Verslag van het college van geneesheren
RADIOOTHERAPIE-ONCOLOGIE
contract 1 januari 2012 – 31 december 2012

Rapport du collège de médecins
RADIOOTHERAPIE-ONCOLOGIE
contrat 1 janvier 2012 – 31 décembre 2012

Prof. Pierre Scalliet
Voorzitter-Président
Inhoudstafel

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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 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 2012 is aan verschillende projecten gewerkt:

1. BELdART
2. Procare
3. Incident Report Systems
4. IMRT
5. Audits

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

In maart 2012 ging de jaarlijkse vergadering van het college en de diensthoofden van alle Belgische radiotherapie centra door. Op deze vergadering waren ook de fysici aanwezig. Feedback werd gegeven over de uitgevoerde projecten, en de planning voor 2012-2013 werd voorgesteld en besproken.
B/ Samenstelling van het college van radiotherapeuten-oncologen

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. Miltine
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
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 vervaard door experten (fysici, verpleegkundigen en radiotherapeuten).
Tot eind 2012 was de samenstelling van de commissie van experten als volgt:

radiotherapeuten
Prof. P. Vanhoutte
Dr. J. Vanderick
Dr. P. Huget
Prof. Y. Lievens (voorzitter VBS)
Dr. P. Bulens (voorzitter BVRO)

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

verpleegkundigen
G. Vandevalde
P. Bijdekerke
S. D’Haese (voorzitter VVRO)

Vanaf begin 2013 was 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)

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

verpleegkundigen
G. Vandevalde
P. Bijdekerke
C/ Plenaire vergaderingen

Volgende plenaire vergaderingen werden gehouden in 2012:

<table>
<thead>
<tr>
<th>DATUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>23-01-2012</td>
</tr>
<tr>
<td>15-05-2012</td>
</tr>
<tr>
<td>18-09-2012</td>
</tr>
</tbody>
</table>

De verslagen van bovenstaande vergaderingen zijn in dit jaarverslag geïncludeerd, u vindt ze op de volgende pagina's.
Minutes of the meeting of 23-01-2012

***no report***

Present:
College: P. Scalliet, C. Weltens, D. Van den Weyngaert,
Experts radiation oncologists: J. Vanderick, P. Van Houtte,
Experts phycisists: A. Rijnders, M. Van Dycke, D. Verellen
Invited:
1. P. Bulens for the BVRO
2. K. Feyen for the BVZF
3. Guy Vandevelde, P. Bijdekerke for the VVRO
4. Y. Lievens for the VBS
5. A. Dehaene

Apologized: K. Vandeputte, P. Huget, S. D’Haese, C. Mitine, P. Spaas, F. Vanneste
Minutes of the meeting of 15-05-2012

***provisional report***

Present:
Experts radiation oncologists: J. Vanderick
Experts phycisists: F. Vanneste, A. Rijnbers, M. Van Dijcke, D. Verellen
Invited:
   A. P. Bulens for the BVRO
   B. K. Feyen for the BVZF
   C. P. Bijdekerke for the VVRO
   D. Y. Lievens for the VBS
   E. P. Van der Donckt en Kristel Geerts for the FANC (only for point 2 of the agenda)

Apologized: Guy Vandevelde, P. Huget, S. D’Haese, P. Van Houtte

1. Approval of the minutes of the previous meeting

2. Incidentmelding—standpunt FANC
   Toelichting college radiotherapie door dr. Patrick Van der Donckt en mevrouw Kristel Geerts.
   The power point of this presentation has been added to this report.
   Please note that dr. Van der Donckt kindly asked to use this document in a confidential way.
   The college was very interested in the presentation and decided to discuss the position and opinion of the FANC in this delicate matter with all the heads of the Belgian radiotherapy departments.
   Some of the members of the college however question the formal role of the FANC when medical accidents/errors/incidents are concerned.

3. Beldart II: update
   The continuation of this project is questioned since Bob Schaeken is not working for/with Xios anymore. Xios provides the infrastructure and medical devices needed for the alanine dosimetry, Bob was coordinating this project. The BHPA is solving this problem.

4. IMRT questionnaire
   A new questionnaire (MVD) is planned on the methodology and tolerances of IMRT.
   The alanine phantom will be used to check IMRT treatments. The questionnaire is ready and will be distributed by Françoise Vanneste and Michel Van Dijcke.
5. PROCARE
The PROCARE project is coming to an end, possibly this project will be replaced by a college guided project for breast and prostate delineation. For prostate, G. Demereeleer will be invited together with Laurette Renard. For breast V. Remouchamps, C. Kirkove and C. Weltens will be invited.

6. Membership of the college
The composition of the college will change, all members have to be replaced. A total of 8 new members will be assigned by the FOD/SPF. The BVRO/ABRO and the VBS/GBS provided the FOD/SPF with a list of candidates.

Weltens Caroline
18-7-2012

NEXT MEETING: 18-9-2012
Minutes of the meeting of 18-09-2012

***provisional report***

Present:
College: C. Weltens, D. Van den Weyngaert, K. Vandeputte, P. Spaas
Experts radiation oncologists: J. Vanderick, P. Van Houtte, P. Huget
Experts physicists: F. Vanneste, A. Rijnders, M. Van Dijcke, D. Verellen
Invited:
   F. Guy Vandevelde, P. Bijdekerke for the VRO
   G. Y. Lievens for the VBS

Apologized: P. Scalliet, S. D’Haese, C. Mitine, P. Bulens, K. Feyen

1. Approval of the minutes of the previous meeting

2. Audits
The report of the 5 first audits (2011) is ready. The audits for 2012 are planned. The report of the 2011 audit and the planning of the 2012 can be found in attachment.

<table>
<thead>
<tr>
<th>Audited in 2011</th>
<th>To be audited in 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verviers</td>
<td>Leuven</td>
</tr>
<tr>
<td>Hasselt</td>
<td>Bruxelles Bordet</td>
</tr>
<tr>
<td>Liege</td>
<td>Wilrijk</td>
</tr>
<tr>
<td>Namur</td>
<td>Antwerpen ZNA</td>
</tr>
<tr>
<td>Turnhout</td>
<td>Roeselare</td>
</tr>
</tbody>
</table>

3. Prisma RT
Prisma RT (ADHECO) organized several information meetings. The system is operational in several hospitals. Adheco will be asked to inform the college on the actual situation in Belgium. All hospitals need (cf. Cancer plan) to install an incident management system. Then, a national benchmark needs to be established. PRISMA RT is the standard system that is proposed by the college and funded by the cancer plan. However, if necessary, radiotherapy departments can choose to use another system. In that case the department itself is responsible for the creation of a link with Prisma RT and for the transfer of the data.

