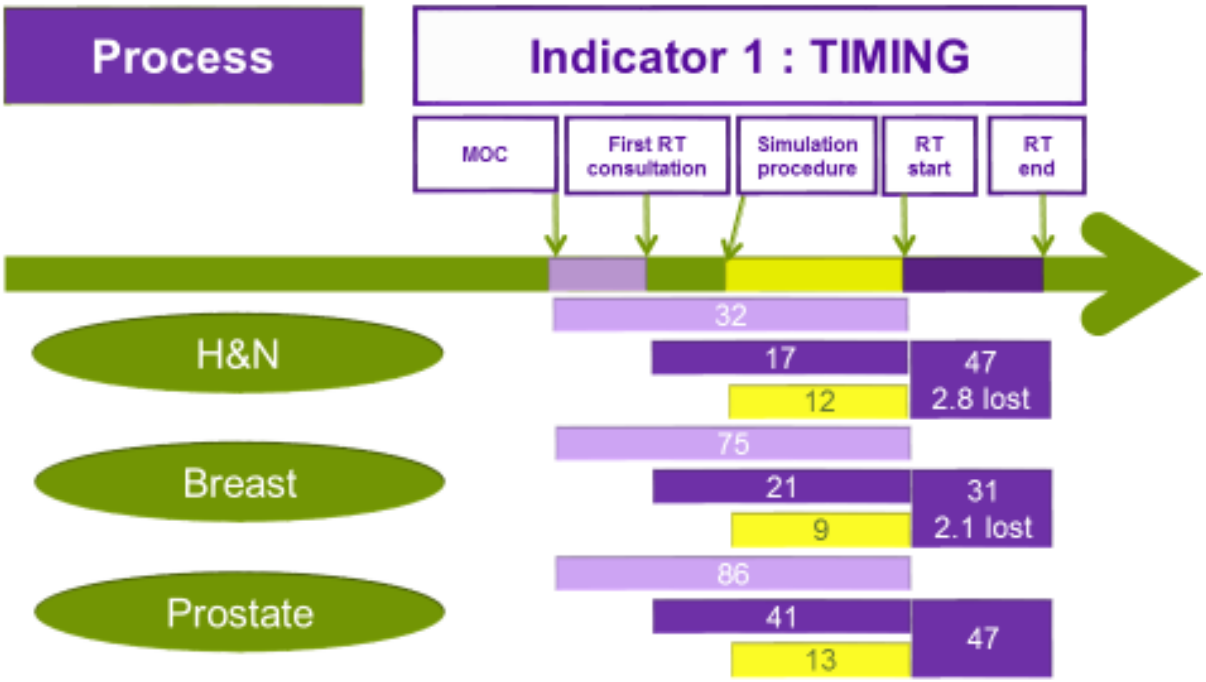
## Quality Indicators

**Process**

**Indicator 1 : TIMING**



## Quality Indicators




## Quality Indicators

| Process | Possible next steps |
|---|---|

**Analyse trends between years**

**Compare to published 'best practice' guidelines on timely delivery**

## 1. QUALITY INDICATORS : Outcome

### V. Remouchamps

# Belgian College of Radiotherapy
# Quality Indicators: Test phase

OUTCOME

→Perspectives

Meeting with the head of departments, Feb 26, 2016, Bxl

# Start end 26/11/2015
# 31/1/2016 2 months: results!
# This was fast …!

College van Geneesheren Radiotherapie-Oncologie
Collège des Médecins Radiothérapie-Oncologie

Leuven, 26/11/2015

To the heads of the Radiation Oncology departments
To the Radiation Oncology quality managers
Dear colleagues,

What is of interest to us? Uncomplicated cure. Or care. And with as little complications as possible. That's our main motivation to practice our exciting specialty, to look for new machines, better methods, etc...

We strongly believe that Belgian Radiation Oncology is already performing an outstanding job, although we have multiple ideas to improve our methods and results. Therefore we believe it is important ...

# Feedback

- Responses from 21/24 centers
- Excellent and constructive remarks
- Globally more coding possibilities are requested, details, doses
- Excellent collaboration of quality managers

Thanks to all of you and teams !!!

# Pilot Phase 5 patients, 21/25 centers

| PROSTATE | | | | | | |
|---|---|---|---|---|---|---|
| | weightloss | | cystitis | | proctitis | |
| | number | % | number | % | number | % |
| **grade 0** | 32/96 | 33 | 27/96 | **28** | 53/96 | **55** |
| **grade 1** | 14/96 | **15** | 43/96 | **45** | 23/96 | **24** |
| **grade 2** | 0 | 0 | 18/96 | 19 | 10/96 | 10 |
| **grade 3** | 0 | 0 | 0 | 0 | 0 | 0 |
| **unknown** | 46/96 | 48 | 4/96 | 4 | 6/96 | 6 |
| **blank** | 4/96 | 4 | 4/96 | 4 | 4/96 | 4 |

*Interesting, no grade 3!!*

# Pilot Phase 5 patients, 21/25 centers

| HEAD and NECK except larynx T1N0 | | | | | | |
|---|---|---|---|---|---|---|
| | weight loss | | mucositis | | radiodermatitis | |
| | number | % | number | % | number | % |
| **grade 0** | 0 | | 14/100 | 14 | 16/100 | 16 |
| **grade 1** | 31/100 | **31** | 19/100 | 19 | 25/100 | **25** |
| **grade 2** | 30/100 | **30** | 34/100 | **34** | 47/100 | **47** |
| **grade 3** | 12/100 | 12 | 30/100 | **30** | 8/100 | 8 |
| **unknown** | 12/100 | 12 | 11/100 | 11 | 2/100 | 2 |
| **blank** | 15/100 | 15 | 2/100 | 2 | 2/100 | 2 |

# Pilot Phase 5 patients, 21/25 centers

| BREAST without nodal RT | | |
|---|---|---|
| | radiodermatitis | |
| | number | % |
| **grade 0** | 33/107 | **31** |
| **grade 1** | 51/107 | **48** |
| **grade 2** | 22/107 | 21 |
| **grade 3** | 1/107 | 1 |
| **unknown** | 0 | 0 |
| **blank** | 0 | 0 |

# (very)Preliminary "Conclusions"

- Possible to collect and report Outcome indicators *at a national level*
- As expected, high level treatments, excellent and expected outcomes, some local variation
- Too few patients (5/center) to correlate process and outcome *currently*

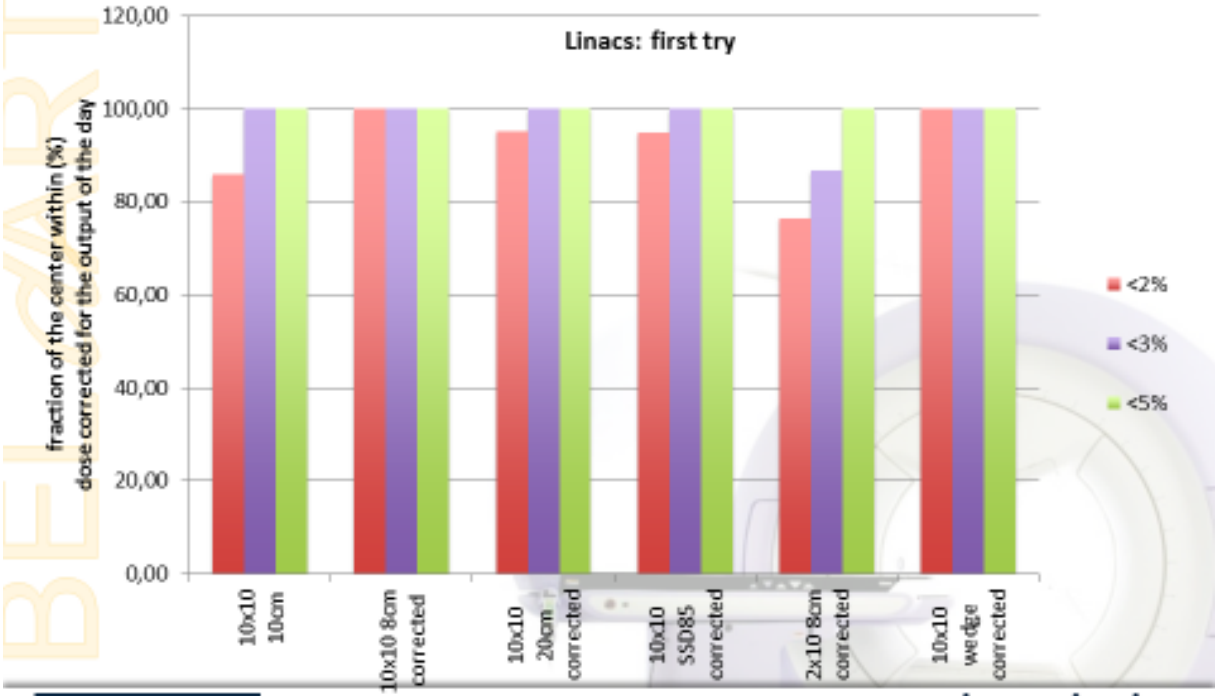
# Perspectives / Action Plan

1. Refine the forms /database with remarks
2. Collect 20 patients /center, (3 pathol.), in 2016
3. Analyse the data with a memorandus (Mathilde Goffaux, Master 2 in Biomedical Sciences from University of Namur, starts March 4, 2016, 6 months), later a doctorandus for college projects
4. Discuss with the Quality Manager's group the project extension: more pathologies, patients
5. Electronic integration, exports, dosimetric data, Big Data…! **Additional means**, eHealth platform integration, export from medical files, TPS, visit other neighbouring countries

## 2. BELDART I & II : results – BELDART II : future

**B. Reniers**

# Global results basic tests EPR: 26 centers

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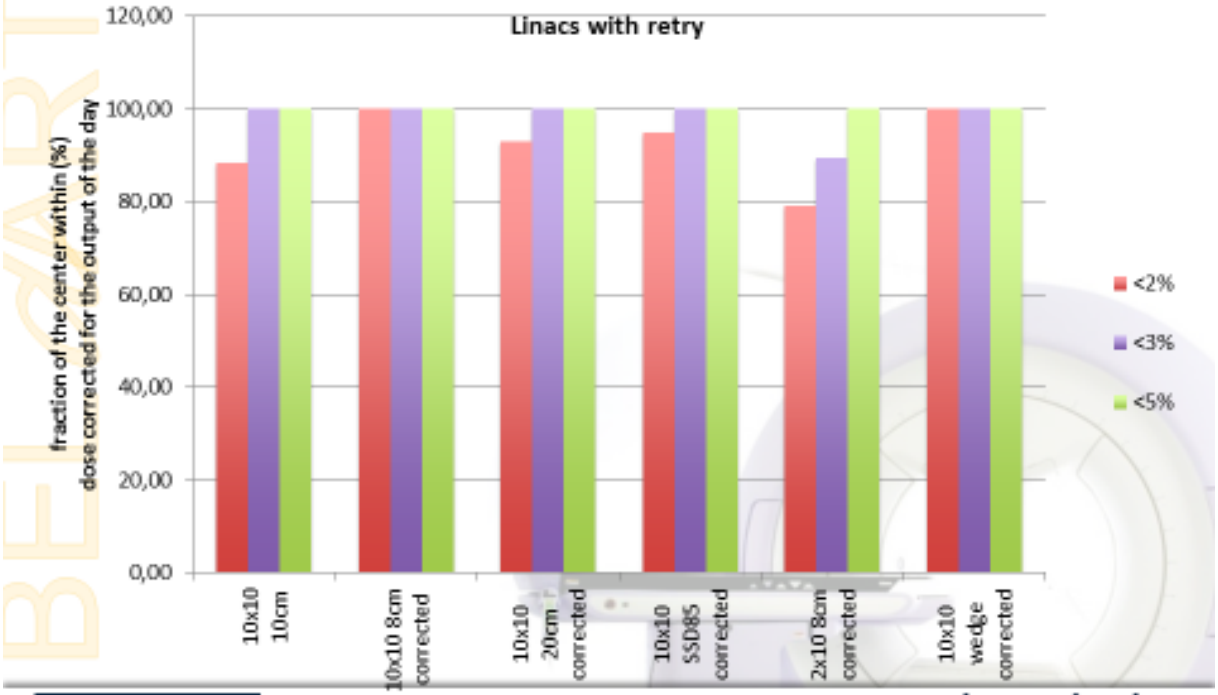
# Global results basic tests EPR: 26 centers

