IT safety requirements in the Radiation Therapy field: risks and solutions all over the process

M. Coevoet
Pr. P. Scalliet
Radiation Oncology Workflow
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<td>11. Treatment</td>
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**RO**

**Med.Phys.**

**RTT**

**Tech./IT**
Issues from a « multi-disciplinary & sequentiel work », impacts...

- Stress
- Operating losses
- Inefficiency
- Risks
- Delays
- Poor organisation
- Treatment quality
- ...

Where are the CT images? What is the prescription? When ...? What about ...?
Quality Assurance

« Who runs the systems ? »

Trust level ?
IT spread in Rad. Onc. Dept.
Example 1

**Screen:** 1980 x 1080 px = 2M Pixels

**CT:** 512 x 512 px = 262k Pixels

*Degraded to 256 x 256 ... 65k px ...*

**Human eyes:** « 576M Pixels »

« **WYSIWYG**

« What You See Is What You Get »

« What You See Is **MAYBE** What You Get »
Example 2

1,000.000 €

1.000,000 €

cm ... versus mm, quid?
Example 2.1
Example 3

Couch position in Absolute / Relative
...  
34 mm difference!

Virtual / Physical GPU card
... Impact on TPS calculation results!
2 medical protocols

HL7  Health Level 7
« ... set of international standards for transfer of clinical and administrative data between software applications used by various healthcare providers. »
Wikipedia

DICOM (-RT)  Digital imaging and communications in medicine
• « The DICOM standard does not address issues of security policies. »
• « Authenticication only at the application level, not the owner. »
• « DICOM enables a very wide variety of authentication and access control policies, but does not mandate them. »
• « When Application Entities agree to interchange information via DICOM through association negotiation, they are essentially agreeing to some level of trust in the other Application Entities. Primarily Application Entities trust that their communication partners will maintain the confidentiality and integrity of data under their control. »

DICOM PS3.15 2016a - Security and System Management Profiles
How to secure
Clinical workflow & Digital workflow?
# Surgical Safety Checklist

## Before induction of anaesthesia

(with at least nurse and anaesthetist)

- **Has the patient confirmed his/her identity, site, procedure, and consent?**
  - Yes
  - Not applicable

- **Is the site marked?**
  - Yes
  - Not applicable

- **Is the anaesthesia machine and medication check complete?**
  - Yes

- **Is the pulse oximeter on the patient and functioning?**
  - Yes

- **Does the patient have a:**
  - Known allergy?
    - No
    - Yes
  - Difficult airway or aspiration risk?
    - No
    - Yes, and equipment/assistance available
  - Risk of >500ml blood loss (7ml/kg in children)?
    - No
    - Yes, and two IVs/central access and fluids planned

## Before skin incision

(with nurse, anaesthetist and surgeon)

- **Confirm all team members have introduced themselves by name and role.**
- **Confirm the patient’s name, procedure, and where the incision will be made.**

- **Has antibiotic prophylaxis been given within the last 60 minutes?**
  - Yes
  - Not applicable

### Anticipated Critical Events

- **To Surgeon:**
  - What are the critical or non-routine steps?
  - How long will the case take?
  - What is the anticipated blood loss?

- **To Anaesthetist:**
  - Are there any patient-specific concerns?

- **To Nursing Team:**
  - Has sterility (including indicator results) been confirmed?
  - Are there equipment issues or any concerns?

- **Is essential imaging displayed?**
  - Yes
  - Not applicable

## Before patient leaves operating room

(with nurse, anaesthetist and surgeon)

- **Nurse Verbally Confirms:**
  - The name of the procedure
  - Completion of instrument, sponge and needle counts
  - Specimen labelling (read specimen labels aloud, including patient name)
  - Whether there are any equipment problems to be addressed

- **To Surgeon, Anaesthetist and Nurse:**
  - What are the key concerns for recovery and management of this patient?

---

*This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.*

Revised 1 / 2009
Same « standard » medical practice
• 1970: 2 clinical FTE
• 2000: > 15 clinical FTE

Healthcare world:
• 4000 medical procedures
• 6000 drugs

Too complex for 1 expert ...
### Solution

**iTherapy Process**

**URGENCE SOUS 72H**

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**Nombre de patients**: 20
How does it work?

= Airplane checklist:
1. Do not forget – incident
2. Reminder rare action
3. Standardisation
4. ...

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Document management
How does it work?
How does it work?
**How does it work?**

### iTherapy Process

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**Nombre de patients: 28**

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**Tableau de travail en cours**

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**Numbers**

*iTherapy Process (iTP) has first been developed under the name of « Intranet Radiotherapy »*

- 1\textsuperscript{st} version: 2005 (88 « checks » - 16 steps)
- Latest version: 387 « checks » - 35 steps
- Experience of more than 16 000 treatments
- DB: 40 requests/sec
- 6500 views per day
- Installed in Alger, Liège, (Bordeaux), ...
Checklists « Reminder of key things to not forget ... »

To help making experts better.
To help people to handle complex systems.

Hierarchy of Effectiveness in Preventing Errors

1. Forcing functions & constraints
2. Automation / computerization
3. Simplification / standardization
4. Reminders, checklists, double checks
5. Rules & Policies
6. Education & training

Herbert William Heinrich
Conclusions

• Standardization of workflow
• Integration of checklists and forcing functions
• Clear task attribution
• Workflow monitoring
• Increased efficiency
• Decreased risk of error

Challenges

• Automation
• More integration
• Clinical & Digital WORKFLOWS link
Thank you!