Dirk Verellen proposes to change the questions and to include the possibility to differentiate between different types of treatment machines.
4. Beldart II: update
The continuation of this project was questioned since Bob Schaeken is not working for/with Xios anymore. Xios provides the infrastructure and medical devices needed for the alanine dosimetry. The coordination of the Beldart project will also be done by Xios.

5. IMRT questionnaire
This questionnaire (MVD) investigates the use of IMRT in Belgium (technical aspects, dosimetrical aspects, quality control, clinical implementation, constraints, ...).
The questionnaire has been distributed by Françoise Vanneste and Michel Van Dijcke.

Following departments have answered:

\[
\begin{array}{c}
\text{Limburgs Onco Centrum} \\
\text{OLV Aalst} \\
\text{St Elizabeth, Namur} \\
\text{St Jan Brugge-Oostende AV} \\
\text{St Jean Bruxelles} \\
\text{St Luc} \\
\text{St Maarten Duffel} \\
\text{Sint Augustinus Wilrijk} \\
\end{array}
\quad
\begin{array}{c}
\text{AZ Groeninge Kortrijk} \\
\text{AZ Turnhout} \\
\text{Bordet} \\
\text{CHU Charleroi, André Vésale} \\
\text{CHU Liège} \\
\text{CHU Tivoli} \\
\text{EpiCURA Baudour} \\
\text{GHBC Charleroi} \\
\end{array}
\]

Following departments did not yet answer:

\[
\begin{array}{c}
\text{UZ Leuven} \\
\text{UZ Brussel} \\
\text{AZ Middelheim} \\
\text{UZ Gent} \\
\text{Roeselare} \\
\text{Cliniques de l'Europe} \\
\text{CHR Peltzer-La Tourelle Verviers} \\
\text{Chirec} \\
\text{Jolimont} \\
\end{array}
\]

This project will continue as follows:
1. Send reminder to departments that did not answer
2. Transfer data to the Excell file
3. Contact departments that only gave partial information
4. Data analysis
6. Questionnaire staffing (nurses and technologists) radiotherapy department
A questionnaire about staffing has been circulated by P. Bijdekerke. Not all departments answered yet, and the answers are sometimes confusing (or the questions?). Paul will contact the different departments to solve this problem. This project is ongoing.

7. PROCARE
The PROCARE project is finalized. A new national project with review of the delineations of tumor and target volumes (and OARs) for breast cancer will be started. First contacts took place between V. Remouchamps, C. Kirkove and C. Weltens. Probably the ESTRO guidelines for delineation will be adopted and only breast with nodal irradiation will be included. First, funding has to be found.
In the future, other tumor types can follow such as prostate or lung.

8. Formation of the nurses
Guy Vandevelde informs the college that the “technologen medische beeldvorming (TMB)” have submitted an application through the “Hoge Raad van Paramedische beroepen” for recognition to allow employment in radiotherapy departments.

Guy also stresses the need to review and update the “normen” especially regarding qualification and minimum number of staff with the required qualification.
Situation in Vlaanderen:
Actually, the number of hours (ECT points) of education in radiotherapy for nurses in the oncology courses and for TMBs during their bachelor degree in Belgium is rather low compared to the rest of Europe (and even compared to the former eastern European countries). A 20 ECT points academic programme has been organized since 3 years for nurses, already working in radiotherapy by the HUBrussel.
Since last academic year, this academic programme + a clinical placement programme has been integrated in the bachelor education of TMBs.
This is a start but it is certainly not sufficient, there is still a need to raise the total number of hours for radiotherapy subjects.
Therefore, Guy proposes that the college and the radiotherapy community should support the participation of RTT's (nurses and TMBs) in the ESTRO “Train the trainers” program, to develop various radiotherapy modules in the existing education programmes.

Jean Vanderick informs the college that the university of Liege started this year with a 1 year radiotherapy course.
L'ULg organise un nouveau certificat d'université en Radiothérapie et pris en charge oncologique – options « dosimétrie » et « technologie » comptant pour 10 crédits.

Public Cible : Ce programme de formation s'adresse à un large éventail de profils puisque les compétences et tâches reliées au traitement de Radiothérapie – Oncologie sont multiples et pluridisciplinaires : Infirmiers, technologues de laboratoire, diplômés de 2e cycle ou porteurs d'une expérience professionnelle en radiothérapie ou dans le domaine de l'oncologie.

La formation est organisée en 1 année à raison de 3 à 4 demi-journées par mois.

(adapted from the website http://www.ulg.ac.be)

9. Membership of the college
The composition of the college will change, all members have to be replaced. A total of 8 new members will be assigned by the FOD/SPF. The BVRO/ABRO and the VBS/GBS provided the FOD/SPF with a list of candidates. The composition of the new college has first to be published in the "Belgisch Staatsblad/Moniteur Belge", then a meeting will be planned. First the college of radiotherapy-oncology will meet, afterwards a meeting with the (renewed) experts team will be planned.
This was the last meeting of the currently existing college.

Weltens Caroline
19-9-2012

NEXT MEETING: after installation of the new college
Deel 2:
resultaten
1. From BELdART-1 to BELdART-2

S. Lelie
D. Verellen

Overview

1. BELdART - I

2. BELdART - II
   a) Goals
   b) Organisation
   c) Status BELdART - II
Alanine/EMR dosimetry

Dosimetry based on magnetic resonance of electrons:

All you need is a balance and an EMR spectrometer...

BELdART - I project - audit

- On site visitation by a BELdART employee, together with the local radiation physicist
- Verifications with BELdART material

- A check of the most important mechanical parameters
- A dosimetric check of 2 photon and 2 electron beams
- Benchmarking with BHFA ionization chamber
BELdART - I results

- Dosimetric (1st run)

![Dosimetric graph]

- 2nd run

![2nd run graph]

BELdART-1 statistics

- Number of visited sites: 34/34
- Number of audited machines: 61/91
- Number of audited beams: 212

- Not audited:
  - Tomotherapy
  - Cyberknife
  - Gamaknife
  - Mobetron
Overview

1. BELdART - I

2. BELdART - II
   a) Objectives
   b) Organisation
   c) Status BELdART - II

BELdART-2: The Idea

- Dose verification of basic and dynamic RT techniques in Belgium
- 4 objectives:
  1. Basic dosimetric check of MVX and MVE beams
     - Subset of BELdART tests
     - Mailing audit based on BELdART-1 protocols using dedicated holder
  2. Dynamic RT (IMRT, tomo, RA, VMAT, ...)
     - Mailing audit: phantom, dosimeters & film
  3. Benchmarking with BHPA IC
  4. Up2Date inventory of devices in Belgium
## Organization BELdART-II

