

Not able to distinguish between X-ray tube and image intensifier: fact or fiction?

Skills in radiation protection with focus outside
radiological departments



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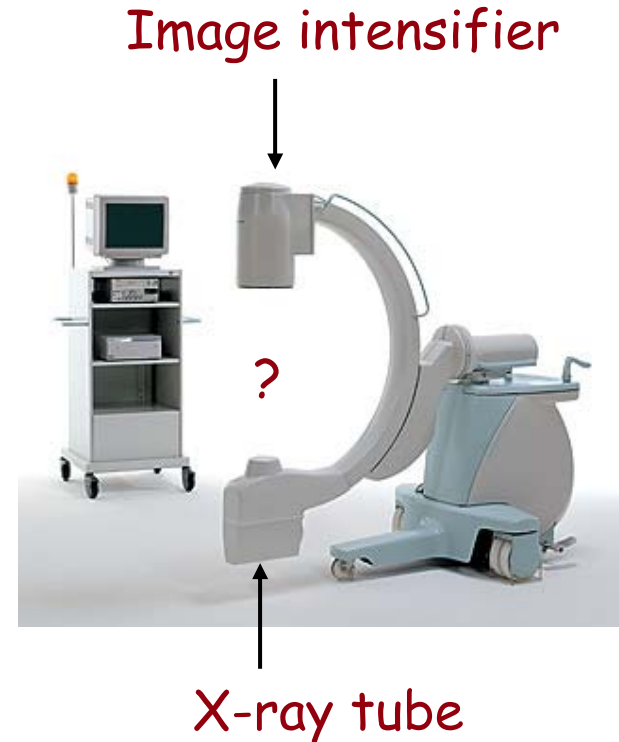
Norwegian Radiation Protection Authority

