

# Study on the Contamination Monitoring System of Large Groups through the Fukushima Daiichi Nuclear Power Plant Accident

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## Introduction

- Nuclear or radiological emergency that radioactive materials can be released into the environment can cause the radiation exposure of the public and environmental contamination. In the case of radioactive materials' release, radiological contamination monitoring is one of the critical components to identify individuals who need medical treatment, prevent cross-contamination, and deal with anxiety and concerns of evacuees.
- Affected people have to be monitored and evaluated for the needs of medical treatment, the presence of external and internal contamination, the received dose, and the health risk from exposure and long-term health effects.
- The accidents such as the Chernobyl, Goiania, and Fukushima have shown that it needs preparedness and implementation of the rapid survey and assessing internal contamination in large numbers of individuals.
- This study reviewed the contamination monitoring experiences in the Fukushima accident and suggested need points for the effective and practical contamination monitoring system of large groups in a nuclear or radiological emergency.

## Methods & Results

### Radiological screening survey in the Fukushima Accident [1]

- The screening survey period : 2011.3.12 ~ 2012.2.10 (4 periods)
- Screening of the 1<sup>st</sup> period (3.12 ~ 3.20) : **70,000 evacuees**(Restricted Area, 20 km from the NPP), shelters
- Screening of the 2<sup>nd</sup> period (3.21 ~ 4.9) : evacuees and the **general public**
- During the 1<sup>st</sup> and 2<sup>nd</sup> period : screening at **200 sites (188 shelters)**
- 3<sup>rd</sup> period (4.10 ~ 4.24) : the individuals who had entered the Restricted Area
- Detector : **Geiger-Müller (GM) survey meter** (1 cm distance from the body)
- Decontamination level : **100,000 cpm**
- Survey result (1<sup>st</sup> period)

3.12 ~ 3.20	Number of cases	
13,000 ~ 100,000 cpm	645	0.14 %
<b>Over 100,000 cpm</b>	<b>104</b>	<b>0.88 %</b>
total	72660	

★ 13,000 ~ 100,000 cpm (partial decontamination (wiping, dry decontamination))

### Preparedness for contamination monitoring in Korea

- Focus on **the injured patients**
- **No detailed contamination monitoring procedure** for the evacuees and the public
- If the General Emergency is declared, the residents of Precautionary Action Zone (PAZ) should be evacuated into designated shelters.
- The residents of **PAZ** in the Gori site are approximately **10,000**. If this number of residents is considered, the amount of resources required is more than the Fukushima accident case. Fukushima prefecture dispatched more than 100 monitoring staff per day at 200 sites (2011.3.12 ~ 20).
- Local governments have some portal monitors and hand-held devices for contamination monitoring but the **instruments and staff are insufficient compared to the number of residents**.

## Suggestion

**This study suggests designating the community reception center (CRC) and arranging the detailed contamination monitoring procedure.**

Most local governments already have the evacuation plan to shelter. This plan may not be adequate for caring for people in a nuclear or radiological emergency due to potential contamination with the radioactive material.

**The monitoring for large groups needs lots of resources such as monitoring staff, measuring devices, decontamination tools, supporting resources, etc. So CRC has to be a checkpoint for screening, decontamination, medical triage, registry, etc.** Because it is hard to conduct these response actions at each shelter. According to the time, the target of contamination monitoring changes and the response performed after the contamination monitoring is as shown in fig. 2. In each response step, appropriate detectors, proper procedure, screening criteria, and trained staff are needed.