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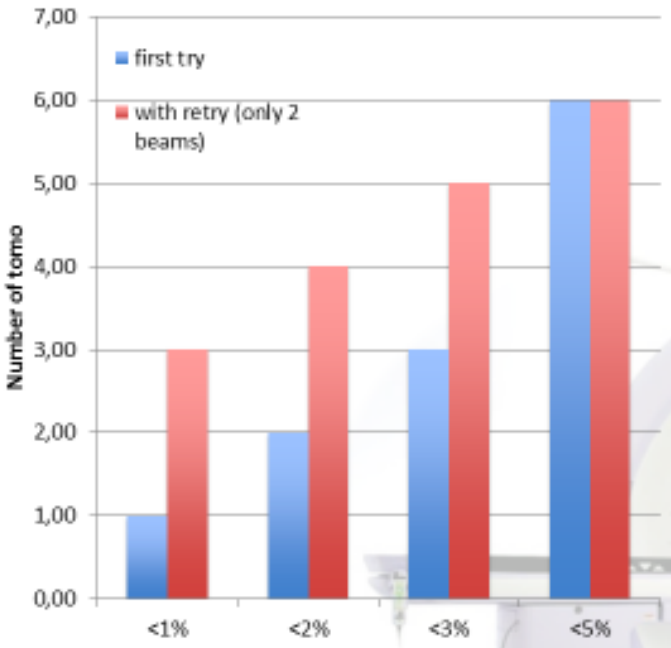
# Tomotherapy basic test




The normal procedure is to calibrate the Tomo using water equivalent plastic and the fact that we use water has revealed a problem in the CT calibration curve

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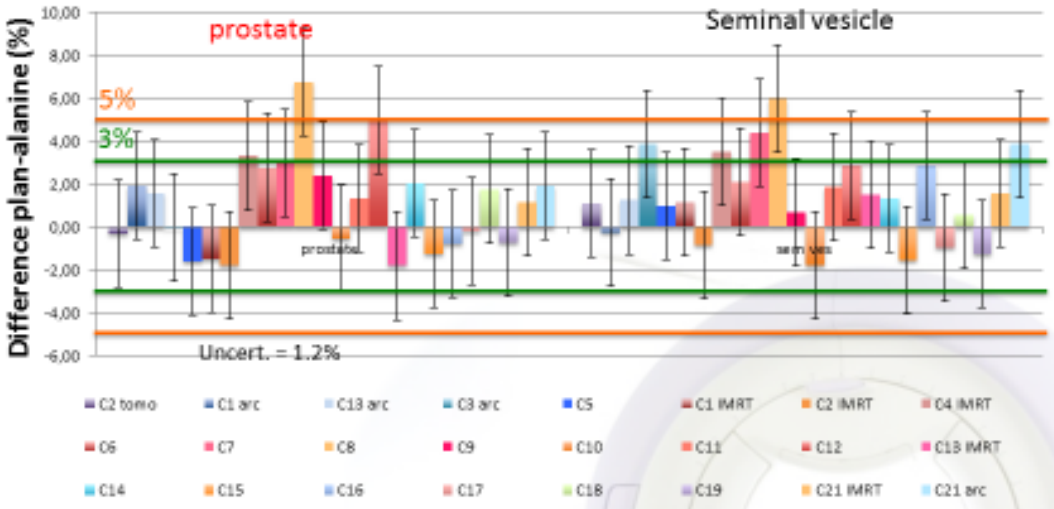
# Alanine high dose region




- Prostate: 87.9% within 3% (29 beams /33)
- Sem Ves: 78.8% within 3% (26 beams /33)

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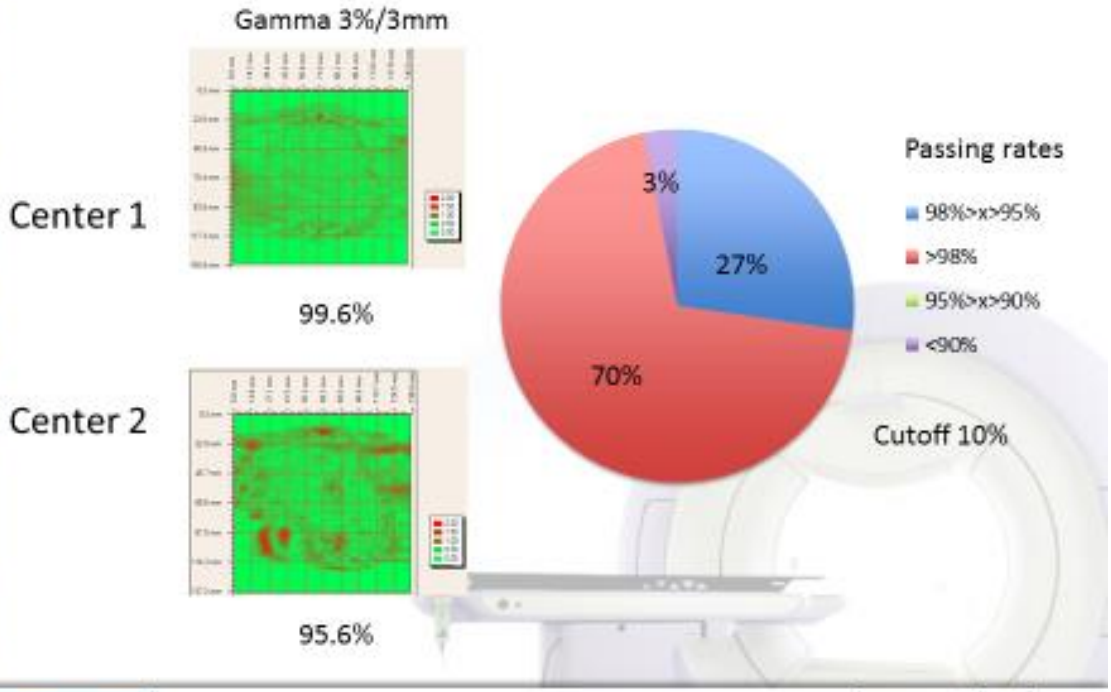
# Film results: gamma 3%/3mm

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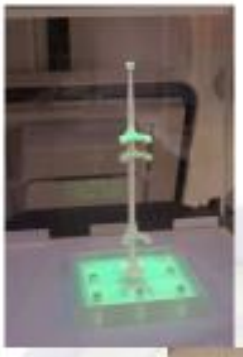
# BELdART-2 => BELdART-3

- Dose verification of basic and dynamic RT techniques in Belgium for SBRT
- 3 objectives:
  - Basic dosimetric check of MVX beams
    - *Subset of BELdART tests (same as B2?) but with higher dose*
    - *Mailing audit based on BELdART-1 protocols using dedicated holder*
  - Dynamic RT for SBRT (IMRT, tomo, RA, VMAT, ...)
    - *Mailing audit: phantom, EPR dosimeters* & film
  - *Benchmarking with BHPA IC (to redo)*



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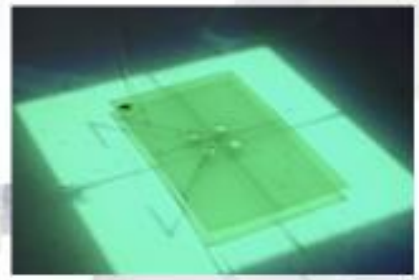
## Film: Calibration and the one-scan procedure

- Combination of films with alanine
  - Calibration (about 0, 50, 100, 200, 400, 800, 1600 cGy) measured with alanine
  - One-scan procedure (prescription dose of the plan measured with alanine)

➡ low uncertainty on the dose to the films used for calibration + traceability



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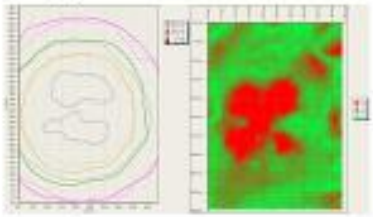
## 1 step: cranial stereotaxy

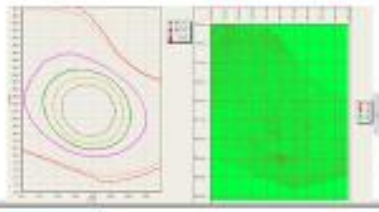
Development for SBRT:

- Feasibility study during a bachelor thesis (3 weeks) done in Hasselt (VMAT) and liege (Cyberknife)

lung



head



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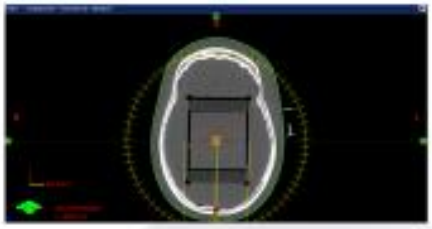
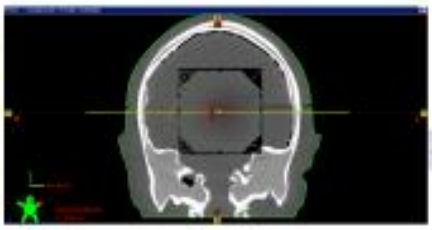
# Film + alanine

- Use more than 1 film
  - One in combination with alanine to confirm the absolute dosimetry
  - One without alanine used in a more "relative way"
  - All the film scanned together



Film1 with alanine



Film2 no alanine

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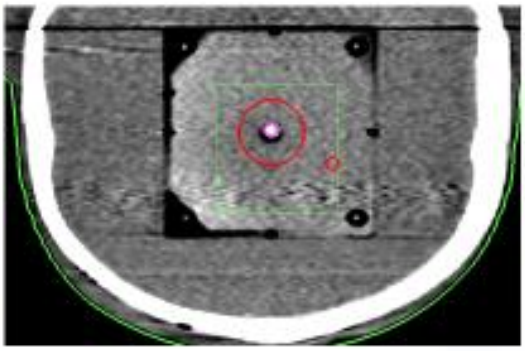
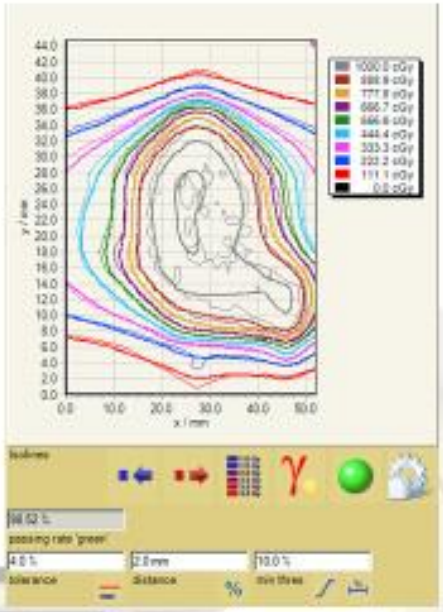
# Combination film - alanine



- Put 2 contours with different sizes
- Place an alanine pellet in the bigger one
- Use the film for the small one
- Use "rescale" to report the dose measured by alanine to the film and so lower the uncertainty.



Slight rotation that was not compensated

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# Material B3: head

- Phantom ok
- Films ±ok
- Alanine ok
- Positioning system? Probably better to use what is used in the institutes.
- Imaging done at the institutes.
- Contours: send a CT of the head with contours to be registered to the actual CT made in the institutes.

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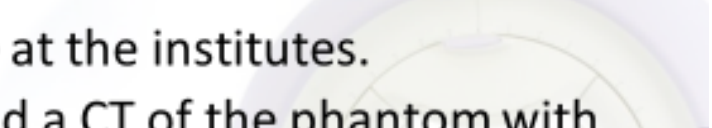
# Material B3: lung

- Phantom: to buy
- Films ok
- Alanine ok
- Positioning system? Probably better to use what is used in the institutes.
- Imaging done at the institutes.
- Contours: send a CT of the phantom with contours to be registered to the actual CT made in the institutes.