Section for Dosimetry and Medical Applications



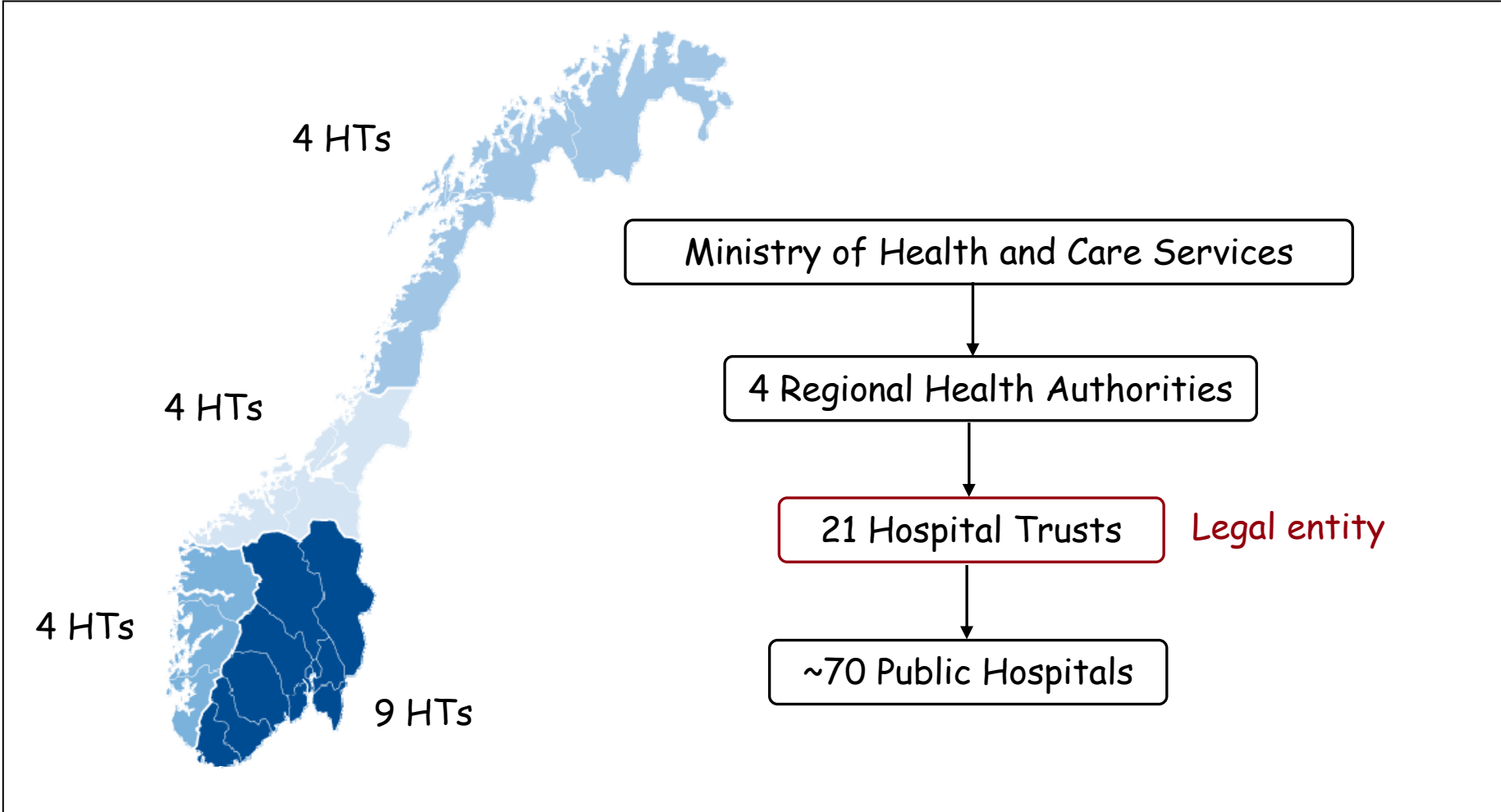
Introduction to modern C-arms

- Common tool in interventional and surgical procedures outside radiological departments
- Used in complex and time consuming procedures
- Highly technically advanced
- Potential to deliver high patient doses
- Operated by physicians and nurses