<table>
<thead>
<tr>
<th>Steering Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colleges of Physicians (2)</td>
</tr>
<tr>
<td>IMBA (1)</td>
</tr>
<tr>
<td>Project responsible</td>
</tr>
<tr>
<td>Scientific supporter</td>
</tr>
<tr>
<td>Project coordinator</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BELdART-II Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project responsible</td>
</tr>
<tr>
<td>Project coordinator</td>
</tr>
<tr>
<td>Scientific supporter</td>
</tr>
<tr>
<td>Dosimetry lab assistant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scientific Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project responsible / coordinator</td>
</tr>
<tr>
<td>Scientific supporter</td>
</tr>
<tr>
<td>Hospital physician (1)</td>
</tr>
</tbody>
</table>

## BELdART II Team

- Members:
  - Brigitte Reniers, Responsible, auditor
  - Wouter Schroevers, Project coordinator
  - Steven Lelle, Scientific support
  - Nathalie Reulens, dosimetry lab technician
  - Sonja Schreurs, coordinator NuTeC
**Scientific IMRT committee**

- Members:
  - Michael Duchateau, UZ Brussels
  - Wouter Crijns, UZ Leuven
  - Yassine Boucours, Centre Hospitalier Peltzer-La Tourelle
  - Antoine Delor, UCL
  - Michel Mathot, University of Liege
  - Brigitte Reniers, Responsible BELdART-II
  - Wouter Schroeyers, Coordinator BELdART-II
  - Steven Lelie, Scientific support BELdART-II

**Steering committee BELdART II**

- Members:
  - François Sergent; Clinique et Maternité Ste-Elisabeth
  - Stefaan Vynckier; UCL
  - Dirk Verellen; UZ Brussels
  - Alex Rijnders; Cliniques de l'Europe
  - Karen Feyen; AZ St. Maarten
  - Brigitte Reniers, Responsible BELdART-II
  - Wouter Schroeyers, Coordinator BELdART-II
  - Steven Lelie, Scientific support BELdART-II
Status BELdART II

- New team of BELdART II is gathered

- The Scientific Committee is designing and fine tuning the IMRT audit protocol.
  - 1st meeting scientific committee 26/10/2012
  - 2nd meeting scientific committee 11/12/2012

- The newly designed IMRT audit protocol is built in close interaction between scientific committee and steering committee.
  - 1st meeting steering committee 23/01/2012

Status BELdART II

- Selection, testing and acquisition of suitable IMRT phantoms for mailed audits is ongoing
  - 3 phantoms will be circulated simultaneously
  - Currently under consideration:
    - Stereotactic Radiosurgery-head-phantom
    - Tomotherapy Cheese-phantom or comparable
    - Easy cube body phantom or comparable
Main idea

- Split in **two phases** to let some time to be sure of the film dosimetry
  - Phase 1: Easy set-up, identification of difficulties in film dosimetry, planning, transport, ... Our CT, our targets, ...
  - Phase 2: Real IMRT case, e.g. H&N, depending on survey with CT, planning, ... in center
- Phantom is sent with films and detectors → no handling @ center!

Phantom phase I

- Detectors:
  - 1 sagittal film
  - Alanine pellets
    - 1 pellet on Rectum
    - 2 pellets on Prostate
  - 1 pellet on bladder
  - 2 pellets on seminal vesicle
- Planning
  - Send images of the phantom with structures (inspired by a prostate clinical case)

Problem of the calibration curve for HU: override the body structure by the HU corresponding to the electron density of the material on the CT of the institute (if necessary?)
Easycube: example

Status BELdART II

- Initiation of the development of a validated code of practice for EBT3films
  - Detailed film read-out and handling procedure is under construction.
  - Testing of specific film analysis software is ongoing.
  - Handling of films during the audits and transport is under study
  - Setting plan for
Conclusions: External QA for IMRT

What is checked:
- Immobilization
- Imaging
- Patient Positioning
- Treatment
- Tumor Localization
- Treatment Planning
- Quality Assurance and Verification

BELdART II

Thank you!
2. Procare

Prof. Dr. K. Haustermans

Can we improve rectal cancer care in Belgium by standardizing CTV delineation?

The PROCARE RT project
Karin Haustermans
on behalf of the PROCARE working group

Outline

- Introduction
- Procare RT project
  - Set up
  - Review procedure
  - Results
- Conclusion
**Procare project**

- Profession-driven
- National
- Voluntary participation
- Multidisciplinary
- Anonymized registration (BCR)
- Feedback and benchmarking
- Governmental support

**Improve outcome**
**reduce variability**

**of rectal cancer treatment in Belgium**

- Standardization (guidelines)
- Decentralized implementation of guidelines
- Training
- Quality assurance (registration and feedback)

**Multidisciplinary**

- Pathology
- Radiology
- Surgery
- Medical Oncology
- Radiation Oncology
### PROCARE induced improvement

<table>
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<tr>
<th></th>
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</tr>
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<tbody>
<tr>
<td>All patients</td>
<td>46.6</td>
<td>51.6</td>
<td>52.4</td>
<td>66</td>
</tr>
<tr>
<td>Stage I</td>
<td>77</td>
<td>75.1</td>
<td>76.8</td>
<td>86</td>
</tr>
<tr>
<td>Stage II</td>
<td>64.4</td>
<td>61.5</td>
<td>61.2</td>
<td>74</td>
</tr>
<tr>
<td>Stage III</td>
<td>38.2</td>
<td>54.1</td>
<td>54.7</td>
<td>65</td>
</tr>
<tr>
<td>Stage IV (&lt;75 yr) 2 yr OS</td>
<td>28</td>
<td>49.8</td>
<td>52</td>
<td>73</td>
</tr>
</tbody>
</table>

**REMARKS**
1. Overall a 10% absolute increase in OS for all stages
2. Cautions for stages (pStage x CStage in BCR) and PROCARE registration bias

### PROCARE induced improvement

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI for ct3-4</td>
<td>41</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>R(C)T for cStage II-III</td>
<td>54.8</td>
<td>76</td>
<td>76</td>
</tr>
<tr>
<td>RO resection</td>
<td>76</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>APE + HR overall</td>
<td>24</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>APE + HR lower third</td>
<td>48</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>30 day mortality</td>
<td>2.9</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>ypCRMA positive overall</td>
<td>18</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>ypStage 0</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS**
1. RC management (staging methods, use of preop RT) (further) improved
2. Type of surgery remained constant, but postop mortality decreased
3. Registration bias cannot be excluded
What is the impact of a central review platform on the quality of CTV delineation?