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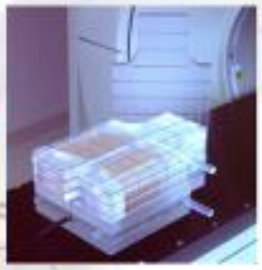
# Phantom lung

- CIRS (30000 eur)
  - Good
    - heterogeneities
    - Coronal position of the film
  - Bad
    - size of the film compared to the tumor.
    - Possibility to turn the film/tumor insert
- Rando (or similar) + tumor (25000 + tumor)
  - Good
    - heterogeneities
  - Bad
    - Only axial films
- IMRT dose verification phantom + tumor
  - Good
    - Coronal films possible
  - Bad
    - Heterogeneities? PMMA phantom.
- Home-made phantom based on the PMMA one
  - Poly? RW3? + Lung equivalent material + spinal cord
  - Slabs -> coronal films possible
  - Position for alanine + chamber



NuTeC Nuclear Technologisch Centrum

universiteit hasselt

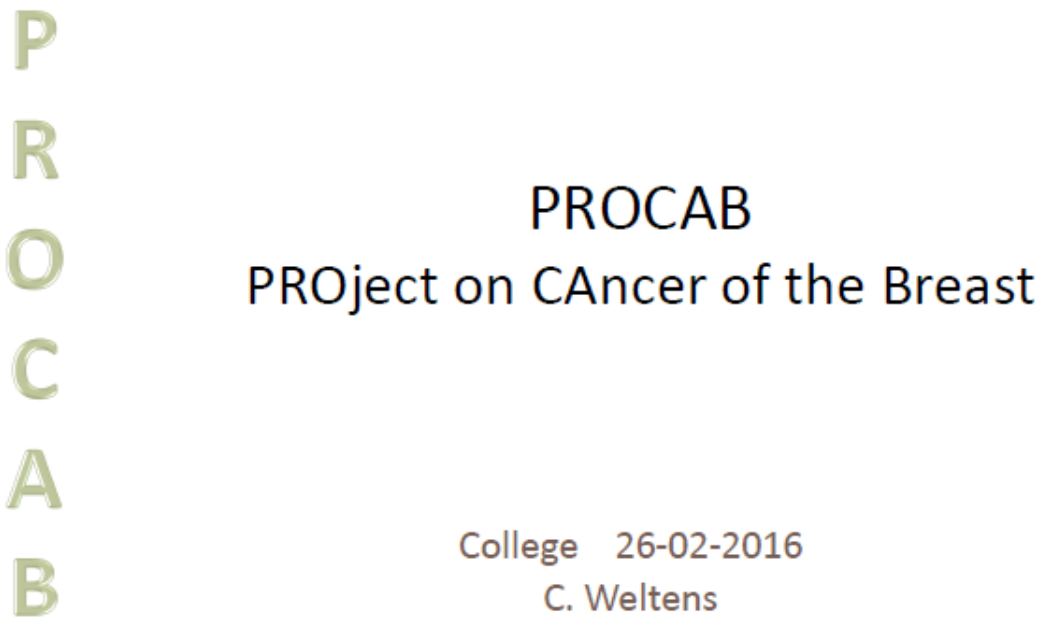
- Steering committee:
  - Stefaan Vynckier, Dirk Verellen, François Sergent, Alex Rijnders + Milan Tomsej
- No scientific committee but possibilities to test or ask for advices.

NuTeC Nuclear Technologisch Centrum

universiteit hasselt

## 3. Procab

**C. Weltens, V. Remouchamps**



## *Guideline-based contouring and clinical audit systems*

Summary, C. Weltens

Accurate, unambiguous and precise target delineation is mandatory in high conformal radiotherapy, since the treatment plan and subsequently treatment delivery are based on the delineated target volumes. Errors in target delineation will on the one hand lead to systematic errors in treatment delivery and possibly to geographical misses in clinical practice. The projected outcome will be undermined both with respect to the chances of tumor control and the risks of side effects. On the other hand, inconsistencies in target volume contouring compromise the validity of the results of clinical trials.

To improve the quality of the delineations, guidelines were made for nearly all tumor sites as well as for the normal tissues. Notwithstanding these published guidelines, important inter- and intra-observer variation in target delineation have been demonstrated. Several solutions have been proposed to improve the quality of target delineation: (1) for nearly all tumor sites delineation guidelines with complementary atlases have been published, (2) the registration of CT scans in treatment position with a combination of different imaging modalities has been tested and introduced, (3) automated and semi-automated delineation software has been developed, and (4) education through hands-on workshops at radiotherapy meetings and online tutoring sessions (e.g. FALCON) is available.

Studies also show that peer review can improve delineation quality. The quality of target delineation was measured in Belgium through clinical audits for rectal and breast cancer patients. We have evaluated the role of a central review platform in improving uniformity of clinical target volume delineations within a national Belgian project. All 25 Belgian radiation oncology departments were invited to participate in this QA project. CTV delineation guidelines and atlases were discussed and distributed at a national meeting. After this education of the radiation oncologists, a review process was set up. Departments were asked to delineate the clinical target volumes and to upload it to a secured server. For rectal cancer, the clinical target volume was delineated and for breast cancer, the regional nodal areas (internal mammary, level I to IV axillary and Rotter space) were contoured. A trained radiation technologist then reviewed all cases according to the guidelines and feedback was given within 24 hours. Twenty-four departments participated to the study and in total more than 2200 contours were reviewed: over 1200 rectal cancer patients and over 1000 breast cancer patients.

Evaluation of the contours showed that 74 % of rectal cancer cases were modified. These high numbers indicate that the interpretation of guidelines is not always straightforward. More important however is the learning curve that was achieved. The rectal overlap and volumetric parameters significantly increased between the first ten patients per center and others. The study of the contouring of the locoregional nodal delineation in breast cancer is still ongoing and first results are presented in the next slides. Also for breast cancer, a learning curve is shown. Further data analysis is planned once all centres have submitted all delineations.
For both breast and rectal cancer, some deficiencies in the description of the guidelines were demonstrated, making the interpretation ambiguous, and the guidelines will be adapted accordingly. A first adaptation has already been published (see slide presentation of dr. Remouchamps).

Within a national QA project, we have shown that clinical audit of target delineation improves the quality of the contouring: the inter-observer variability and the major deviations from the guidelines are substantially reduced. Variability in anatomical contouring contributes to uncertainty in treatment planning and compromises the quality of the treatment plan and delivered treatment. The standardization of tumor and target volume contouring is therefore highly desirable and can be positively influenced by consensus guidelines, education and clinical audits.

P
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A
B

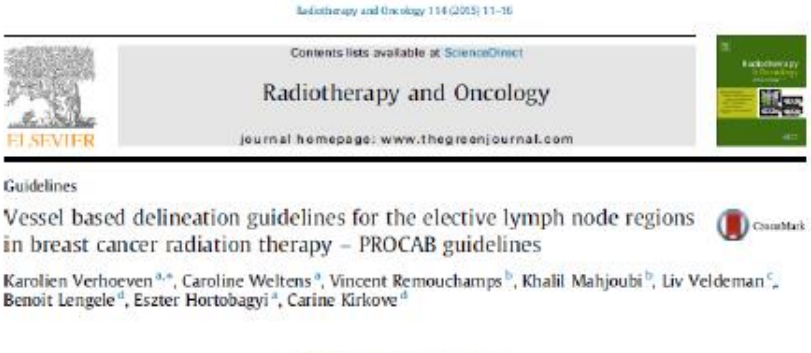
# National project

supported by
the College of Radiotherapy-Oncology

Aiming at the improvement of the
quality of breast cancer radiotherapy

Delineation of the nodal regions

03-2014 till 01-2016



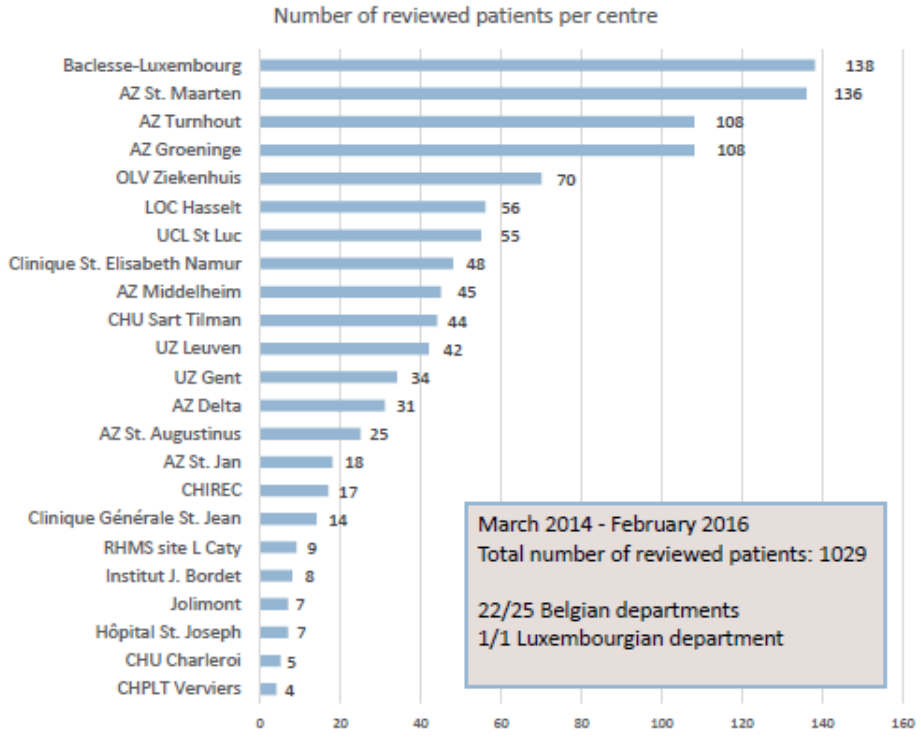


Attachments:

| | | |
|---|---|---|
| 2014.05.16_Delineation guidelines for the regional lymph node areas | [] | 490 kB |
| Delineation of the heart | [] | 1342 kB |
| PROCAB contouring atlas left | [] | 2718 kB |
| PROCAB contouring atlas right | [] | 2437 kB |
| PROCAB-Normal anatomy | [] | 6462 kB |

# Central Review

PROCAB




- 03-2014 till 01-2016
  - Stop submission of contours for review
  - Except for the departments with < 20 cases: inclusion continued

- Preliminary results 02-2016
  - Work done by Dr. Isabelle Kindts, Ad Vermeulen and Eszter Hortobagyi (review platform)

# Effect of peer Review?

Preliminary results

- Patient characteristics?
- Deviations from the guidelines?
  - With respect to volume?
  - With respect to clinical relevance?
- Learning curves?

# delineations

| Level | Number of delineations |
|---|---|
| Level I | 327 |
| Level II | 548 |
| Level III | 808 |
| Level IV | 1007 |
| Rotter | 462 |
| IMC | 542 |
| **TOTAL** | **1009** |

# Patient Characteristics

| Variable | N/1009 | % |
|---|---|---|
| Tumor location | | |
| Right | 463 | 46% |
| Left | 546 | 54% |
| Tumor grade | | |
| I | 108 | 11% |
| II | 455 | 45% |
| III | 432 | 43% |
| Type of Surgery | | |
| Mastectomy | 492 | 49% |
| BCS | 520 | 52% |

| Variable | N/1009 | % |
|---|---|---|
| Tumor Stage | | |
| pT0 | 37 | 4% |
| pT1 | 377 | 38% |
| pT2 | 415 | 41% |
| pT3 | 108 | 10% |
| pT4 | 20 | 2% |
| Unknown | 52 | 5% |
| Nodal stage | | |
| pN0 | 157 | 16% |
| pN1 | 546 | 54% |
| pN2 | 171 | 17% |
| pN3 | 81 | 8% |
| Unknown | 54 | 5% |

# Deviations from the guideline? Major versus minor

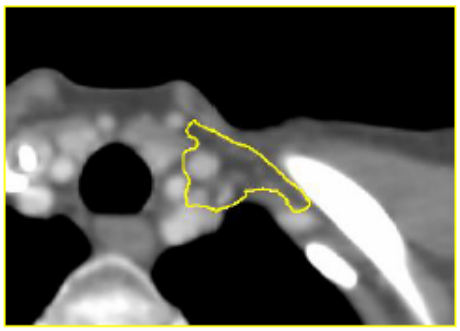
- 2 observers
- Definition major/minor deviations

| | |
|---|---|
| **LEVEL I MAJOR** | **< 5 mm around veins** |
| | cranial > 5 mm from guideline |
| | caudal > 5 mm from guideline |
| **LEVEL I MINOR** | cranial 1-5 mm from guideline |
| | caudal 1-5 mm from guideline |
| | subscapular vessels included |
| | muscle included |

# Number of deviations

| | Number of delineations | Total number of major errors | Total number of minor errors |
|---|---|---|---|
| **Level IV** | 1007 | 2623 | 3582 |
| **Level III** | 808 | 658 | 2067 |
| **Level II** | 548 | 460 | 1210 |
| **Level I** | 327 | 274 | 932 |
| **Rotter** | 462 | 152 | 754 |
| **Parasternal region** | 542 | 879 | 1010 |