Operators often no formal education in RP

Organization of Public Health Care System



Each HT: generally 3-6 hospitals

National legislation - Radiation Protection

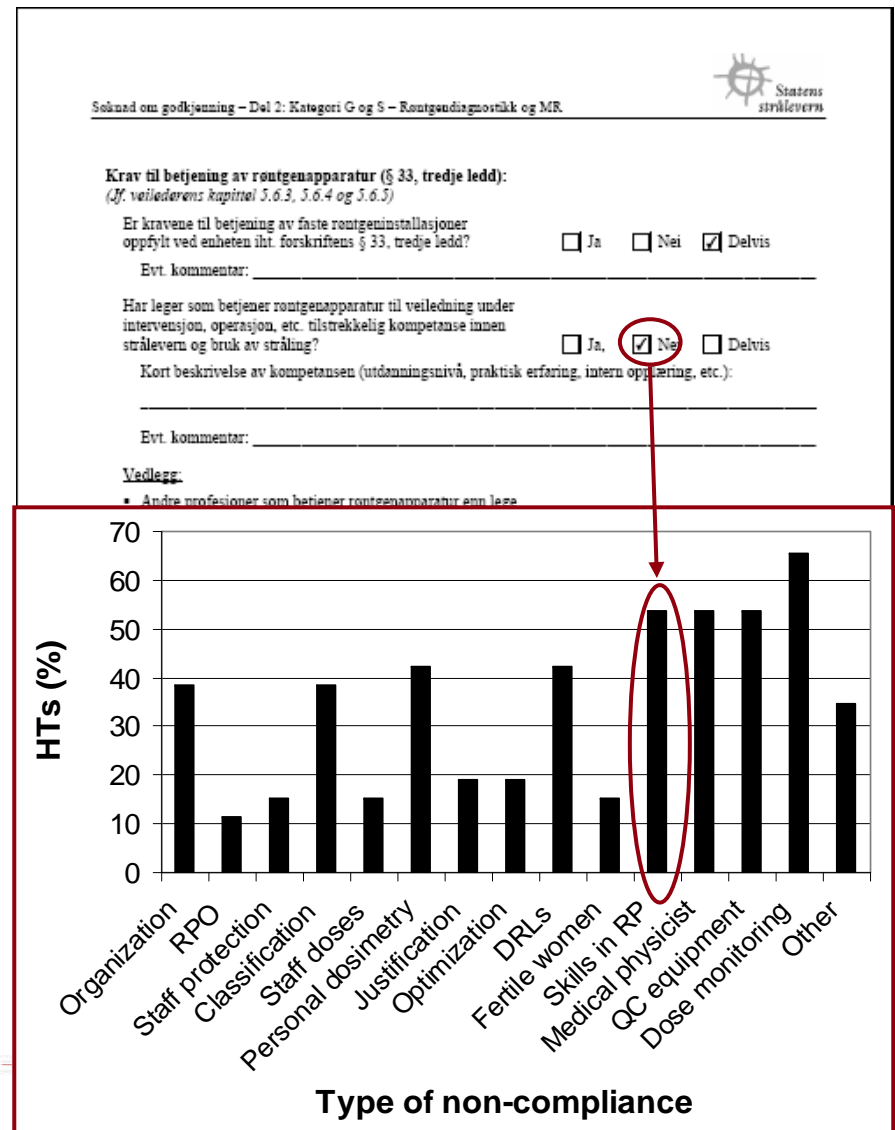


- HTs obligated to ensure that all personnel involved in radiological examinations have **sufficient qualifications and skills in RP**
- All HTs must be **authorized** by NRPA in order to use advanced X-ray equipment for medical purposes (**within end of 2007**)

Opportunity to get a national overview of compliance

Authorization process: 2004-2007

- Application form
 - Based on personal statements
- 54% reported inadequate skills in RP
 - Associated with X-ray use outside radiological departments
- Condition for authorization
 - Fully compliance within a given time limit
- Most HTs finally confirmed fully compliance



Follow-up inspections: 2008-2009

- **Aim:** To verify if the HTs self declared compliance regarding education and skills in RP were sufficient or not
- National overview
 - Inspections of totally 52% of all HTs
 - HTs representing all four regional HAs
 - Normally two hospitals within each HT were visited
- **Focus:** Education and skills in RP among users outside radiological departments
 - **Included departments:** Orthopedic, gastrological and cardiac X-ray guided procedures

Inspection method: Quality system review

- All HTs were notified 4-6 weeks ahead

Main elements of the inspection:

- Document reviews
 - Procedure for training in RP (sent in, in advance)
 - Documentation of performed training in RP (on-site)
- Interviews (planned and ad-hoc)
 - Head of departments (responsible persons)
 - Users of C-arms: physicians and nurses
 - Both experienced and new employees



Review of training procedures in RP

Received from 64% of the inspected HTs

- 71% were traceable to a QA-system (new, two revised)
- Responsibilities were clearly defined
 - Head of Department
- Area of application were defined
 - Personnel involved with no RP in formal education
- Demand for yearly training in RP (by RPO, MP)
- Demand for specific training in operating C-arms (by vendors, little RP)
- Demands for documentation of performed education and training

Responsibilities in RP: Head of Department

Interviews revealed:

- Many not aware of the written procedure and its content
- Many not aware of their responsibility to ensure sufficient qualifications and skills in RP among their employees
 - Most pronounced among physicians

Performed training courses in RP

- Courses in RP had **occasionally** been given by the RPO with no **systematic** approach
- Level of attendance depended on profession
 - **Physicians:** generally low attendance
 - **Nurses:** generally high attendance
- Insufficient documentation
 - Type of course, speaker and level of attendance

91% of the inspected HTs had no systematic system for education and training in RP

Skills in RP (or lack of skills)

Interviews of physicians and nurses revealed:

- Unable to identify the X-ray tube from the image intensifier of the C-arm
- Inadequate knowledge of the C-arms operation consol
 - Switch on and start fluoroscopy regardless of the default exposure settings
- Unknown with the three cardinal principles for staff protection
 - Time, distance and shielding
- No deliberate use of collimation and pulsed fluoroscopy
- Total lack of knowledge about patient doses and risks

Clear distinction in level of awareness of RP between physicians and nurses, nurses having highest level of awareness

Summary of inspections

FACT: Lack of skills in RP outside radiological department is not a fiction ☹️



How can the real world be so different from the assumed situation?

Procedures for education and training in RP were not followed

Possible answers:

- Responsible persons unaware of their responsibility to ensure sufficient skills in RP among their employees
- General lack of prioritizing and focusing on RP outside radiological departments
- Insufficient system for systematic and frequent education and training in RP
- Anticipation of sufficient skills in RP from formal education

Conclusion

Urgent need for increasing knowledge in RP among physicians and nurses

- **How:**
 - Increase focus on RP in basic education (highlighted in MED)
 - Introduce “driving licenses” for operating C-arms
 - Change in attitude towards RP

Fact:

Teaching some “do’s” and “don’ts” can have a tremendously impact on patient doses (**presented in our poster: U0066**)