Variability in CTV delineation

Delineation error = systematic error
Room for improvement!
Impact of guidelines and atlas

Variability vs high conformal techniques
Brief history

- 2009 Nov – first Aquilab installation
- 2010 March - start of the review with 3 centers
- 2010 April – launch of the official test
- 2010 May – full operation between 10 centers
- 2011 March – 18 centers participating
- 2011 July – 20 centers participating

Clinical guidance

- 2010 March – distribution of a CD
  - Procare guidelines
  - Guidelines on CTV delineation
  - CTV delineation atlas
  - OAR delineation atlas
Delineation guidelines
Structure of the system

Central Secured server

Archive server at Cancer Registry

Required information

- Name of the sender hospital
- Identification of the patient
- National registration number
- TNM staging
- Localization of the tumor
- Name of the hospital where surgery is planned
- Any further comment
Agreement

- Contours were reviewed within 24 hours
- Review was performed by a well trained radiation technologist
- If uncertain: supervision by radiation oncologist
- Modified CTV structures were sent back
- Implementation of the CTV_mod was left at the discretion of the physician

Review outcome

Submitted CTV

- CTV per guideline
- Change suggested
- Fully accepted
- Partly accepted
- Rejected

Used CTV

Storing the Used CTV is important to properly assess treatment outcome
Cases submitted

- Enrollment
  n=1255

- Excluded (n=31)
  - Not in PROCARE project (n=1)
  - No supervision performed (n=23)
  - Patients with inguinal lymph nodes (n=3)

- Total patients included in the final analysis
  N=1224

Patient inclusion between March 2010 and September 2012
Cases submitted

<table>
<thead>
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<td>90</td>
<td>13.4</td>
</tr>
<tr>
<td>20</td>
<td>60</td>
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Median number of patients per center: 64  
Range: 6-195

Patient characteristics: gender

<table>
<thead>
<tr>
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<th>Frequency</th>
<th>Percent</th>
<th>Cumulative frequency</th>
<th>Cumulative percent</th>
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<td>F</td>
<td>596</td>
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<td>596</td>
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### Patient characteristics: age

<table>
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<th>Mean</th>
<th>Std Dev</th>
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<th>Lower quartile</th>
<th>Upper quartile</th>
<th>Min</th>
<th>Max</th>
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<tr>
<td>1195</td>
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<td>66.0</td>
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</table>

### Patient characteristics: TNM

<table>
<thead>
<tr>
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<tbody>
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<td>6</td>
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*Note: Frequency missing = 12
### Patient characteristics: TNM

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### Patient characteristics: stage

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Patient characteristics: tumor localization

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</table>

CTV modification

Submitted CTV: N= 1222
CTV per guideline: N= 315
Change suggested: N= 907
Fully accepted: N= 622
Partly accepted: N= 37
Rejected: N= 150

Modification Frequency Percentage
Yes 907 74.2
No 315 25.8
CTV evaluation: overlap parameters

Submitted CTV

Reviewer's CTV (reference)

Kappa Index [K]

Overlap volume [OV]

Ideal case: KI = 1

Ideal case: OV = 1

CTV evaluation: volumetric parameters

Submitted CTV

Reviewer's CTV (reference)

Volumetric ratio [RV]

Contoured Common Volume [VCC]

Contoured Additional Volume [VSC]

Ideal case: RV = 1

VCC = 100%

VSC = 0%
CTV evaluation over time

Evaluation by month?

- Variability in the time of inclusion between two patients in one center
- Variability in the time of inclusion between two patients between centers
- Different number of patients by center per month (different contribution by month)

Evaluation by "categorical patient order"

Categorical patient order

1 = [1-5]th patient of each center
2 = [6-10]th patient of each center
3 = [11-15]th patient of each center
...
...
19 = [91-95]th patient of each center
20 = >95th patient of each center
Least square means of RV by categorical patient order

VCC by categorical patient order
Summary

- There was a high level of agreement on the initial delineations
- There was a significant increase in RV and VCC between the first ten patients and the others
- The VCC of mid rectal tumors was significantly lower compared to low and high seated rectal tumors
- There was no significant difference in delineations by gender

BUT

- Only 11 centers included more than 50 patients
3D surface distance analysis

Aim:
To identify CTV subregions with large interobserver variability in order to precise/redefine these regions in the delineation guidelines

Delineation variation in subregions

Bad

Good
Delineation variation in subregions

Delineation variation in subregions
Delineation variation in subregions

150 cases

- Gender: 75 male, 75 female
- Tumor location: high, med, low
- Regions: upper border, lower border, ischiorectal fossa, upper lateral pelvic subsite, anterior region, posterior pelvic subsite, obturator region
- Quantification of differences (≥3 mm is significant)

Delineation variation in subregions

Analyses ongoing...
But...
- Disagreement on ischiorectal fossa in mid and low rectal cancer
- Disagreement on upper lateral pelvic subsite for all localizations
- Agreement on posterior border, obturator region, lower and upper border
Conclusion

- Interobserver variability is an important issue in the era of conformal radiotherapy and an increased emphasis on training is needed.
- Accurate and reproducible imaging techniques, guidelines, delineation atlas and central review improve the uniformity in CTV delineation.
- 3D surface analysis can highlight current ambiguities in the delineation guidelines and can help us in further improving these.
- Datasets such as this one may help to develop an automatic delineation tool.

Acknowledgements

- Eszter Hortobágyi
- David Jegou
- Freddy Penninckx
- Pierre Scalliet
- Liesbet Van Eycken
- Maarten Lambrecht
- Ines Joya
- ... the PROCARE working group
3. Incident report systems

Prof. Dr. P. Scalliet

MINUTES PRISMA-RT Meeting

Date Monday March 25th 2013
Time 9.00 – 12.00 CET
Place Cliniques Universitaires St Luc (Brussels)

Participants
- Pierre Scalliet (PS)
- Alain Dehaene (AD)
- Frederik Vanhoutte (FV)
- Maxime Coevoet (MC)
- Aude Vaandering (AV)

MINUTES

1. Introduction

All the participants were welcomed. FV explained that uncertainties remained concerning the use of PRISMA-RT within the QM and radiotherapy community. This meeting will thus have as a main objective the clarification of these issues.

2. Analysis of the different options available for the use of the PRISMA-RT platform

PRISMA-RT as a process is comprised of three distinct steps:
- The incident and/or near-incident reporting itself (department level)
- The PRISMA analysis of the incident/near-incident (department level)
- Export into benchmarking database of the following data (national level);
  o Center code
  o Date of near-incident/incident
  o Eindhoven classification codes
  o Context variables
The PRISMA RT web platform was developed as a powerful tool specifically for the project. At this time it’s the only system that is fully ready for use. However, the FPS Healthcare has added requirements after the start of the project so in some centers some implementation issues arose. To accommodate those centers, we discussed long and hard, during and after the meeting. We believe that there are three fully compliant systems that are sustainable in the future and that all centers should strive towards one of these systems. The systems differ in how the PRISMA-RT workflow is divided over the hospital’s safety management system (SMS) and the PRISMA-RT web platform. In any case, there will be sufficient flexibility so that each center can accommodate their own preferences. We firmly believe that for each center there is a convenient transition possible from their current situation to one of these systems. The QMRT.be group will assist in providing center-specific roadmaps.