# Learning Curve

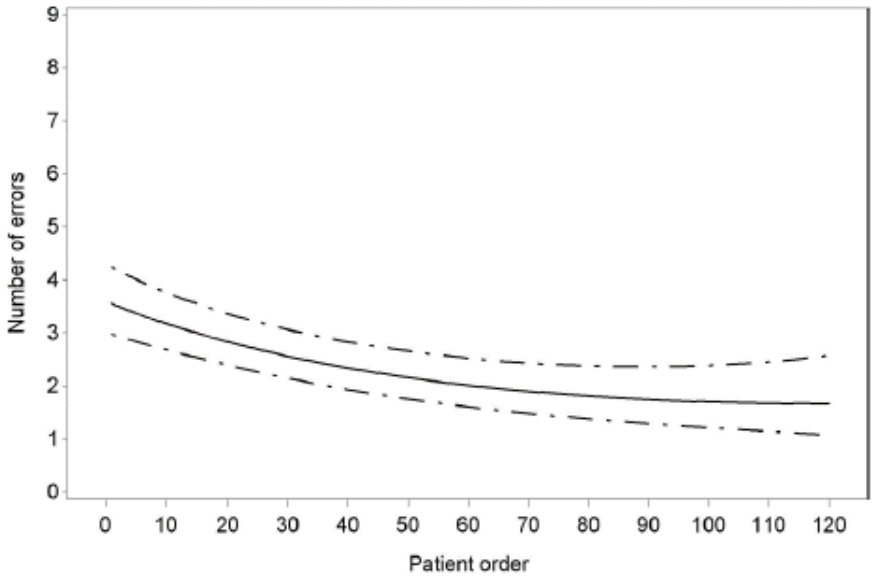


## Level IV Major Deviations

## Effect of patient order on number of deviations

| | Estimated mean number of deviations | Estimated % decrease |
|---|---|---|
| Patient 1 | 3,553 | |
| Patient 20 | 2,840 | -20% (p < 0,01) |
| Patient 50 | 2,102 | -40% (p < 0,01) |

**Level IV Major Deviations**
**evolution of mean number of errors over patient order**



# Conclusion 1

- 1 national guideline
- International consensus, adaptation
- Preliminary results show
  - A learning curve
  - Decrease in major deviations
  - Peer review improves quality of delineation
  - More analyses planned
  - Evaluation of volumes planned

# Conclusion 2

- Need for additional cases from some hospitals
- Need for sheets with dosimetry data
- Need for a new project!

# PROCAB

## Delineation Update:
## 2 letters to the editor in 2016

**Vincent Remouchamps, CHU UCL Namur**
On behalf of the PROCAB team from
The Belgian College of Radiotherapy
and on behalf of
**Carine Kirkove, UCL St Luc, Bxl**

**Meeting between college and the head of departments, Bxl, 26 feb. 2016**

College of Radiation Oncology, Feb 26, 2016

Radiotherapy and Oncology 114 (2015) 3–10

Contents lists available at ScienceDirect

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

Guidelines

Vessel based delineation guidelines for the elective lymph node regions in breast cancer radiation therapy – PROCAB guidelines

Karolien Verhoeven [a,*], Caroline Weltens [a], Vincent Remouchamps [b], Khalil Mahjoubi [b], Liv Veldeman [c], Benoit Lengele [d], Eszter Hortobagyi [a], Carine Kirkove [d]

[a] University Hospitals Leuven/KU Leuven; [b] Clinique Sainte Elisabeth (AMPR), Namur; [c] Ghent University Hospital; and [d] Catholic University of Louvain, Brussels, Belgium

Radiotherapy and Oncology 114 (2015) 3–10

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journal homepage: www.thegreenjournal.com

ESTRO consensus guidelines

ESTRO consensus guideline on target volume delineation for elective radiation therapy of early stage breast cancer

Birgitte V. Offersen [a,*], Liesbeth J. Boersma [b], Carine Kirkove [c], Sandra Hol [d], Marianne C. Aznar [e], Albert Biete Sola [f], Youlia M. Kirova [g], Jean-Philippe Pignol [h], Vincent Remouchamps [i], Karolien Verhoeven [j], Caroline Weltens [j], Meritxell Arenas [k], Dorota Gabrys [l], Neil Kopek [m], Mechthild Krause [n], Dan Lundstedt [o], Tanja Marinko [p], Angel Montero [q], John Yarnold [r], Philip Poortmans [s]

[a] Department of Oncology, Aarhus University Hospital, Denmark; [b] Department of Radiation Oncology, Maastricht University Medical Centre – GROW (MAASTRO), The Netherlands; [i] Department of Radiation Oncology, Catholic University of Louvain, Belgium; [q] Department of Radiation Oncology, Instituto Verbense, Elbara, The Netherlands; [r] Department of

Radiotherapy and Oncology 118 (2016) 209–210

Contents lists available at ScienceDirect

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

PROCAB guidelines

## Vessel based delineation guidelines for the elective lymph node regions in breast cancer radiation therapy – PROCAB guidelines

Dear Editor,

Hereby, we present a small adaptation of the PROCAB guideline for lymph node delineation in breast cancer [1].

It was decided to modify the definition of the caudal border of level II and the interpectoral (or Rotter) space. A few slices are added to lower the caudal border until the insertion of the pectoralis minor muscle with the chest wall (see Table 1).

Radiological observation of nodes in the fatty space more than 5 mm below the axillary vein and/or the vessels perforating the pectoral muscles in early-stage breast cancer patients explain our modification. With this adaptation, the PROCAB guideline is also in coherence with the ESTRO guideline [2].

Best regards,
Karolien Verhoeven,
On behalf of the PROCAB team.

### Conflict of interest statement

None.

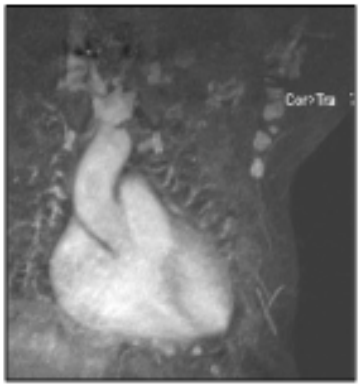
### Acknowledgments

Financial support was provided by the Belgian College of Physicians in Radiation Oncology (the Belgian Cancer Plan, action 16 – fgov.be) and the Myny Vanderpoorten Foundation.

**Table 1**
Adapted PROCAB/ESTRO delineation guidelines for the clinical target volume (CTV) definition for elective irradiation of lymph node level 2–4, interpectoral and internal mammary node region in breast cancer.



# MISE AU POINT SUR LE CONTOURAGE DES AIRES GANGLIONNAIRES



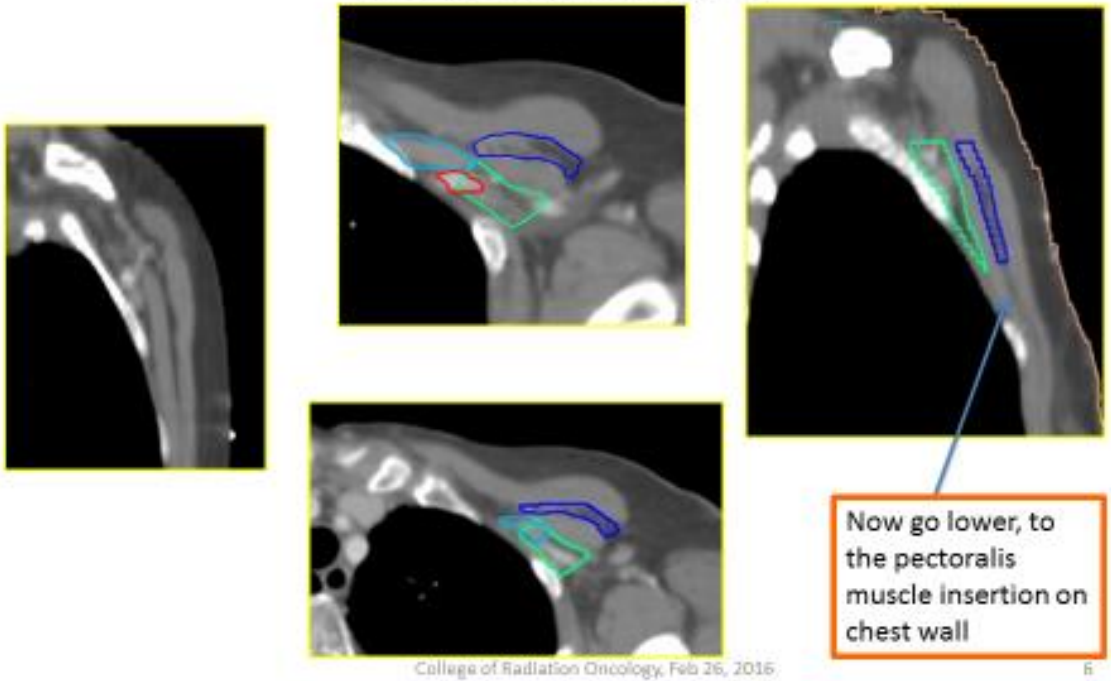
*Trucs et astuces …*

Dr Carine KIRKOVE
Service de Radiothérapie Oncologique

carine.kirkove@uclouvain.be

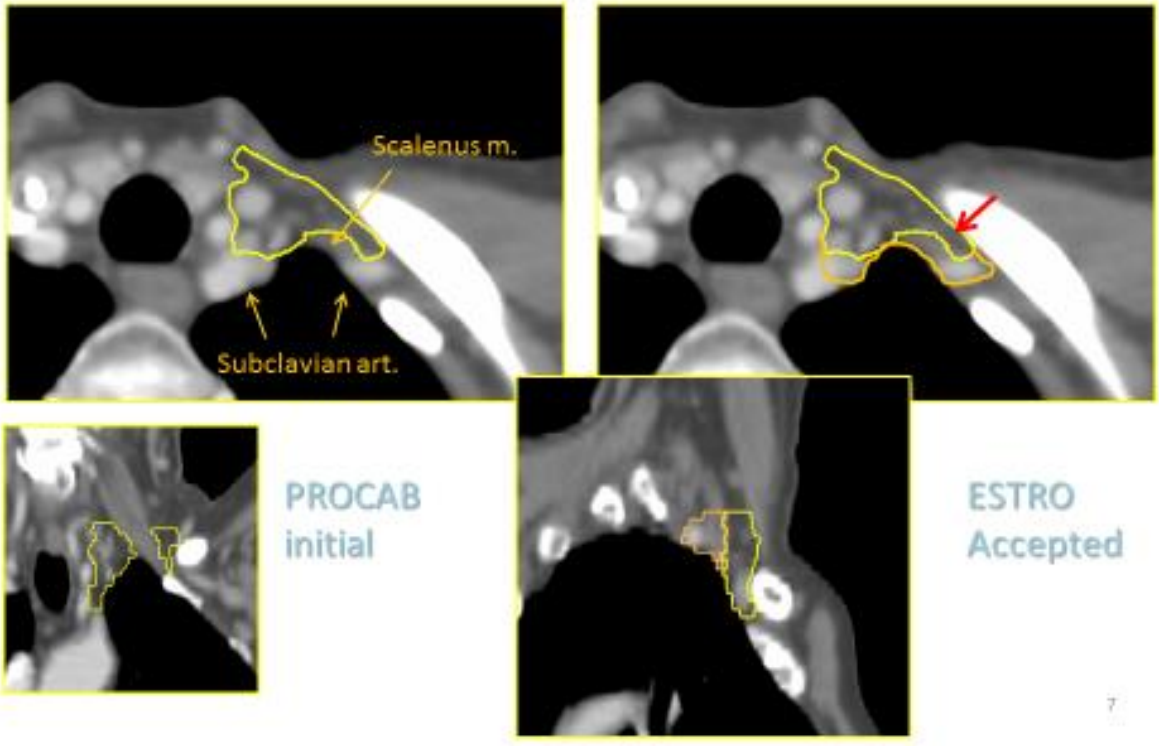
Presented at SFSPM, Bordeaux
11/11/2015

## PROCAB joins ESTRO
## CTVn-Level II and Rotter - Interpectoralis
## Caudal Limit extended






## CTVn_L4 : posterior Limit more post



Radiotherapy and Oncology 118 (2016) 205–208

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ESTRO breast cancer consensus guidelines

**ESTRO consensus guideline on target volume delineation for elective radiation therapy of early stage breast cancer, version 1.1** ☆

*To the Editor,*

One year ago we presented the ESTRO consensus guideline on target volume delineation for elective radiation therapy of early stage breast cancer [1]. We hereby present an update following the need for modification of the caudal part of CTVn_L4 and the lateral border of CTVn_IMN in the published pdf-files. Also, as a consequence of frequent questions, we provide more information regarding the lateral border of the CTVp_breast and for dose planning in relation to the humeral joint.