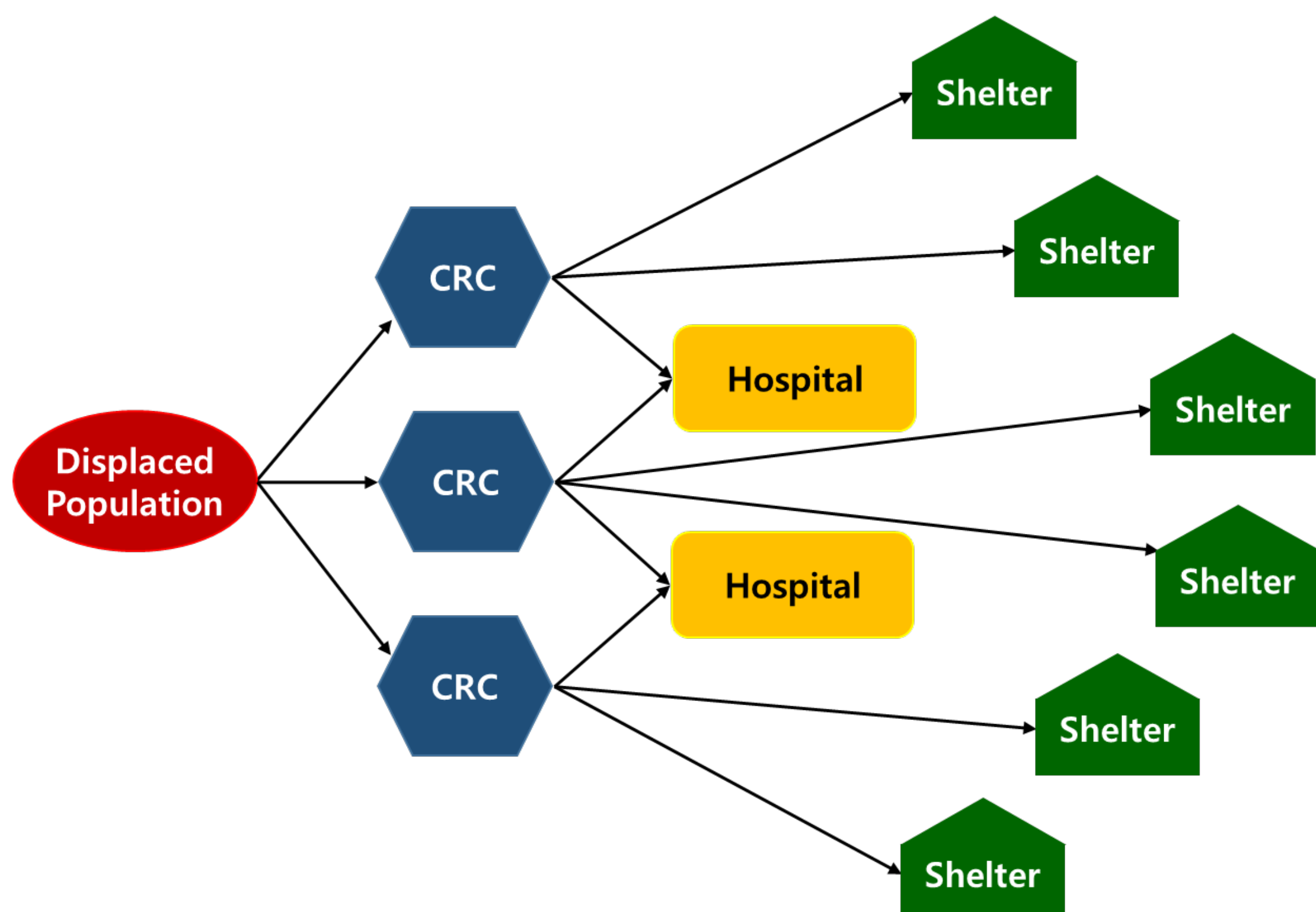


fig. 1. CRC Network [2]

