Examples of experiences with self-monitoring (D-shuttle experiences)

Makoto Miyazaki Vice-director Health Promotion Center Fukushima Medical University

Consultancy Meeting on Science, Technology and Society Perspectives on Nuclear Science, Radiation and Human Health – The International Perspective, May 23, 2017

D-shuttle (Personal dosimeter, Chiyoda Technol Corp.)



- Recording interval: 1 hour
- Measured radiation type: gamma-ray (also including natural radiation)
- Minimum value: 0.01 microSv

The data shows where you were yesterday

Example: Graphs of a married couple



A: Husband's dose tend to be low during day time on weekdays.

- B: The wife's dose was low at noon on Wednesday. Why?
- → They visited Sendai together! Possibility of using dosimeter as a communication tool

Quoted from Figure 2, "Using and Explaining Individual Dosimetry Data Case Study of Four Municipalities in Fukushima" M Miyazaki, Asia Pacific Journal of Public Health, 29 (2S) 2017, 110S-119S

Developments in FY 2013-14

- 2013 FY
 - August : Distributed to residents of Miyakoji district, Tamura-city (B)
 - Gave one-to-one consultation, requested by Support Team for Residents
 Affected By Nuclear Accidents
 - One-to-one consultation sessions held until March 2014
- 2014 FY
 - April: Evacuation order was lifted in Miyakoji
 - D-Shuttle rental within 20 km radius zone became responsibility of the Ministry of Environment.
 - Tamura-city distributed dosimeter to ALL elementary and junior- high school students that re-opened.
 - Held explanation sessions for teachers in April, one-to-one consultation in October to November.

Quoted from Figure 1, "Using and Explaining Individual Dosimetry Data Case Study of Four Municipalities in Fukushima" M Miyazaki, Asia Pacific Journal of Public Health, 29 (2S) 2017, 110S-119S



Developments in FY 2014-15

- 2014 FY
 - April: Started distributing in Suetsugi district, Iwaki-city (D)
 - Assisted data analysis and group explanation.
 - July: Fukushima-city started distributing devices via public health nurses (C)
- 2015 FY
 - Suetsugi: Continued data analysis and group explanations
 - Utilized "advisor (相談員)" system: One regular adviser who facilitated community participation.
 - Distributed around 100 devices and collected data.
 - Naraha-town (within 20km radius): D-shuttle to be utilized upon the lifting of evacuation order (*E*)
 - Data of returnees and visiting residents to be analyzed with their consent.
 - Set "Intensive wearing period" of D-Shuttle, compare data with personal activity record before aggregating data for publication.
 - Set up one-on-one explanation and dialogues.

Comparison of D-Shuttle project

Location (Participant)	M, T-city (400)	S, I-city (100)	F-city (less than 100)	N-town (7,000)
Distributor /Method	C. Office (before lift) Ministry of Env. (after lift)	NPO (before) Muni. + Advisor (Muni. Project)	Pub. Health Nurse (Volunteer-based participation)	Distributed to all residents. Consent to be obtained later.
Reading	Explainer	Explainer (before) Advisor (now; some outsourced)	Dosimeter collected from nurses→read and prepare by explainer	Residents : Gov't Battery change: outsourced vendor
Liaison/schedul ing w/ Explainer	Relevant ministry provides logistics & adm. support, etc.	NPO and municipality work together on scheduling	Gov't provides logistics & adm. support, etc.	Gov't provides logistics & adm. support, etc.
Follow Up	Regular contact by ministry, consult explainer if necessary	NPO and advisor contact and feed- back to the explainer	Pub. Health nurse contact, feed-back to the explainer	Gov't & vendor contact and feed- back to the explainer
Subject	Individuals (Result not published)	Individuals +District shares overall results	Individuals (Data aggregation not planned)	Individuals +Data collected for publication

Examples of the actual dose data of 2 residents



Quoted from Figure 3, "Using and Explaining Individual Dosimetry Data Case Study of Four Municipalities in Fukushima" M Miyazaki, Asia Pacific Journal of Public Health, 29 (2S) 2017, 110S-119S

Graph shows daily cumulative dose living in Suetsugi, Iwaki-city obtained from D-shuttles



- Duration of possession period: about 2 months
- Both ends: before and after the measurement
- Red bar:

4.22 μSv/day = 1.54 mSv/y = additional dose "1 mSv/y"

• Green bar:

 $1.48 \mu Sv/day = 0.54 mSv/y = Japanese average natural dose$

Distribution of est. annual dose in Naraha-town FY 2015 Summer – Winter (n = 16)



Naraha Town. 2015FY 2nd result of the Naraha Town D-shuttle survey (in Japanese). http://www.town.naraha.lg.jp/kurashi/files/28.4.27%E8%B3%87%E6%96%99%EF%BC%91.pdf

Lessons Learned

- Just measuring and handing back the result is NOT enough to meet the residents' needs
- Individual needs differ (information, advice, etc.)
- If the "dose" is at stake
 - Priority should be measuring and providing explanation (group or one-on-one)
- If the "dose" is NOT at stake

Other measures become necessary

 For appropriate follow-up : It is essential that someone close to the residents find and involve people who will benefit from measuring dose, as well as being present when the measurement is explained.

Conclusion

- This presentation showed to record various projects using D-shuttle in various circumstances—different locations and different users—in chronological order.
- Generalization of these projects is limited.
- However, as each emergency situation after a nuclear accident is unique and different, there is no general setup to explain the many types of "values" measured to the affected population.
- In the case of D-shuttle project, the need to provide face-toface feedback of the measurement result led to the project design.
- The experience in Fukushima explained in this presentation emphasizes the importance of face-to-face explanation after a nuclear accident as well as the need to develop appropriate system, including human resources, to provide such explanation.