**Caudal part of CTVn_L4**

In the consensus guideline a link is given to an atlas with patients treated for left-sided and right-sided breast cancer,

: EVEN TRANSATLANTIC!!!

College of Radiation Oncology, Feb 26, 2016

**Acknowledgements**

The authors thank the following persons, listed alphabetically, for their input and the fruitful discussions we had while preparing these consensus guidelines: Breton-Callu Christel (Bordeaux, France); Brunt Murray (Stoke-on-Trent, UK); Buchholz Tom (Houston, USA); Budach Wilfried (Düsseldorf, Germany); Coles Charlotte (Cambridge, UK); Harris Jay (Boston, USA); Kirby Anna (Sutton, UK); Maduro John (Groningen, The Netherlands); Mahjoubi Khalil (Namur, Belgium); Mjaaland Ingvil (Stavanger, Norway); Rivera Sofia (Villejuif, France); Stenfert Kroese Marika (Deventer, The Netherlands); Valli Mariacarla (Bellinzona, Switzerland); Veldeman Liv (Gent, Belgium); White Julia (Columbus (OH), USA); Michael Yassa (Montréal, Canada).

**Appendix A. Supplementary data**

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.radonc.2015.12.027.

# ESTRO joins PROCAB

**Caudal part of CTVn_L4**

In the consensus guideline a link is given to an atlas with patients treated for left-sided and right-sided breast cancer, respectively. In both cases the caudal border of CTVn_L4 has now been modified a few slices more caudal to fully include the Subclavian vein, which is positioned caudal and ventral to the Subclavian artery (Figs. 1A and 1B). New links are provided to the corrected atlases (links…).

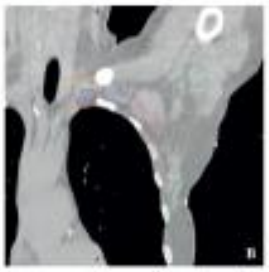


Fig. 1B. CTVn_L4 including the Subclavian vein highlighted in blue (positioned slightly more caudal and ventral to the Subclavian artery).

**Lateral border of CTVn_IMN**

Since lymph nodes are positioned equally frequent medial and lateral to the internal mammary vessels, the definition of CTVn_IMN is modified to include both the internal mammary vein and artery with 5 mm margin (Table 1) [2,3].

**Lateral border of CTVp_breast**

The thoracic vessels at the lateral border of the breast can be a helpful guide to define the lateral border of the CTVp_breast. However, it is not always necessary to delineate the CTVp_breast that far lateral. In patients with clearly visible glandular breast tissue, it is recommended to include the glandular tissue and not necessarily extend the volume lateral upto the thoracic vessels (Fig. 1C).

Breast CTV not addressed in PROCAB

**Dose to CTVn_L1**

In the consensus guideline a planning risk volume (PRV) around the humeral head is advised to help dose planning so that the resulting field edge (i.e. the 50% isodose line) follows the humeral head. This may cause a need for compromise on dose coverage of

Field compromise ≠ Delineation guideline

## 4. Audits

**The report of the clinical audits 2015 will be made after the meeting Auditors on 09-10 may 2016.**

**Hospitals clinical audits 2015 :**

**St Lucas, Gent** **9-11 December 2015**
Contact person : Dr Wim Duthoy (wim.duthoy@azsintlucas.be)

RTT: Mia
clinician: P. Van Houtte
physicist: M. van Dycke

---

**Saint Jean, Bruxelles** **18-20 November 2015**
Contact: Dr Sophie Cvilic (scvilic@clstjean.be)

RTT: Pieternel Thysebaert
clinician: D. Van den Weyngaert
physicist: D. Verellen

---

**AZ Groeninge, Kortrijk** **23-25 November 2015**
Contact: Dr Antoon Lambrecht (antoon.lambrecht@azgroeninge.be)

RTT: P Bijdekerke
clinician: P. Van Houtte
physicist: S. Vynckier

---

**UZ Brussel, Jette** **23-25 November 2015**
Contact: Prof Mark De Ridder (Mark.DeRidder@uzbrussel.be)

RTT: G. Vandevelde
clinician: K. Vandeputte
physicist: M.T. Hoornaert

---

**St Jan, Brugge** **3-5 November 2015**
Contact: Dr Geertrui Demeestere (geertrui.demeestere@azbrugge.be)

RTT: G. Vandevelde
clinician: P. Scalliet
physicist: S. Vynckier

---

**The report of the clinical audits 2015 will be added to the report of 2016.**

# College of radiotherapy – results of clinical audits 2014

This is the fourth report of the college of radiotherapy, under action 16 of the Cancer Plan. Five additional hospitals have been audited in 2014, as planned. See the list below.

Auditors have been welcomed in all 5 hospitals and could carry the audits out with free access to all documentation and staff colleagues, allowing for an efficient peer review.

## A. Executive summary

- The 5 hospitals audited in 2014 are all declared "centres of competence" according to the nomenclature of IAEA.
- There are no deficiencies or malpractice that would require immediate corrective action.
- Quality management systems are in development or completed in all 5 hospitals.
- These satisfactory results are in line with the findings of the previous 2011, 2012 & 2013 audit campaign.
- Staffing levels are generally low compared with EORTC-ESTRO-EFOMP standards[1], and compared to Northern European countries (Sweden, Denmark, Norway, The Netherlands), with an exception for the staff in medical physics that is well developped in Belgium (a Belgian tradition).
- Staffing levels are on average 20% lower in non-academic vs. academic centres and this within the three staff groups of RTTs, radiation oncologists and medical physicists. This accounts for the additional missions of *teaching and training* of residents and students (medicine, physics, RTT) in academic centres.
- A clear curriculum and a professional legal title are needed for nurses/technologists working in radiotherapy.
- A clear curriculum and legal title also needs to be developped for dosimetrists.
- The 2015 audit campaign is already organised for the fourth trimester of the year.

---

1 ESTRO: European Society for Therapeutic Radiotherapy and Oncology, EORTC: European Organisation for Research and Treatment of cancer, EFOMP: European deration of Medical Physics.

## B. List of audited hospitals with auditors

OLV, Aalst. December 1st-3rd, 2014
Contact person : Dr Luc Verbeke (luc.verbeke@olvz---aalst.be)

| | |
|---|---|
| RTT: | G Vandevelde |
| clinician: | P Scalliet |
| physicist: | K Feyen |

Hôpital de Jolimont, March 2-4th, 2015
Contact: Dr Carine Mitine (c.mitine@skynet.be)

| | |
|---|---|
| RTT: | G Vandevelde |
| clinician: | K Vandeputte |
| physicist: | S Vynckier |

Hopital St Joseph, Gilly, October 22-24th, 2014
Contact: Dr Françoise Gilsoul (Francoise.Gilsoul@ghdc.be)

| | |
|---|---|
| RTT: | P Thysebaert |
| clinician: | D Van den Weyngaert |
| physicist: | D Verellen |

St Maarten, Duffel, 26-28 January, 2015
Contact: Dr Dominique De Bal (dominique.debal@emmaus.be)

| | |
|---|---|
| RTT: | M Debaere |
| clinician: | P Van Houtte |
| physicist: | M Van Dycke |

Cliniques de l'Europe, Brussels, 10-12 December, 2014
Contact: Dr Carl Salembier (c.salembier@europaziekenhuizen.be)

| | |
|---|---|
| RTT: | P Thysebaert |
| clinician: | Y Lievens |
| physicist: | TM Hoornaert |

## C. Results of the audits

Each individual audit report follows the IAEA template. It has been delivered to the head of department after 6 to 8 weeks.

The 5 audit reports have then been discussed together by the entire staff of auditors, during their plenary meeting of May 7th 2015.

Results of the audit can theoretically fall into 3 classes (according to IAEA procedure).

1. Severe deficiencies requiring immediate action and short-term re-auditing (requires partial or total suspension of activities)
2. Deficiencies or non-conformities requiring immediate action without need for re-auditing (does not require suspension of activities)
3. No corrective actions requested and the centre is declared "centre of competence". Minor non-conformities requiring correction, if any, should be corrected before the next audit (5 years)

Similar to the previous year's findings, there were no class 1 or class 2 recommendations in the 5 Belgian hospitals audited in 2014. Only minor items have been identified, and offered to the department as food for thought. So, rather than recommendations, most remarks were merely indications for further departmental reflexion and development.

All in all, there was a lot of **convergence** between the 5 departments, with little regional differences. Clearly, there is Belgian approach to radiotherapy.

**Practices** are influenced by the "school" from which the medical staff received its training, for instance in the repartition of roles between physicists and medical doctors, or in the selection of irradiation regimen amongst a number of possible options, but these were minute differences that did not impact on the overall level of quality.

**Safety** levels are now monitored in all departments directly using PRISMA-RT or similar platforms that integrate PRISMA-RT for the registration and root-cause analysis of deviations in radiotherapy administration. This is a major achievement at the federal level.
However, a difficulty was again found in allocating some of the staff to a specific specialty. This is due to the lack of **professional title** for several categories: technologists in imaging frequently work as radiation technologists, without a professional title and nurses or oncology nurses frequently work in radiotherapy departments[2], without a specific professional title all the same. In addition, several departments work with "dosimetrists", considered as assistants to medical physicists, but there again there is no professional title (although the AFCN/FANC is currently reflecting on the issue).

[2] There is also work going on at this level, by the FOD, in terms of determining the tasks that can be carried out by Imaging technologists and in legalising Technologists in Radiation Oncology, just as in Radiology and Nuclear Medicine.

As a result, a global recommendation that can be carried over from the three previous audit reports (2011, 2012 & 2013) is that **clear curricula should be created for selected staff members, in association with a legal professional title**. This would guarantee that staff members in any radiotherapy department actually have the required competences, which is currently not the case. Only radiation oncologists and medical physicists have a legal degree. *Belgium is one of the last European countries where such curriculums and professional titles do not exist for nurses and technologists as well as dosimetrists working in radiotherapy.* And given the level of responsibility taken by these staff members in the performance of their role it is important that they have the required education and competences to carry out those tasks with professional autonomy and within the context of a multidisciplinary approach to patient management[3].

## D. Workload definitions

The workloads have been calculated on the basis of IAEA QUATRO definitions[4]. It is defined as the number of treatments divided by the number of FTE of the appropriate staff group. Due to the lack of professional title (see above), the **workloads** have been calculated by pooling "dosimetrists" with medical physicists. Imaging technologists were pooled with nurses under the European professional title Radiation TherapisT (RTT).

A **treatment** is defined as a number of fractions or **sessions** directed at a specific disease. An individual patient can be treated twice in the same year (bilateral breast cancer, or lung cancer followed by bone metastasis). In this case, 2 treatments are registered. In general, whenever a treatment has required a separate simulation and computer dosimetry, it is considered as a full treatment. The Belgian nomenclature for reimbursement is relatively clear on this issue.

As in 2011, 2012 & 2013, **brachytherapy** has not been included; it would require a separate audit program. Not all hospitals do have a fully deployed brachytherapy activity, and, also, some of the activities are carried out by "travelling" radiation oncologists and physicists, sometimes far away from their main place of activity (prostate brachytherapy). In addition, some of the brachytherapies are a complement of an external beam treatment, and some are not, which introduces confusions in the counting of patients and treatments. But it is clear that efforts should be made for in order to specifically address brachytherapy treatments.

The same is true for radiotherapy **satellites** that have not been visited[5]. They are often at a distance of the main department, and the time allocated for the audit did not permit separate on-site visits. However, the shared procedures between the main departments and their satellites have been reviewed. The college is re-thinking the issue and will try to find an appropriate solution to this question.

