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# Physical Infrastructure Requirements and Opportunities in Challenging Environments

## Equipment & facility needs

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# Need assessment

National needs: number of patients requiring RT and cancer pattern

1. National cancer registry
2. Data by Extrapolation
3. Distribution of RT centres

Institution clinical needs: needs for different types of RT (EB/BT)

1. Is it the first/unique RT centre?
2. Integrated into a comprehensive cancer prg
3. Hospital data from previous years
4. Referral patterns, treatment policies

Facility-Equip. & HR needs

1. Budget (capital and operational)
2. Human Resources
3. New facility?
4. Local conditions

## ESSENTIAL EQUIPMENT AND STAFFING FOR A BASIC RADIOTHERAPY CLINIC

### Buildings

- A megavoltage bunker (space for one more is desirable)
- An X ray bunker for an orthovoltage unit
- A simulator (CT) room
- A darkroom (for film processing)
- A treatment planning room
- A room for HDR or LDR
- A mould room
- Ample clinical space (for examination, consulting, changing and waiting rooms)

### Setting Up a Radiotherapy Programme:

Clinical, Medical Physics,  
Radiation Protection and Safety Aspects



## Equipment

- External beam therapy equipment
- A single-photon-energy teletherapy unit
- An orthovoltage unit
- Beam measurement and QA
- A simulator, preferably a CT
- A TPS
- Film processing equipment
- Patient immobilization and mould room equipment
- Brachytherapy HDR or LDR
- An X ray C-arm
- A computerized TPS
- A full range of applicators
- Quality assurance physics equipment

### Setting Up a Radiotherapy Programme:

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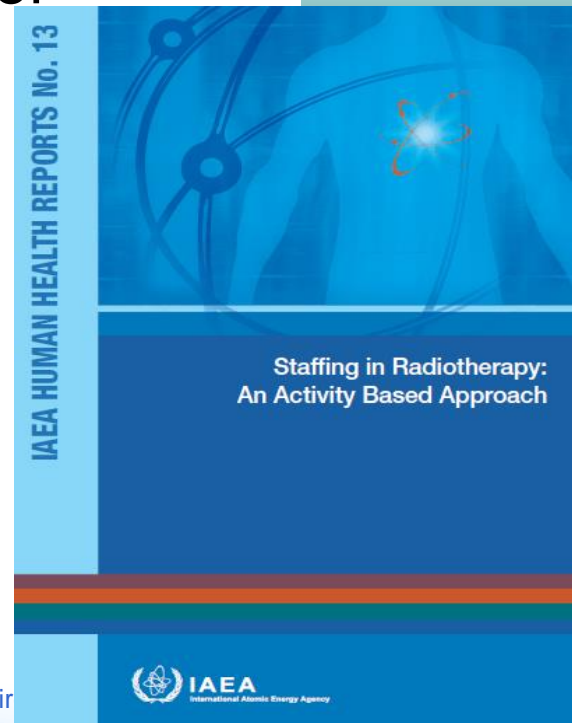
# IAEA- basic radiotherapy clinic

## Personnel

- Four or five radiation oncologists
- Three or four medical physics staff
- Seven RTTs
- Three oncology nurses
- One maintenance technician/engineer

## New approach for estimating staffing needs in radiotherapy: an activity-based approach

Setting Up a  
Radiotherapy Programme:  
Clinical, Medical Physics,  
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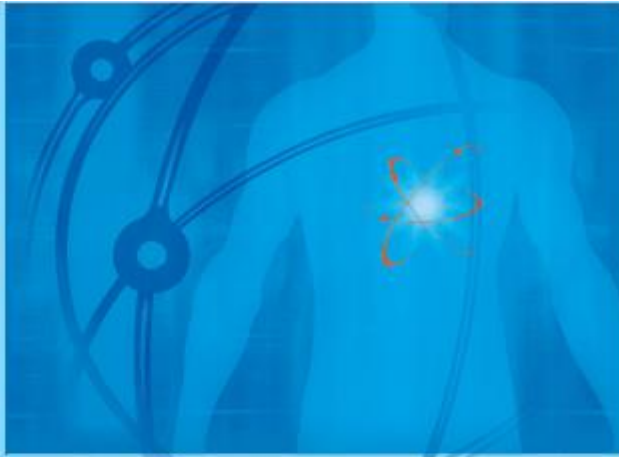
# Equipment & facility needs in challenging environments: Planning, Design & Constr.

- Design stages: lack of local experienced staff (architect, structural engineer, medical physicist, etc.)
- Construction stage: lack of experienced local contractors and lack of independent verification and monitoring services:  
**Prefabricated bunkers?**
- Poor synchronization - equipment delivery and completion of bunker construction.

# Equipment & facility needs in challenging environments: equipment supply and use

- Preparing equipment specification
  - Lack of experienced staff
  - Resisting the temptation to get the most recent model
- Lack of resources/local capacity to commission new equipment
- Maintenance (lack of funds/awareness)
- Protection against rodents
- Lack of regulatory infrastructure might stop import of sources





## Radiotherapy Facilities: Master Planning and Concept Design Considerations

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# Challenges during operation

- Reliable and stable power supply: Voltage stabilizers protect against “normal” over/under voltage, but not fully against voltage spikes with extremely high rate-of-rise.
- Extreme ambient environmental conditions affect quality and functionality: Ex. beam bending magnet goes out of tolerance and affect the dose rate and the beam symmetry.
- Remote diagnosis is already a reality but needs good internet connection and a trained hospital staff.
- Lack of preventive maintenance on the LINAC but also on the A/C.
- How to retain trained maintenance staff ?

# Summary

- Guidelines exist on equipment and facility needs, but LMICs need support for practical implementation, especially when establishing the first treatment centres
- Construction or prefabricated solution ?
- Solutions are needed to minimize voltage spikes or their impact on LINACs
- Better protection against rodents
- Maintenance packages- best if integrated with the purchase of a LINAC
- How to retain trained local staff? public-private partnership



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*Thank you!*