We have ordered the systems as 1, 2a and 2b according to the classification of the FPS Healthcare. There is no preference implied.

1. Centers using PRISMA-RT platform for benchmarking only

These centers will encode and analyze their incident/near-incident data into their own hospital’s safety management system (SMS). A Simple Object Access Protocol will allow the export of the following data into PRISMA-RT’s benchmarking database (through the use of a SOAP listener installed in the benchmark database):
- Hospital number
- Date of reporting the incident
- Eindhoven classification codes (following Root Cause Analysis)
- Context variables

**Location and confidentiality of the data:**
- All data is contained in the SMS of the hospital. This system naturally needs to comply with all requirements of the FPS healthcare.
- The only data in the TPSC cloud are the benchmark exports

**Prerequisites:**
- SOAP listener needs to be implemented by Adheco/TPSC.
- Export data format needs to be clearly defined by Adheco/TPSC.
- XML export needs to be supported by SMS vendor (mandatory by FPS healthcare).
- Full PRISMA RT analysis possible in SMS + context variables. At this time only TPSC offers this fully, Infoland partially.

**Likely candidates:**
- Sites with local installation of TPSC + PRISMA-RT module.
- Sites with Infoland, if PRISMA RT and export are further developed.
- Sites with other commercial systems, if vendor is willing to implement PRISMA RT and export.
- Sites with home-built systems with strong and willing IT support.

**Advantages:**
- MAJOR: Maximal locality, maximal integration in hospital system
- MAJOR: No need for links or double bookkeeping

**Disadvantages:**
- MAJOR: not ready. Extensive development needed, also from third parties with no direct interest in PRISMA-RT. (Need to emphasize that PRISMA-RT is a vanguard in quality in healthcare...). At this time only TPSC fully supports PRISMA-RT with context variables, potential for Infoland after "some" development.
- MINOR: export to benchmark
### 2a. Centers using the PRISMA-RT platform for incident reporting

<table>
<thead>
<tr>
<th>Hospital system (local)</th>
<th>Minimal report</th>
<th>Report identifier and/or data</th>
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</thead>
<tbody>
<tr>
<td>PRISMA-RT Center (cloud-based)</td>
<td>Report and analysis</td>
<td></td>
</tr>
<tr>
<td>PRISMA-RT Benchmark (cloud-based)</td>
<td>PRISMA-RT classification + context variables</td>
<td>PRISMA-RT Benchmark Statistical tool</td>
</tr>
</tbody>
</table>

These centers will report and analyze radiotherapy incidents in PRISMA-RT. The hospital system will only contain an indicator that a radiotherapy report was made (incident type "aiaab"). Actual workflow will depend on the system used but may include (again no preference):

- a hyperlink from the hospital safety management system to the PRISMA-RT web-based form and possible transfer of filled-in fields.
- A hyperlink from PRISMA-RT to the hospital system
- Manual link, i.e. the person analyzing the data also enters an "aiaab" event into the hospital system. Inconvenient but not insurmountable.

#### Location and confidentiality of the data:

- The PRISMA-RT platform is only available in cloud-based form. So all radiotherapy data is contained in the TPSC cloud. A local installation of the PRISMA-RT platform would require a local installation of the TPSC platform (cfr. Leuven). But this is NOT budgeted for.
- The hospital will have its own separate database for the reports and for the PRISMA-RT results. Confusingly this was named the "local" database but this is also cloud-based.
• It is also important to note that once a report is encoded into the PRISMA-RT platform, this data can be exported as an excel, csv or xml file back into a local database server.

• The hospital can decide to activate its data and make the PRISMA-RT results accessible for the benchmarking database. The only data shared is:
  o Hospital number
  o Date of the incident
  o Eindhoven classification codes (following Root Cause Analysis)
  o Context variables

• Confidentiality:
  This is a split issue:
  o AD: confidentiality is no issue. The contract exists between Saint-Luc and Adheco. Individual centers do not have individual contracts. Their rights are guaranteed by the College.
  o FVH: confidentiality is an issue. The contract only exists between Saint-Luc and Adheco. Individual centers do not have individual contracts. So legally hospitals might object to entrusting data to a third party they have no direct contract with.

Prerequisites:
• Hospitals should ensure confidentiality of all data entered into PRISMA-RT platform. This can be difficult since many people are involved in reporting. But the PRISMA-RT platform supports anonymization at a certain point in time (immediately, after 3 months, 6 months, 1 year, etc.)
• By preference, some kind of “automatic system” should ensure that the hospital system and PRISMA-RT platform are always in sync ("alaab"). Feasibility will greatly depend on system in use.
• Speculative: alternatively, hospitals can opt for a local solution with a mini-TPSC SMS platform running the PRISMA-RT module. But this has budgetary consequences and has not been talked through. But this way, PRISMA-RT would be fully available, all data is local and confidential. In effect, TPSC will act as a stand-alone SMS for radiotherapy, similar to scenario 1 but with the additional requirement of the link into the hospital system...

Likely candidates:
• Sites with SMS systems for which no vendor support for PRISMA-RT can be gained.
• Sites with home-built systems where customization would require too much time and resources.
• Sites willing to anonymize the entire reporting process so confidentiality is ensured even when using a cloud-based solution without a direct trusted third party.
• Sites opting for a type 1 like scenario but with more manual intervention. User reports in local system, administrator makes an anonymized copy, manually or through some automation, into PRISMA-RT platform.

Advantages:
• MAJOR: PRISMA-RT fully implemented.
• MAJOR: no implementation required from third parties.
• MAJOR: fully ready to deploy (in principle, the matters of level of reports and lists of context variables need to be resolved...)

Disadvantages:
• CRITICAL(FVH)/MINOR(AD) confidentiality issues with incident reports stored in cloud-based system with no individual contracts
• MINOR: “aiaab” link in hospital system, some development needed to avoid inconvenience

2b. Centers using the PRISMA-RT platform as an analysis tool

This scenario is a hybrid of 1 and 2a. Similar to scenario 1, these centers will encode the near-incident/incident into their own local reporting system.
However, the PRISMA analysis will be carried out in the web-based PRISMA-RT platform. Similar to scenario 2a, a link is made between the hospital system and the PRISMA-RT platform. For this option, a placeholder incident report should be put in the hospital specific-part of the PRISMA-RT platform containing only:

- The hospital code
- The date of the event
- The event number

The user will then use the web-based PRISMA analysis tool to determine the classification codes and the following data can be shared to the benchmarking database:

- Hospital number
- Date of the incident
- Eindhoven classification codes (following Root Cause Analysis)
- Context variables

**Location and confidentiality of the data:**

- All incident report data is contained in the local hospital system.
- The hospital will have its own separate cloud-based database for the placeholder reports and for the PRISMA-RT results.
- The hospital can decide to activate its data and make the PRISMA-RT results accessible for the benchmarking database. Again the only data shared is:
  - Hospital number
  - Date of the incident
  - Eindhoven classification codes
  - Context variables
- Confidentiality is not an issue if the PRISMA-RT analysis does not contain confidential information. Even then, confidential data can be made anonymous at a certain point in time (immediately, after 3 months, 6 months, 1 year, etc.)