---

[3] Recommended ESTRO Core Curriculum for RTTs (Radiation TherapisTs) – 3rd edition

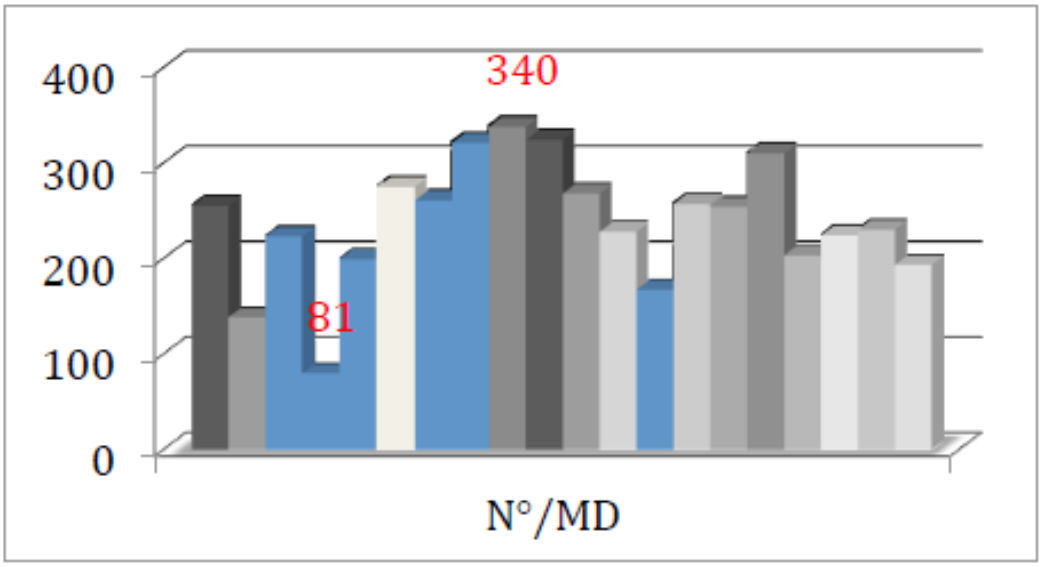
[4] Comprehensive Audits of Radiotherapy Practice; A Tool for Quality Improvement. IAEA, Vienna, 2007

[5] Mouscron, Ottignies, Libramont, Liège (2), St Niklaas, Antwerp, Genk, Aalst, Tivoli (La Louvière),

Last but not least, the auditors had a long debate on the inclusion or not of **Mobetron** activities in the workload[6]. Although the Mobetron is a linear accelerator, and its use probably falls under Category IV for reimbursement, there was a general feeling that the essence of this treatment is closer to HDR brachytherapy than to external beam radiotherapy (no simulation, very limited dosimetry). Eventually, Mobetron activities have not been taken in consideration for workload benchmarking. This point remains however open for further discussion, depending on how the situation will develop in the future.

Workloads have been calculated on the basis of hospital statistics provided by the departments. They reflect the number of personnel that is paid by the hospital, i.e. excludes personnel paid by external grants or programmes.

A. *Table A. Radiation oncologist workload: number of external beam radiotherapy treatments per radiation oncologist (academic centres in blue). Mean value is 239 ± 64 (range 8--340).*




Variations in workload reflect staffing levels, except that medical tasks do not completely overlap between hospitals. Some of the difference is explained by differences in job description (skin cancer for instance is less demanding than pediatric patients). Also, departments running a satellite incur substantial waste of time due to travel from one site to the next. The burden of CMO/MOC (multidisciplinary oncology meeting) is also variable across the departments; it does affect the workload substantially in hospitals with a complete set of multidisciplinary meetings or with meetings scattered amongst several different hospitals.
All in all, the mean workload is high. EORTC and ESTRO recommend a workload not exceeding 250 treatments/radiation oncologist. This is to allow for sufficient time in continuous medical education, re-training, clinical research, etc. Nearly 50% of radiotherapy departments are over this benchmark.

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[6] The Mobetron is a dedicated accelerator for intra---operative radiotherapy. It is mainly used for breast cancer.

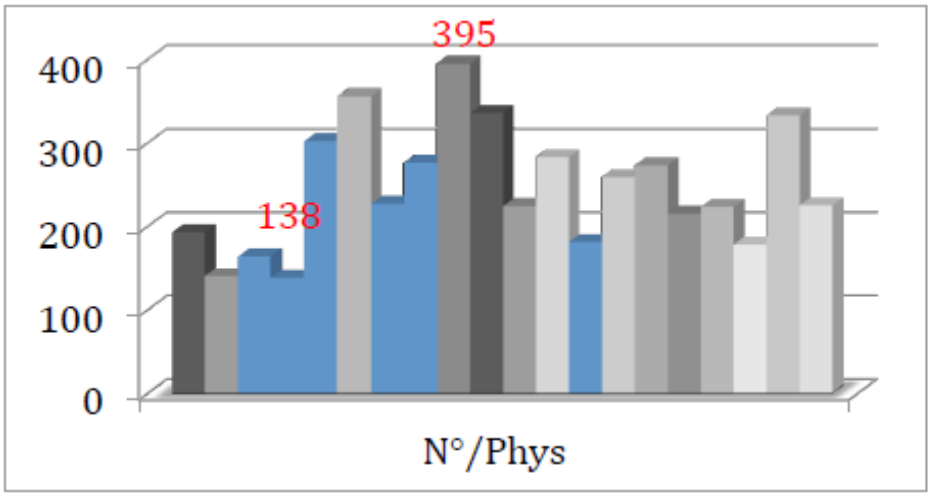
A large number of radiation oncologists are due to retire over the next 10 years (about 50%). The existence of a *numerus clausus* to access the radiotherapy specialty (master complémentaire, MANAMA) is expected to increase the shortage in the near future, which is of great concern to the College of radiotherapy.

Workloads in academic (blue) and non-academic (grey) departments are slightly different. The mean workloads are 214 vs. 273, respectively. Of note is the exclusion of residents from this benchmark.

Including residents is not a straightforward issue. They carry part of the job in their training hospitals, relieving full staff members from some of their activities, but they also need supervision and work slowly compared to experienced radiation oncologists. If residents were to be included, then the additional burden of academic work for their supervisors should also be considered, and the residents themselves should not be counted as FTE doctors.

In a French benchmark, the FTE in academic hospitals were considered 0.5 FTE per full time academic radiation oncologist and 0.6 FTE per full time resident. Applying this corrective value would not significantly change the conclusions in the Belgian audit. Therefore the residents have been omitted.

*B. Table B. Medical physicists workload (mean 246 ± 72, range 138-395).*




Again there is a relatively wide range of workloads. This partly reflects the difference in treatment techniques (more 3D CRT or more IMRT treatments) and equipment (some equipment is more automatized than others), IMRT being in fast development in Belgium.

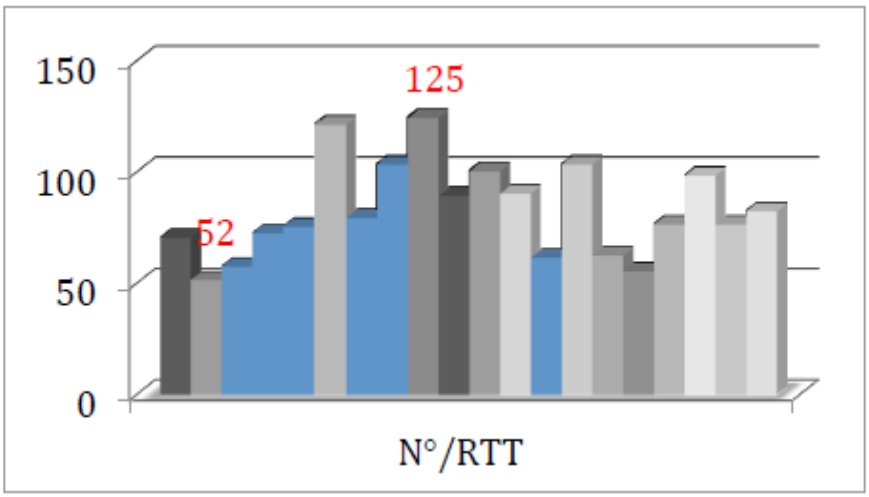
IMRT is commonly accepted as a particular burden for the medical physicists, but it is not invariably so. Some equipments are more user-friendly than others, all the same for the dosimetry softwares. Therefore, the learning curve can be fast or slow, but in all case it represents a formidable challenge in learning and in quality control for the physics team.

Once in the routine, IMRT class solutions have usually been developed and the workload falls back, although not to the level of conventional radiotherapy, which is far less demanding for the physics staff.

EORTC and ESTRO/EFOMP recommendation is 400 to 500 treatment/medical physicist as a maximum. As these figure come from the pre-IMRT era, they underestimate the actual workload but, all in all, Belgium is well staffed in this respect and the general feeling is that there is currently no shortage in medical physics. Yet, a few departments have a low number of them, which impairs their migration from 3D conventional radiotherapy towards IMRT.

Lastly, the same 20% difference in staffing is seen between academic and non-academic departments.

C. *Table C. RTT workload: number of treatments/RTT. Mean value is 83 ± 21 (range 52-125).*




Similar to the 2 other staff groups, the workload for RTT varies broadly between the audited centres.
What is an adequate workload for RTTs remains an open question. Currently, the recommended staffing is 2 RTT/linac, or 3/linac if the number of patients exceeds 25/day[7]. It must of course be corrected according to the social legislation (summer holidays, bank holidays). For instance, 3 FTE per linac becomes 3.6 in Belgium in order to cover for the entire year.

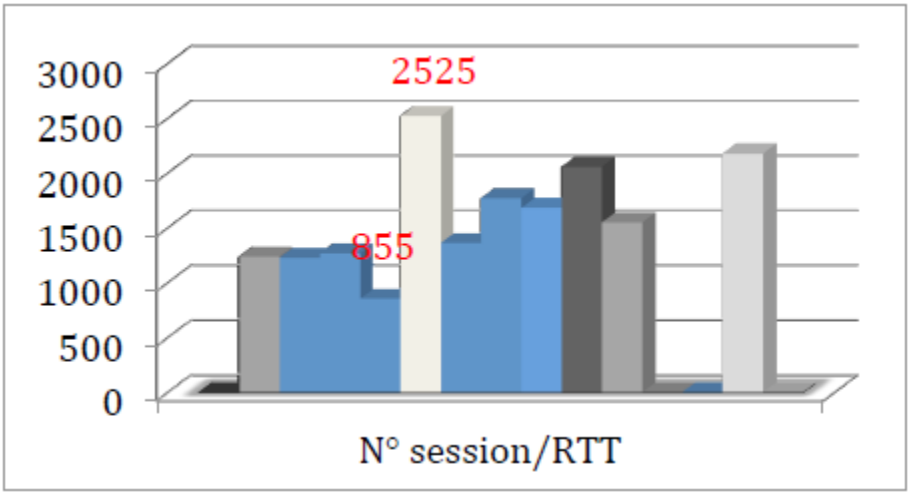
[7] Setting up a Radiotherapy Programme: Clinical, Medical Physics, Radiation Protection and Safety Aspects. IAEA, Vienna, 2008.

But this does not actually *measure* the workload adequately, and efforts are made by IAEA and ESTRO (HERO project) to develop more appropriate definitions. Currently the IAEA uses the number of treatments divided by the number of RTT, but without proposing a benchmark figure.

In developing countries where about 70 IAEA QUATRO missions have been carried out, a workload over 100 treatments/RTT has been considered high. It is surprising to see that 5 out of the 15 Belgian audited centres are over this figure.

It is possible that hospitals at the low workload end might want to look into their efficiency, while hospitals on the high workload end should consider expanding the RTT staff. This point deserves further research, as no international benchmark is currently available.

D. *Table D. RTT workload: number of radiation sessions per RTT. Data from hospitals 3 and 8 need to be verified. Mean value is 1612 ± 493 (range 855-2525).*




Calculating the workload of RTTs according to the number of sessions reflects more accurately the actual burden of activities. The exact number of sessions is available in 11 hospitals only.

Each treatment consists of a number of sessions or fractions, comprised between one (short palliative treatments or stereotaxic radiosurgery) and 35-38 (long curative treatments). Ten treatments with palliative intent mean ten sessions of irradiation, whereas 10 treatments with curative intent mean 350-380 sessions. The occupation of the linac depends thus both on the number of treatments and on the number of sessions for each treatment, i.e. the radiotherapy case-mix of the department, and so does the workload of RTTs.

Here too a three-fold variation exists between departments, depending on the case-mix (palliative vs. curative treatments) and the type of treatments (i.e. stereotactic radiotherapy which is delivered over a smaller number of fractions). Also, there is a 20% difference in RTT workload between academic and non- academic hospitals.

