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**QUATRO audit to the Institute of Oncology and Radiology
of Serbia: An example of good impact on the
development of radiotherapy in the institution**

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General information



- Institute of Oncology and Radiology of Serbia (IORS) in Belgrade is the largest oncology institution in Serbia.
- It was founded in 1939.
- It is a national comprehensive center dealing with cancer prevention, health care and treatment of malignant disease and serves as a teaching base for Faculty of Medicine and Medical College for RTTs.
- It is organized on the principles of UICC and WHO applicable to the national institutes.
- The Institute is one of the founders and an active member of the European Organization of Cancer Institutes (EOCI) and the European Association for Cancer Research (EACR).
- It is national cancer research center for studies in field of oncology and participates in many international multilateral and bilateral research studies and trials (EORTC, CECOG...).

Before the audit 2006.

- Radiotherapy department worked in three shifts due to long waiting lists more than twenty years, treating up to 350 patients daily on 3 Linacs (about 4000 patients per year).
- Staff consisted of 22 radiation oncologist, 10 medical doctors, 7 medical physicist and 30 RTT s.
- Equipment was outdated and we had no IT system.
- We had 3 LINAC (oldest from 1993, youngest from 2003), RO simulator(from 1996), rudimental immobilization equipment, no moldroom, HDR brachytherapy machine Ir 192 (from 1992).

Equipment



Reason for requesting audit

- Due to external and internal problems in Serbia in the last decade of twenty century, the problems and difficulties have been accumulated in field of radiotherapy and we tried to find more efficient way and brief directions to surmount this situation and to joining to other radiotherapy department in our neighborhood in further development.
- Detail independent expertise, evaluation and assessment of situation, as well as complete process in radiotherapy department, with competent critics and estimation, have been one of the most important interest for further development of radiotherapy in Serbia and its promotion.

Audit 2006.

- The QUATRO audit was approved and conducted in March 2006 (13-17th) by an IAEA audit team.
- Beside equipment deficiencies, audit team observed a significant amount of shortcomings in our protocols, QA/QC procedures and guidelines such as outdated protocols (some from 1993).
- There was no proper quality management system, almost no 3DCRT were conducted, and only 2D treatments were provided.
- No teaching and training programs for radiation oncologists, physicists and RTTs, based on the ESTRO “curriculum for radiotherapy”, were conducted.
- Despite many critics and negative comments of the IAEA Audit team, the report was completely objective and according to our situation in Radiotherapy Department.

After the audit 2006.

- We arranged many meetings with the Government in the attempt to acquire more funding.
- That resulted in the purchase of new equipment suggested in the IAEA report: a CT simulator, Ro simulator, 3 new LINACs, dosimetry, QA and mold room equipment.
- On our part we made new protocols and procedures describing the functioning in whole RT department from the beginning until the end of treatment, up to date with the current oncology practice in the world.
- We defined the new educational programs for RTT s, radiation oncologists and medical physicist.

Reconstruction



Reconstruction



New equipment

- We decommissioned 2 old LINACs and bought 3 new ones to a total of 4 LINACs;
- New HDR brachytherapy machine Ir 192 purchased complete with applicators for various locations;
- We had no CT simulator, ultrasound or MRI units, and now we have one of each;
- We had no IT system and after audit we had IMPAC/MOSAIQ with 30 workstations and all of the patients go through the system.
- CMS TPS:2xXiO+4xFocal+2xFocalSim

IORS – Radiotherapy Service 2009.

Varian 6EX
(2009.)

Elekta
Synergy -1
(2008.)

Elekta
Synergy - 2
(2009.)

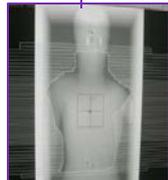
Primus
Mid Energy
(2003.)



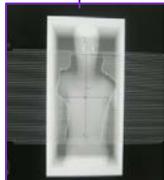
NUCLETRON:
HDR Microselectron -18
kanala (1992.)
HDR Microselectron -30
kanala (2006.)
Plato TPS + (2006)
Shimadzu Ro mobilni
aparat
(2006.)