**Prerequisites:**

- PRISMA-RT analysis should not contain confidential data. This is easier to control than in 2a because only a limited number of people are involved in analysis.
- By preference, some kind of "automatic system" should ensure that the hospital system and PRISMA-RT platform are linked and that the generation of placeholder reports is automated. This is easier than in 2a because only an URL-type link with some variables is needed.
Likely candidates:
- Sites with SMS systems for which no vendor support for PRISMA-RT can be gained.
- Sites with home-built systems where customization would require too much time and resources.
- Sites not willing to anonymize the entire reporting process but can accept the PRISMA-RT analysis to be done on a cloud-based system.
- Sites aiming for solution 1 in the long term but not willing to wait for development to complete.

Advantages:
- MAJOR: PRISMA-RT fully implemented.
- MAJOR: Incident reports are local.
- MAJOR: fully ready to deploy (in principle, the matters of level of reports and lists of context variables need to be resolved...)

Disadvantages:
- MINOR: potential confidentiality issues with PRISMA-RT analysis
- MINOR: report in one system, analysis in another. In practice an analysis on the level of the PRISMA-RT results will rarely trace back to an individual event. (In the rare event this seems desirable; an HFMEA analysis of the event would probably be more suitable in any case...)
- MINOR: need for placeholder reports in PRISMA-RT platform. Might require some development to avoid inconvenience.

3. Ownership of the data

As was mentioned in the letter of the Collège of Radiothérapie:
- Individual data (reporting forms + PRISMA analysis) are the property of each individual radiotherapy department
- Each center can anonymize its own data.
- Collective data (benchmarking data) are owned by the Collège of Radiotherapy

In the PRISMA-RT platform implementation each hospital has its own cloud-based database, separate from the (also cloud-based) benchmarking database. This individual database can contain incident reports and PRISMA-RT analysis results. Each center has to activate its data for it to be visible in the benchmarking database.
Since the contract for this project (see 4) is between Adheco and Saint-Luc, the rights of data-ownership are guaranteed through the College.
4. **Sustainability of the project**

The PRISMA RT project is a 5 year project financed by the Plan Cancer/Kanker plan. The project was in fact established in 2010 between the Cliniques Universitaires St Luc and ADHECO as Cancer Plan funding must be channeled through one single hospital. This is not unusual and is the case with several projects.

The project is sustainable if the funding remains. And no blind guarantee can be given, but... Min. Onckelinckxx has explicitly stated that the funding of the cancer plan will not be part of any budget cuts. If the FPS healthcare would decide that quality in radiotherapy is not important and does not renew funding then the PRISMA-RT platform will disappear (unless sustained in some other way). In fact the same would remain true even if funding would be directly from FPS Healthcare funds.

Concerning the terms of the contract and the involved partners, the PRISMA-RT platform is built on TPSC technology and hosted on the TPSC cloud. As such it is not transferable.

5. **Team of experts**

A multi-disciplinary team of experts will be set up in order to:

- Define the context variables
- Define the level of reporting that needs to be exported (use of French adaptation of IAEA INES Scale?)
- Continuously ensure consistency of PRISMA-RT analysis

Initial composition and first assembly of the team of experts is planned still before summer.

6. **Communication**

PRISMA-RT/ADHECO will channel all relevant information through the college and the QMRT.be group listing. They will also broadcast quarterly progress reports. Similarly, any comments/feedback concerning the PRISMA-RT functionalities can be forward to FV and AV who will sort through the information and forward it to PRISMA/ADHECO. We propose to collect all bug reports and customer improvement requests and include their status in the quarterly reports.

7. **Other**

- It has always been the intention of Adheco to support site-specific customization of the web form and in fact they have done this already at several sites. Requests should be sent to Adheco, but it might be useful to share with the group.
- Training for BackOffice administration is foreseen Q4 2013 – Q1 2014.
• The PRISMA-RT web platform is a reporting and analysis tool. It can however be expanded with other modules, for example to track corrective actions. This extension is foreseen in the contract but the financial implications have not yet been discussed.
• 4 PRISMA-RT training dates are foreseen for Gent, Leuven en 2 in Namur. These will be communicated by Adheco.
• The college of radiotherapy will discuss representation of QMRT.be in its meetings.
4. IMRT

M. Van Dijcke
F. Vanneste

IMRT SURVEY PART 2
Collège de Radiothérapie
Situation 28.01.2013

F. Vanneste, M. Van Dycke
# Composition du Questionnaire

**General information**

Centre: [Text]

Questionnaire filled in by (local contact): [Text]

Position: [Text]

E-mail: [Text]

Are you performing IMRT: □ YES □ NO, if no please return this page only

Do you foresee to use one of these modalities within the coming 3 years? □ YES □ NO

If yes go to page

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<th>No</th>
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Colloque Radiothérapie _ Enquête IMRT 2012 _ PART 2
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<tbody>
<tr>
<td>A) DMLC Technique (dynamic IMRT)</td>
<td>4</td>
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<tr>
<td>Pre-treatment verification</td>
<td>4</td>
</tr>
<tr>
<td>Tumor dose verification</td>
<td>4</td>
</tr>
<tr>
<td>2D Distributions</td>
<td>6</td>
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<td>3D Distributions</td>
<td>7</td>
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<tr>
<td>Tolerances for Fluence Verification</td>
<td>8</td>
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<tr>
<td>Monitor units</td>
<td>11</td>
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<tr>
<td>B) ROTATIONAL IMRT Techniques</td>
<td>12</td>
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<tr>
<td>Pre-treatment verification</td>
<td>13</td>
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<tr>
<td>Tumor dose verification</td>
<td>13</td>
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<td>Distributions</td>
<td>14</td>
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<td>3D Contributions</td>
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<td>Tolerances for Fluence Verification</td>
<td>16</td>
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<td>Monitor units</td>
<td>19</td>
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<td>C) STEP-SHOOT IMRT Technique</td>
<td>20</td>
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<td>Tumor dose verification</td>
<td>20</td>
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<tr>
<td>2D Distributions</td>
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<td>3D Distributions</td>
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<td>Tolerances for Fluence Verification</td>
<td>24</td>
</tr>
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<td>Monitor units</td>
<td>27</td>
</tr>
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<td>D) HELICOIDAL IMRT Technique</td>
<td>28</td>
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<tr>
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<td>28</td>
</tr>
<tr>
<td>Tumor dose verification</td>
<td>28</td>
</tr>
<tr>
<td>2D Distributions</td>
<td>30</td>
</tr>
<tr>
<td>3D Contributions</td>
<td>31</td>
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<tr>
<td>Tolerances for Fluence Verification</td>
<td>32</td>
</tr>
<tr>
<td>Monitor units</td>
<td>35</td>
</tr>
<tr>
<td>E) DAILY LINAC QC DEDICATED TO IMRT</td>
<td>36</td>
</tr>
</tbody>
</table>