## E. Table summary of recommendations

A first finding, already identified 2012, was that, in some hospitals, in spite of a full funding by the Cancer Plan (60.000 €/y), the quality officer was not appointed full time to the development and the maintenance of the local quality system.

| Hospital | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Quality officer full time | | | | | | | | | | | | | | | | | | | | |

**This information was not coded in the first audit year, and it will be subjected to further investigation. A feed-back has been done to the departments in this matter, as this is considered by the College as non- compliant with the objectives of Action 16.**

A detailed list of recommendations is given in the following tables (I to IV). These tables pool the 2011 - 2014 findings. Some new remarks or recommendations emerged from this fourth audit campaign, addressing issues that were not raised during the first campaign. Therefore, a few items are only recorded for 2014.

The tables are anonymized and the ranking from 1 to 20 does not necessarily correspond to the ranking in the previous tables.

Recommendations at the departmental level are either in green (no problem/no recommendation) or in red (recommendation/action to be taken). Hospitals 1-5 have been audited in 2011, 6-10 in 2012, 11-15 in 2013 and 16-20 in 2014. Areas in a grey shade are points that were not raised during the previous audit campaign.

**Table 1** displays the recommendations to the department or to the hospital, i.e. the management echelon above the department, addressing issues that can only be dealt with at the hospital level. For instance, about 33% of the audited department have insufficient surfaces for their missions, and/or, the layout of the department is not adequate for daily care of cancer patients. This situation can have an impact on patient privacy for example.

Also, the high clinical workload in some other departments is in competition with the more time-consuming systematic use of advanced imaging techniques. Some equipment is therefore not used to its nominal capabilities, i.e. the heavy investment is not compensated by a thorough exploitation of the equipment capacity.

**Table 2** is a summary of recommendation to the radiation oncologist staff. The high workload of medical doctors makes it difficult to implement internal peer--- review of treatment plans, prior to their execution, though this is generally considered desirable in quality assurance programs (Only 6 hospitals in 20 have a systematic peer---review of treatment plans).

Systematic scoring of radiotherapy toxicity, another important element of quality control is also generally absent, by lack of specific resources (dedicated nurse, adequate software…).

**Table 3** addresses the recommendations to the nursing staff (and technologists by extension). Fifty per cent of RT departments are understaffed according to the Belgian norms.

**Table 4** is for medical physics. The question of QA programs for telecobalt is no longer relevant as the last working unit has been dismantled in 2013. All in all, the recommendations are minor, mainly aimed at systematic QC of beam and equipment, and its traceability.

## F. Conclusions

It should be stressed in the first place that none of these recommendations result from serious non-conformities. Some of the recommendations were already made by the department themselves, and were simply endorsed by the auditors.

An exception is the low staffing standards according to IAEA as well as Belgian regulation that are met in all departments for radiotherapy medical specialists and RTT's. Indeed, the evolution of modern radiotherapy towards more time-demanding techniques justifies in many instances an expansion of the medical and RTT staff. Also, the routine participation of radiation oncologists to CMO/MOC meetings substantially adds to the daily activity burden.

Satellites deserve a separate note. The very existence of satellites adds to the stress of departments compared to those running a single facility. Requirements for a constant quality level are more difficult to meet, although they seemed to be met in all the audited centers of the present exercise.

Still, it is a general opinion in radiotherapy (cf. advice of ABRO/BVRO and College of radiotherapy) that the dilution of activities on a large number of sites makes it more complicated to ensure an equal quality level in all instances. It is also a suboptimal solution as far as economical considerations are concerned. Obviously the exploitation of 4 linacs in a single site is less time and resource consuming than 4 linacs distributed on separate sites.

On the other hand, easy access to radiotherapy for patients (often elderly and/or with various disabilities) is an asset of the Belgian health care system *provided the aforementioned quality levels are actually met on all sites.* As mentioned before, the college of radiotherapy is looking for specific solutions to satellite audits.

**Table I:** Recommendations at departmental level. Areas in a grey shade are points that were not raised during previous audit campaigns. These are points of attention that will be further carried over to the next audit campaigns.

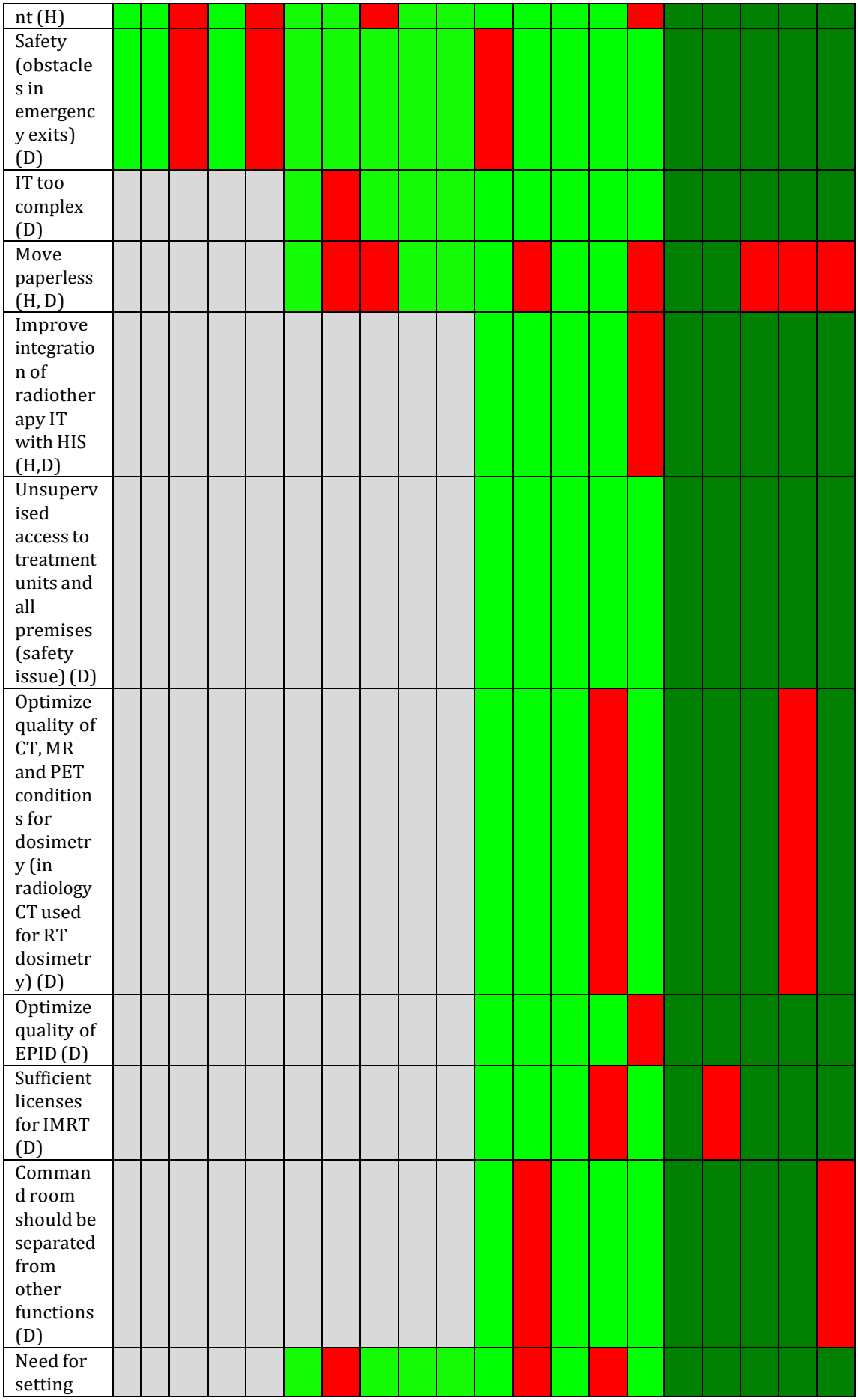
Table IA lists some structural recommendations that can usually be addressed at the hospital level (labelled H), rather than at the departmental level (labelled D).

Table IB lists a number of organisational improvements, i.e. recommendations that can be implemented without specific additional investments.

Table IC lists recommendations that would be satisfied by the development or the improvement of existing procedures.
Red area implies that a suggestion has been made to the department; green means no remark

Table IA (structural observations)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Satellite resource consuming, staff number to be re---considered (H, D) | | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | No | NA | NA | NA | NA | NA |
| Limited resources in equipment (H) | | | | | | | | | | | | | | | | | | | | |
| Optimize layout of the department (H) | | | | | | | | | | | | | | | | | | | | |
| Area of department insufficient (H) | | | | | | | | | | | | | | | | | | | | |
| Optimize storage facilities and culture of storage (H, D) | | | | | | | | | | | | | | | | | | | | |
| Optimize access to the departme | | | | | | | | | | | | | | | | | | | | |


nt (H)
Safety (obstacles in emergency exits) (D)
IT too complex (D)
Move paperless (H, D)
Improve integration of radiotherapy IT with HIS (H,D)
Unsupervised access to treatment units and all premises (safety issue) (D)
Optimize quality of CT, MR and PET conditions for dosimetry (in radiology CT used for RT dosimetry) (D)
Optimize quality of EPID (D)
Sufficient licenses for IMRT (D)
Command room should be separated from other functions (D)
Need for setting

| | |
|---|---|
| positioning lasers at radiology CT (D) | |
| Optimize patient positioning (immobilisation equipment unfit) (D) | |
| No dedicated room for nursing care (D) | |

Table IB (organisational recommendation)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Multidisciplinary representation at morning staff insufficient (RO + MP + RTT) | | | | | | | | | | | | | | | | | | | | |
| Radiotherapy dosimetry discussed during morning staff meeting (particularly discussion of dose distributions) | In discussion at the time of the first 5 audits | | | | | | | | | | | | | | | | | | | |
| Need for formal feedback on personal dosimetry | | | | | | | | | | | | | | | | | | | | |
| Lack of uniformity in level of treatment techniques (equipment dependant) | | | | | | | | | | | | | | | | | | | | |
| Suboptimal utilisation of treatment machine imaging capabilities (EPD, CBCT) | | | | | | | | | | | | | | | | | | | | |

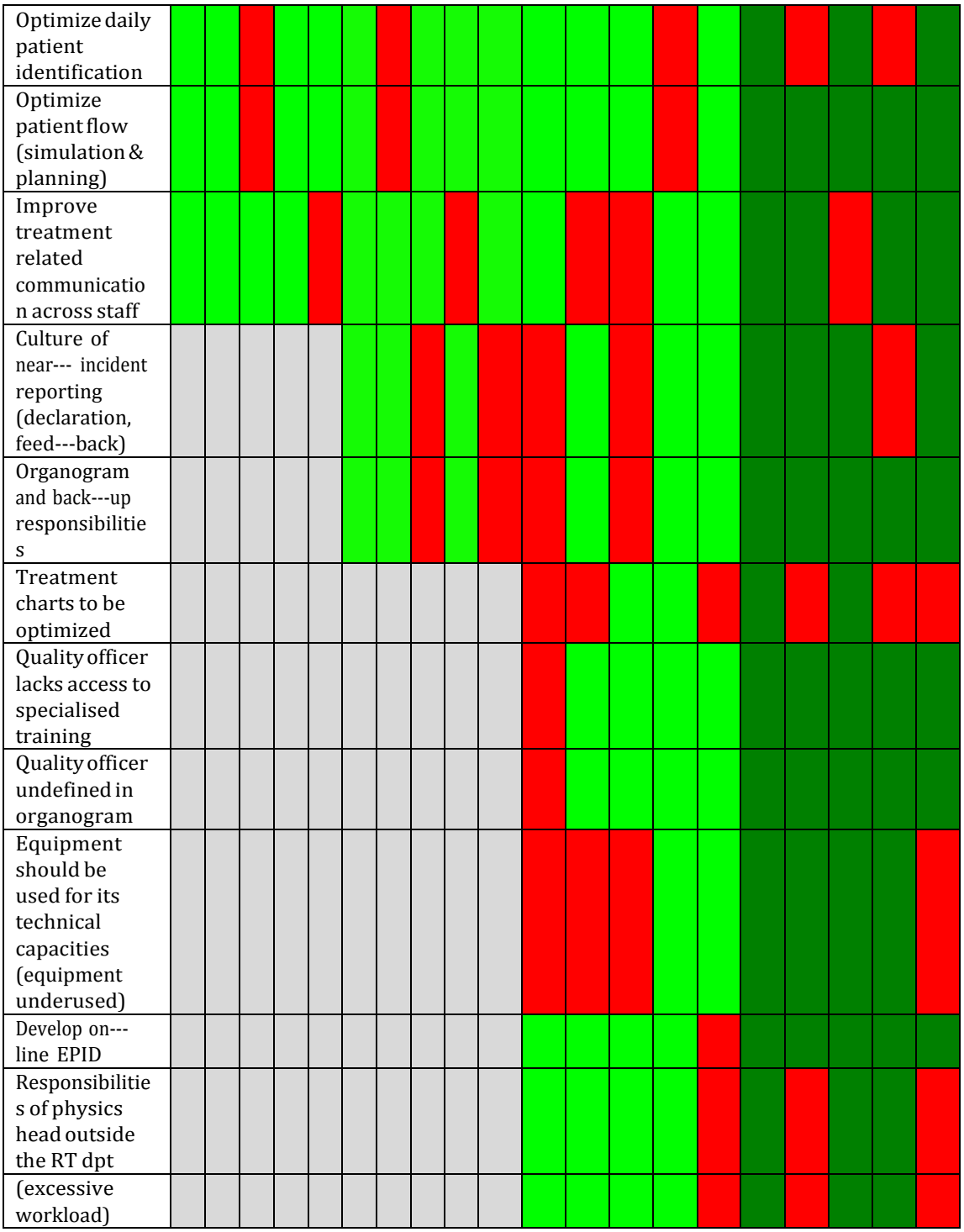

Optimize daily patient identification
Optimize patient flow (simulation & planning)
Improve treatment related communicatio n across staff
Culture of near--- incident reporting (declaration, feed---back)
Organogram and back---up responsibilitie s
Treatment charts to be optimized
Quality officer lacks access to specialised training
Quality officer undefined in organogram
Equipment should be used for its technical capacities (equipment underused)
Develop on--- line EPID
Responsibilitie s of physics head outside the RT dpt
(excessive workload)

