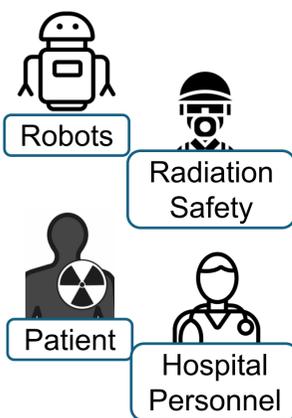


# Exploring Roles for Radiation Safety Robots in Medical Facilities

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## Medical Radiation and Robots



**Main objective:** ensure that all people receive minimal dose and risk while enabling nuclear medical care

*“As Low As Reasonably Achievable” (ALARA)*

## Process

### Facility Tours

**Tours and information gathering at three facility types:**

- Research/Academic Reactors (3 sites)
- Hospital Nuclear Medicine Facility (1 site)
- National Laboratory (1 site)

### Survey

**Conducted a survey of Radiation Safety Professionals (RSPs) and their attitude for automation (15 respondents)**

Likert-style questions (20 total)

- Work and work environment
- Attitude towards automation
- Propensity to trust

Short-answer questions (7 total)

- Tasks of interest to reassign to other humans or automation
- Tasks reserved for human workers

### Semi-Structured Interview

**90 minute semi-structured interviews with medical RSPs**

- Broad goals/perceived benefits for robots in nuclear medicine
- Attitude towards robot performing tasks
- Advantages/Disadvantages

## Findings – Medical Environment

Unique considerations in medical domain, beyond standard radiation safety procedures

### Medical radioactive material

- Short half life → quarantine and release is valid

### Patients

- free-willed mobile radiation sources who are non-experts in radiation safety; privacy considerations

### Dynamics of human relationships and spaces

- high-traffic facilities, dynamic scenes, rapport within patient support network



## Findings – Tasks



### Radiation surveys in patient rooms

- Perform wipe tests and area scans for room turnover; high-touch surfaces, waste bins, splashes



### Decontaminate / clean patient rooms

- Clean urine, etc., from floors/surfaces using specific motions to not spread contamination



### Transport non-radioactive material

- Distribute and collect personnel dosimeters across the medical campus



### Transport radioactive material

- Transport material in heavy shielded containers (25-400lbs); retain “positive control” for security



### Sealed source leak testing

- Access secure areas and perform wipe tests on sealed radioactive sources; dexterity required



### Waste handling

- Remove contamination from waste stream; “dumpster diving” required in some protocols



### Tasks reserved for human professionals

- Including but not limited to spill response during patient treatment, direct patient interaction, relationship-building, judgment calls

## Discussion

### Factoring in the patient

- Tasks of interest predominantly non-patient facing
- Less trust with safety-critical patient decisions
- Roboticians should anticipate downstream effects even when operations do not involve explicit social behaviors

### Regulatory expectations

- Autonomous robots present new territory for regulation
- Strong ties between upstream regulatory processes and downstream radiological control effects
- Regulatory bodies should evolve with robot adoption

*Create upstream policies that do not overlook Radiation Safety Professionals’ comfort and work fulfillment*

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