IMRT SURVEY PART 2 28.01.2013
Pre-treatment verifications (patient oriented)

At which frequency do you perform this type of measurement?

- For no patient at all
- For some patients
- For all patients
- How many times per patient?

3) Point dose verifications

Four doses are generally measured with an ionisation chamber in a flat phantom for gantry 0 degree for every beam (fluence) or in a geometrical or anatomical phantom from the planned gantry angles.

Do you perform point dose measurements?  

- YES  
- NO

If YES:

<table>
<thead>
<tr>
<th>Phantom</th>
<th>Flat</th>
<th>semi-anatomical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of detector used:</td>
<td>Detector Volume:</td>
<td>CC</td>
</tr>
<tr>
<td>Each field at gantry 0?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Individual field fluence control?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Dose points in homogeneous dose region?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Special dose points in region of critical organs?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Total number of verified dose points/field?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Do you use your TPS "point doses" values or do you take into account the size of your ionisation chamber and use a mean dose value in the chamber?

- Point dose
- Mean dose

FOR EACH MODALITY

1) Point doses
2) 2D distribution
3) 3D distribution

Tolerances As point dose verification results:

<table>
<thead>
<tr>
<th>Localisation</th>
<th>Primary</th>
<th>Head and Neck</th>
<th>Other</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Tolerance in %</td>
<td>Tolerance in %</td>
<td>Tolerance in %</td>
</tr>
<tr>
<td>Individual Fluence</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Total dose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organs at risk 1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Organs at risk 2</td>
<td></td>
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</tr>
</tbody>
</table>

In case some point doses would be out of tolerance, how are you dealing with this situation?

Do you have a local protocol for this situation?

- Yes
- No

If yes please summarise as few lines.
b) 2D Distribution

Are you performing fluence verifications for each patient?  □ YES  □ NO
Do you analyze each field individually?  □ YES  □ NO
Do you use gantry at 0 degree for each field?  □ YES  □ NO

Which type of measuring device are you using?
□ 2D Array system
□ Goldstone
□ EDR1
□ Film
□ Other

Value:
□ Other scanner

Analyzing software:
□ EPID
□ Portal Dosimetry
□ Epigen
□ Other

Are your comparisons performed in?
□ Absolute dose  □ Relative dose

In case of relative dose comparisons, do you perform an additional absolute dose control with an ionization chamber?
□ YES  □ NO

Remarks:

c) 3D distributions

This is the case when the treatment data are transferred on a semi-anatomical phantom for combined dose distributions control.

Are you performing fluence verifications for each patient?
□ YES  □ NO

Do you acquire data for each field individually?
□ YES  □ NO

Which type of measuring device are you using?
□ TLD
□ 2DARRAY system
□ 3 DARRAY (Delta 4, arc check)
□ Film
□ Other
□ Chamber

Do you measure doses in?
□ Coronal planes
□ Transverse planes
□ Sagittal planes
□ Multiple planes
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Do you take anyone to the Symptom?</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>Yes</td>
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</tr>
<tr>
<td>No</td>
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</tr>
</tbody>
</table>
e) Monitor units

The purpose of this question is to try to have an idea of the number of monitor units delivered for specific localisations in the different centres in Belgium.

We would like to obtain a mean value for the specified treatments.

To give us the possibility to perform a comparison, it is very important to provide some information regarding beam calibration.

Which photon energy is used for IMRT?

MU reference conditions: 1 MU = 1 cGy at SSD = cm
                     DEPTH = cm

<table>
<thead>
<tr>
<th>Localisation</th>
<th>Technique:</th>
<th>Typical Number of MU for 2 Gy at Ref. Point</th>
</tr>
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<tbody>
<tr>
<td>Prostate</td>
<td>Dynamic</td>
<td></td>
</tr>
<tr>
<td>Brain (no stereo)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head and Neck</td>
<td></td>
<td></td>
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</tbody>
</table>
Situation 28.01.2013

21 Centers / 25

AZ Groeninge Kortrijk
AZ Turnhout
Bordet
Chirec
CHU Charleroi, André Vésale
CHU Liège
CHU Tivoli
Clinique de Jolimont
Cliniques de l'Europe
EpiCURA Baudour
Gent University Hospital
GHBC Charleroi
Limburgs Onco Centrum
OLV Hospital Aalst
Sint Augustinus Wilrijk
St Elizabeth, Namur
St Jan Brugge-Oostende AV
St Jean Bruxelles
St Luc
St Marnix Duffel
URA AZ Middelheim
### EXELL ANALYZE

<table>
<thead>
<tr>
<th>Centre</th>
<th>SMLC</th>
<th>DMLC</th>
<th>Rotational</th>
<th>Helicoidal</th>
<th>Cyberknife</th>
<th>GammaKnife</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>2</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
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<td>3</td>
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<td>5</td>
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<td>NO</td>
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<td>6</td>
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## For each modality

### Pre-treatment verifications (patient oriented)

**At which frequency do you perform this type of measurement?**

- a. For no patient at all
- b. For some patients
- c. For all patients
- d. How many times per patient?