Table IC (procedural recommendations)

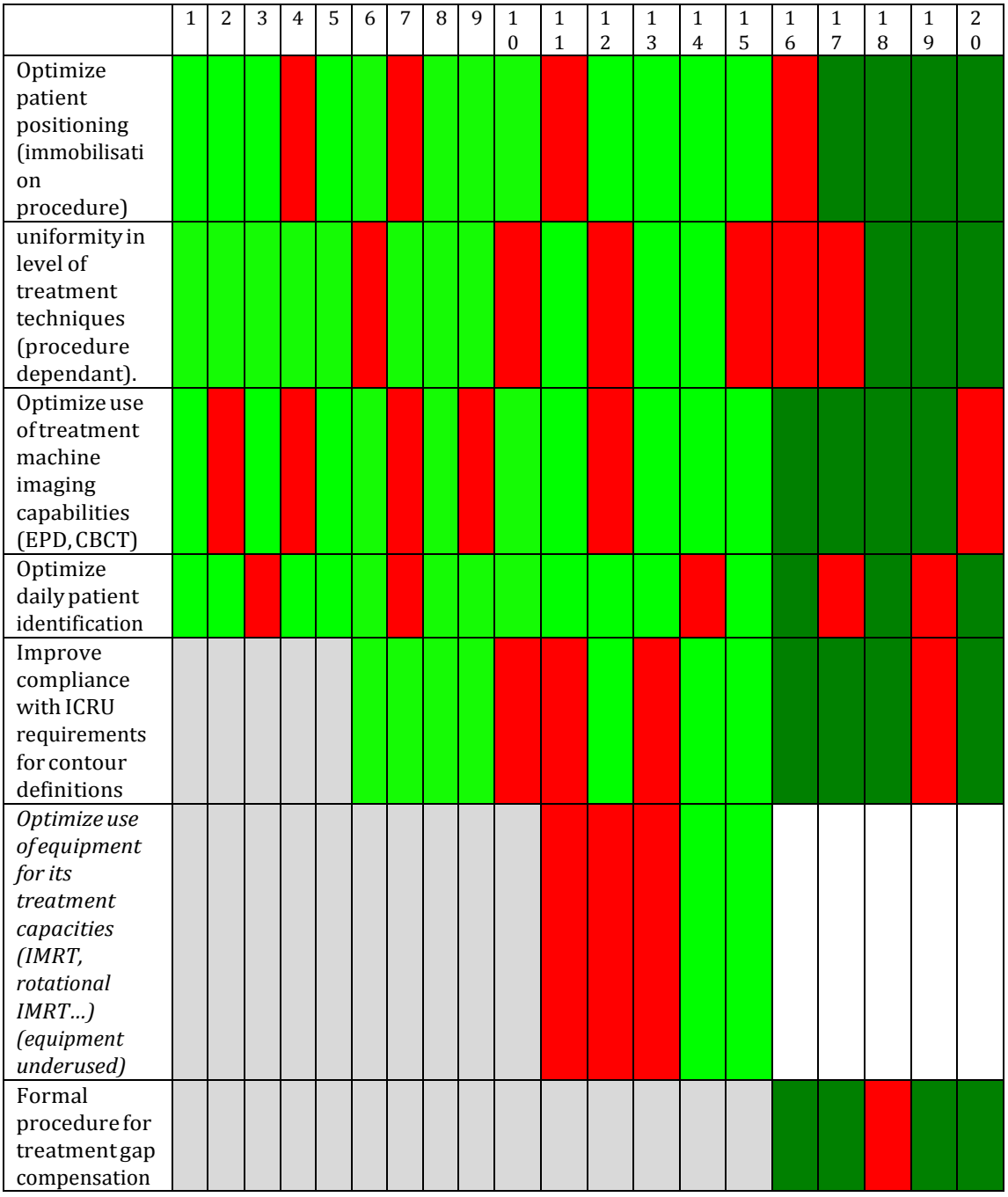


**Table II:** recommendations to medical staff

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Improve coordination | | | | | | | | | | | | | | | | | | | | |
| with referring departments | | | | | | | | | | | | | | | | | | | | |
| Implement peer review process of all treatment (plans) | | | | | | | | | | | | | | | | | | | | |
| Optimize medical charts (minimal set of information) | | | | | | | | | | | | | | | | | | | | |
| Protocols for palliative treatments should be evidence---based | | | | | | | | | | | | | | | | | | | | |
| Complete the oncological manual | | | | | | | | | | | | | | | | | | | | |
| Complete the RT handbook | | | | | | | | | | | | | | | | | | | | |
| Expand the medical staff | | | | | | | | | | * | * | | | | | | | | | |
| Improve systematic toxicity scoring | | | | | | | | | | | | | | | | | | | | |
| Improve external reporting on treatments | | | | | | | | | | | | | | | | | | | | |
| Heterogeneities in MOC/COM recommendations between referring hospitals | | | | | | | | | | | | | | | | | | | | |
| Need for follow---up consultation | | | | | | | | | | | | | | | | | | | | |
| Back---up specific pathologies between staff members | | | | | | | | | | | | | | | | | | | | |

(*) pending

**Table III:** recommendations to nursing staff

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adjust staffing on simulation according to Belgian regulation | | | | | | | | | | * | | | | | | | | | | |
| Adjust staffing on treatment according to Belgian regulation | | | | | | | | | | * | | | | | | | | | | |
| Optimize rotation of staff between preparation and treatment delivery | | | | | | | | | | | | | | | | | | | | |
| Monitoring of patient during treatment delivery to be optimised | | | | | | | | | | | | | | | | | | | | |
| Structured briefing between shifts to be developed | | | | | | | | | | | | | | | | | | | | |

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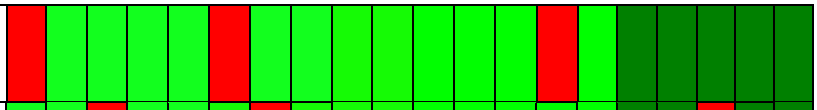
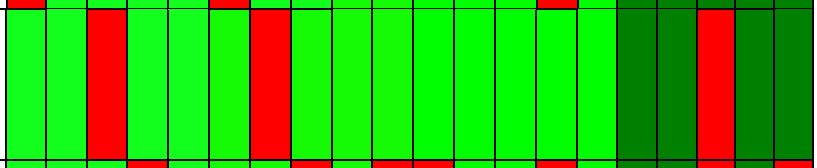
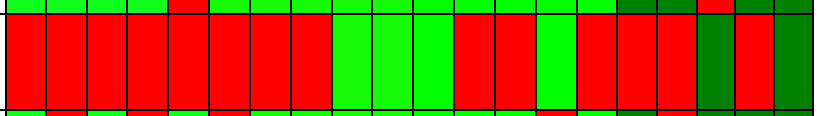
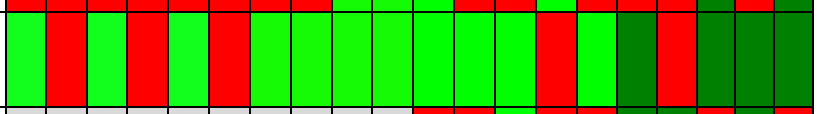
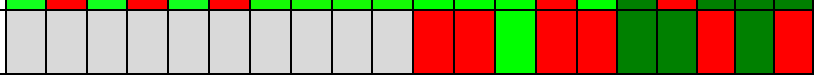
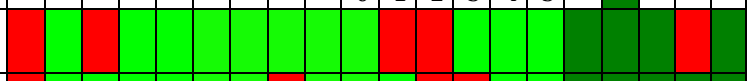
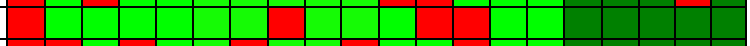
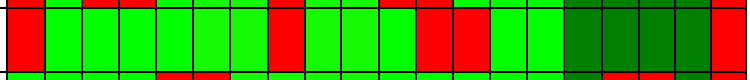
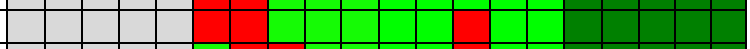
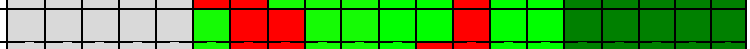
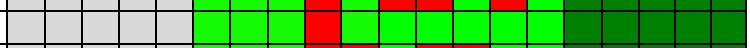
|---|---|
| A formal *on call* procedure for RTT's should be foreseen |  |
| Involvement of RTT's in treatment techniques, objectives, constraints (needs to expand in separate paragraph) |  |
| Endorse continuing education for RTT's |  |
| Need for professional title in oncology |  |
| Need for formal job description |  |
| Need for appropriate QA of patient positioning devices |  |
| Improve basic hygiene of treatment couch and accessories |  |
| Improve professional education of RTT staff |  |

(*) pending

**Table IV:** recommendations to physics staff

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Optimize QA on CT---sim and PET/CT |  | | | | | | | | | | | | | | | | | | | |
| Optimize QA on TPS |  | | | | | | | | | | | | | | | | | | | |
| Optimize In Vivo |  | | | | | | | | | | | | | | | | | | | |
| Optimize imaging QA on EPID / CBCT |  | | | | | | | | | | | | | | | | | | | |
| Optimize test after repair/downtime |  | | | | | | | | | | | | | | | | | | | |
| Provide dedicated physics office space |  | | | | | | | | | | | | | | | | | | | |
| **Contribution of CT & CBCT to total dose** | | | | | |  | | | | | | **NA** | | | | **discussion** | | | | |
| Need for mechanical QC on treatment units | | | | | |  | | | | | | | | | | | | | | |
| Need for logbook on QC | | | | | |  | | | | | | | | | | | | | | |
| Need for daily QC of equipment | | | | | |  | | | | | | | | | | | | | | |
| Need for daily QC at the start of the day | | | | | |  | | | | | | | | | | | | | | |
| Need for maintenance and repair staff | | | | | |  | | | | | | | | | | | | | | |
| Need for dedicated QA time | | | | | |  | | | | | | | | | | | | | | |
| Need for uniform calibration protocols | | | | | |  | | | | | | | | | | | | | | |
| Need for curriculum for dosimetrists | | | | | |  | | | | | **NA** | | | | | | | | | |
| Traceability of repair details to be improved | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Need for more details on QA procedures in case of deviations | | | | | | | | | | | | | | | | | | | | |
| Need for double check on dosimetry | | | | | | | | | | | | | | | | | | | | |
| Treatment algorithm for electrons to be optimized | | | | | | | | | | | | | | | | | | | | |
| MLC should be included in equipment QC | | | | | | | | | | | | | | | | | | | | |
| Optimise monthly QA manual | | | | | | | | | | | | | | | | | | | | |
| Plan summation to be optimized | | | | | | | | | | | | | | | | | | | | |