Block
cutter
2009.
NUCLETRON-
SIMULIX
CBCT RoSIM
(2008.)



Milenium 120
MLC
+ Sa 1000
EPID



MLC 2x40
+ iView
EPID
+ MMLC 3



MLC 2x40
+ iView
EPID
+ MMLC 3
mm



ERGO ++



Scanditronix –
Velchofer (2008)



GULMAY RoTH

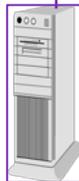


Beobeam2000

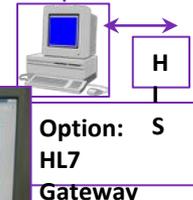
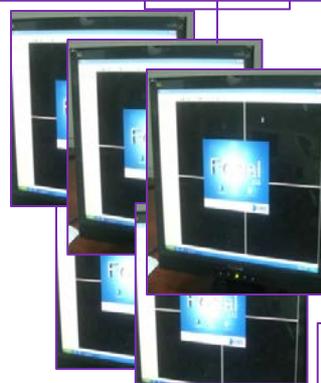
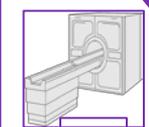
GE CT SIM
Light
speed
Gamex
laseri
Cyvco pt.
Table
(2008.)



IMPAC –
Mosaiq
server



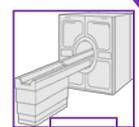
Nuc
Med



CMS TPS:2xXIO+4xFocal+
2xFocalSim



C



M

RI

Radiology
DPT.

New staff

- After the audit we significantly enhanced our staff and we currently employ:
 1. 30 radiation oncologists,
 2. 12 residents,
 3. 11 medical physicist,
 4. 46 RTT s.

New practices

- All 17 recommendations for RTT practice were implemented;
- 11/12 recommendations for improvements in treatment sheets were implemented;
- New redesigned treatment sheets were acquired;
- New up to date institutional RT protocols were created;
- Implementation of 3DCRT in most localizations had begun;
- Quality management system was enforced.

Follow-up audit 2009

- We requested a follow-up audit to assess our development.
- The follow-up audit was approved and conducted from 7-9 December 2009 by the same audit team as in the first visit.

Conclusions of the follow- up audit

- The QUATRO team observed highly positive developments in our department.
- Substantial improvement in developing the infrastructure, logistics, and equipment upgrades had been achieved.
- The QUATRO team observed the already outstanding performance in some treatment units.
- The conclusion of the QUATRO team was that our equipment is up-to-date.
- The Government of Serbia had invested 12 million euros in upgrading the radiotherapy department.

Conclusions of the follow-up audit

- Treatment protocols have been developed but their implementation was in process.
- There were still issues such as reorganization and upgrading of education and training programs.
- Maintenance issues were still expected to be resolved for long-term solutions and regular budgeting in order to guarantee sustainability and self-sufficiency of the service.
- The main conclusion of the follow-up visit was that IORS has been able to implement the recommendations of the 1st QUATRO audit for significant improvement of both in technology and practice.
- The key point of the audit was that with similar compliance to the recommendations of the follow -up audit, there is a good chance to develop the department further with the goal of achieving the level of practice that fulfils the requirements of a center of competence.

Since then...

- 1st radiation oncologist completed specialization training in 2015.
- More than 70% of patients are irradiated with 3D conformal radiotherapy, some patients with IMRT.
- Radiation physicists have started their own specialization.
- New protocols are implemented for 3D conformal RT and IMRT and for QA/QC procedures.

Looking in the future

- We are still working hard to further improve the situation in the Radiotherapy department of IORS and still use the QUATRO report recommendations as guidelines to achieve our goals to become a highly professional and effective service of evidence-based radiotherapy which follows the IAEA, ICRU and ESTRO criteria.
- In the meantime, we have expanded our capacity for 500 m² and built three bunkers more (for CT simulator, MRI and in one of them we already installed and started with a new Elekta).
- We expect to acquire 3 new state of the art LINACs to further improve the quality, precision and treatment delivery for all our patients.

Thank you for your attention

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