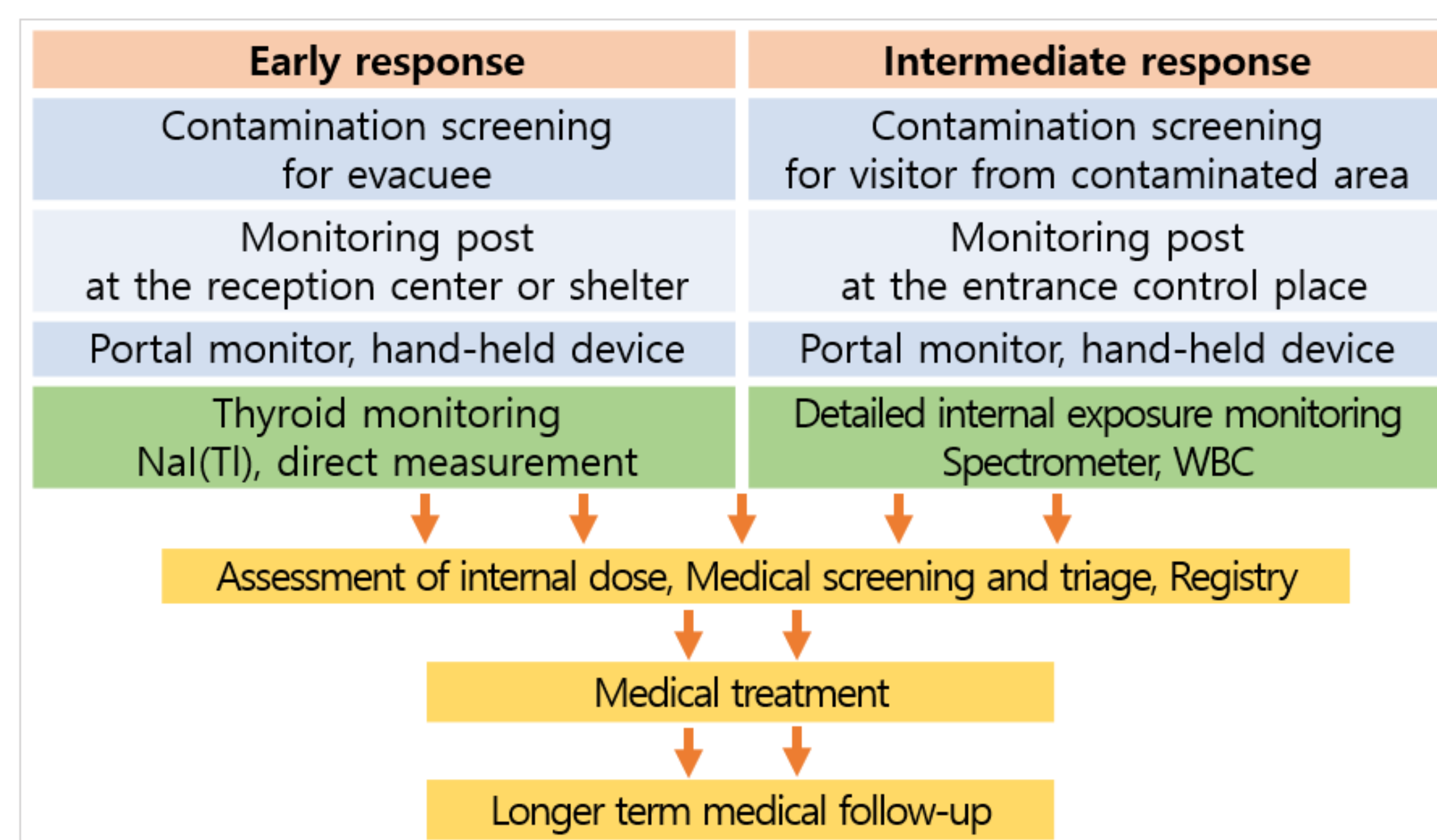


fig. 2. Contamination monitoring and follow-up

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## References

- [1] Hisayoshi Kondo et al, Screening of Residents Following the Tokyo Electric Fukushima Daiichi Nuclear Power Plant Accident, Health Phys, 105(1), pp. 11-20, 2013  
 [2] Centers for Disease Control and Prevention, Population Monitoring in Radiation Emergencies: A Guide for State and Local Public Health Planners, CDC, 2014