**Pre-treatment verifications**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>For no patient at all</th>
<th>For some patients</th>
<th>For all patients</th>
<th>How many times per patient?</th>
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<tbody>
<tr>
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<td>3</td>
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<td>12</td>
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<td>2-3 times, depending on results</td>
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<td>16</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>28</td>
<td>not performed</td>
<td></td>
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</tr>
</tbody>
</table>

**Total**
| A   | B   | C   | D   | E   | F   | G   | H   | I   | J   | K   | L   | M   | N   | O   | P   | Q   | R   | S   | T   | U   | V   | W   | X   | Y   | Z   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | YES | YES | YES | 2D Array system | / | / | Other software | Machine dose | / | / | Other software | Machine dose | / | / | Other software | Machine dose | / | / | Other software | Machine dose | / | / | Other software | Machine dose | / | / | Other software | Machine dose |
| 2   | YES | YES | YES | EPID | / | / | / | EPID | / | / | / | EPID | / | / | / | EPID | / | / | / | EPID | / | / | / | EPID | / | / | / | EPID | / | / | / | EPID |
| 3   | YES | YES | YES | 2D Array system | / | / | / | EPID | / | / | / | EPID | / | / | / | EPID | / | / | / | EPID | / | / | / | EPID | / | / | / | EPID | / | / | / | EPID |

### b) 2D Distribution

- Are you performing beam verification for each patient?  
  - YES | ≥ 300
- Do you analyze each field individually?  
  - YES | ≥ 300
- Do you use gantry at 0 degree for each field?  
  - YES | ≥ 300

### Which type of assignment device are you using?

- 2D-Array system
- Gafchromic
- EPID
- Film
- Other

### Analyzing software:

- EPID
- Portal Densitometry
- Others

- Are you comparing your results?
  - Absolute dose
  - Relative dose

- Is one of these dose comparisons, do you perform an additional relative dose check with an electron chamber?
  - YES | ≥ 100
PRELIMINARY RESULTS

MODALITIES

HELICOIDAL 10%
SMLC 27%
DMLC
ROTATIONAL 36%
HELI KOIDAL

21/25 Centers

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SMLC</td>
<td>27</td>
</tr>
<tr>
<td>DMLC</td>
<td>11</td>
</tr>
<tr>
<td>ROTATIONAL</td>
<td>10</td>
</tr>
<tr>
<td>HELICOIDAL</td>
<td>4</td>
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</table>

IMRT SURVEY PART 2 28.01.2013
<table>
<thead>
<tr>
<th>CLINICAL SITE</th>
<th>PROSTATE</th>
<th>HEAD&amp;NECK</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose/DTA</td>
<td>3%-3mm</td>
<td>3%-3mm</td>
<td>3%-3mm</td>
</tr>
<tr>
<td></td>
<td>9 resp</td>
<td>9 resp</td>
<td>9 resp</td>
</tr>
<tr>
<td>Tolerance (% of points with gamma index &lt;=1)</td>
<td>99% (11)</td>
<td>95% (12)</td>
<td>99% (4)</td>
</tr>
<tr>
<td></td>
<td>97% (3)</td>
<td>97% (3)</td>
<td>99% (3)</td>
</tr>
<tr>
<td></td>
<td>90% (2)</td>
<td>90% (2)</td>
<td>97% (1)</td>
</tr>
<tr>
<td>Local dose comparison (?)</td>
<td>NO (7)</td>
<td>NO (6)</td>
<td>NO (5)</td>
</tr>
<tr>
<td>Maximum Weighted</td>
<td>YES (1)</td>
<td>YES (1)</td>
<td>YES (1)</td>
</tr>
<tr>
<td>Dose Threshold for low doses</td>
<td>YES (11)</td>
<td>NO (8)</td>
<td>YES (1)</td>
</tr>
<tr>
<td>Increasing Tol. Low Doses</td>
<td>YES (3)</td>
<td>NO (14)</td>
<td>NO (4)</td>
</tr>
<tr>
<td>Taking into account points outside path MLC</td>
<td>YES (4)</td>
<td>NO (14)</td>
<td></td>
</tr>
</tbody>
</table>
Who is deciding if the values are in the tolerances?

- Very few responses
- Physician: 4  Med. Doctor: 1  Both: 2

Is the ESTRO booklet 9 used as reference protocol?

- Step & Shoot: Yes (5)  NO (5)
- DMLC: Yes (3)  NO (4)

<table>
<thead>
<tr>
<th>Mean Gamma</th>
<th>Maximum gamma</th>
<th>% Gamma &gt; 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable</td>
<td>&lt; 0.5</td>
<td>&lt; 1.5</td>
</tr>
<tr>
<td>To investigate</td>
<td>0.5 - 0.6</td>
<td>1.5 - 2.0</td>
</tr>
<tr>
<td>Rejected</td>
<td>&gt; 0.6</td>
<td>&gt; 2.0</td>
</tr>
</tbody>
</table>

IMRT SURVEY PART 2 23.01.2013
MU's = f(modality)

<table>
<thead>
<tr>
<th>MU's</th>
<th>S&amp;Shoot</th>
<th>DMLC</th>
<th>ROTAT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>300</td>
<td>540</td>
<td>350</td>
</tr>
<tr>
<td>Max</td>
<td>600</td>
<td>1000</td>
<td>550</td>
</tr>
<tr>
<td>Mean</td>
<td>430</td>
<td>731</td>
<td>458</td>
</tr>
</tbody>
</table>

To be corrected for calibrations conditions
MU's = f(modality)

<table>
<thead>
<tr>
<th>MU's</th>
<th>S&amp;Shoot</th>
<th>DMLC</th>
<th>ROTAT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>430</td>
<td>685</td>
<td>380</td>
</tr>
<tr>
<td>Max</td>
<td>700</td>
<td>1400</td>
<td>600</td>
</tr>
<tr>
<td>Mean</td>
<td>547</td>
<td>1046</td>
<td>486</td>
</tr>
</tbody>
</table>

To be corrected for calibrations conditions
Dayly or weekly dedicated IMRT tests for the? Yes (8) No (5)
to be discussed................

To be extracted from the study:

☐ info about local protocols
☐ QA phantoms used
☐ ..................
5. Audits

The report of the clinical audits 2012 will be made at the meeting Auditors planned on 03-04 may 2013.

Hospitals clinical audits 2012:

1. Namur (Ste Elisabeth): 11 – 13 January.
   Contact person: Dr V Remouchamps
   RTT: G Vandevelde
   clinician: P Van Houtte
   physicist: D Verellen

   Contact person: Dr P Bulens
   RTT: G Vandevelde
   clinician: P Scalliet
   physicist: K Feyen

   Contact person: Prof D Van den Weyngaert
   RTT: P Thysebaert
   clinician: P Van Houtte
   physicist: M Van Dycke

   Contact person: Prof K Haustermans
   RTT: P Thysebaert
   clinician: D Van den Weyngaert
   physicist: D Verellen

5. GZA (St Augustinus) 28- 30 November
   Contact person : M Coen
   RTT: M De Baere
   clinician: K Vandeputte
   physicist: S Vynckier
6. Roeselaere : 03-05 December. 
   Contact person: Dr Lorenzo Staelens 
   RTT:             G Vandevalde 
   clinician:       P Scalliet 
   physicist:       K Feyen 

   Contact person: Dr P Van Houtte 
   RTT:             P Bijdekerke 
   clinician:       Y Lievens 
   physicist:       MT Hoornaert 

The report of the clinical audits 2012 will be added to the report of 2013.