5. CREMPA - Collaborating Centre for Radiation Emergency Medical Preparedness and Assistance (Ulm, Germany, Director - Dr T. Fliedner)

Medical Management of Radiation Accidents in the Federal Republic of Germany

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5.1 Introduction

For a couple of reasons different approaches have been used to obtain a classification of radiation accidents. Whereas, some consider the sources of radiation, others classify by the spread of radioactivity A third approach refers to the effect in man, as individuals or as a population, with special respect to the number of inflicted individuals. By using the latter approach two principle accident scenarios can be identified.

First, singular overexposure in accidental situations have to be taken into account. Mainly, these are incidents within nuclear installations involving only few persons, e. g.,

- γ-sterilisation units,
- industrial installations (reactors, processing of nuclear fuel, processing of nuclear sources),
- non-destructive testing of material,
- medical installations (x-ray, radiotherapy units, nuclear medicine departments), and
- miscellaneous (transport, military etc.).

Secondly, mass accidents can be identified, surpassing the boundaries of such installations, resulting in a spread of radioactivity to the public being at that time totally unaware of this fact and, therefore, unprotected, involving by the way some hundreds to thousands of people, e.g.,

- within the Federal Republic of Germany "Super GAU", i e , an accident for which the structure of the individual reactor building is not technically prepared, and
- nuclear accidents outside Germany with a spread of large amounts of radioactivity and radioactive fall-out to our country.

It is obvious that entirely different ways to cope with the emergency situation have to be taken into account due to the number of people involved or at least assuming to be involved.

5.2 Medical Radiation Accident Management in the Federal Republic

5.2.1 "Small scale" accident scenario

Medical radiation accident management in the Federal Republic of Germany is obtained by two different principle approaches, one, referring to the first scenario as described above, directed towards having at hand the option of maximal technical and medical support for a comparatively small number of persons considered to be involved (see fig. 1). The principle organisational levels for that purpose are:

- company infirmaries,
- local hospitals as named in facility emergency plans,

- regional radiation protection centres appointed by the "Berufsgenossenschaft" (BG), and
- the BG Burn Centre in Ludwigshafen

This type of accident management is undertaken under the auspices of the "Berufsgenossenschaft" (BG), the German workmen's compensation board. The BG serves within the framework of the social law codex as an insurance responsible for all types of radiation protection starting from individual technical as well as medical radiation protection for the employee up to the precautions for the accident preparedness, both technical and medical, and the compensation for health impairment resulting from accidents and occupational disease.

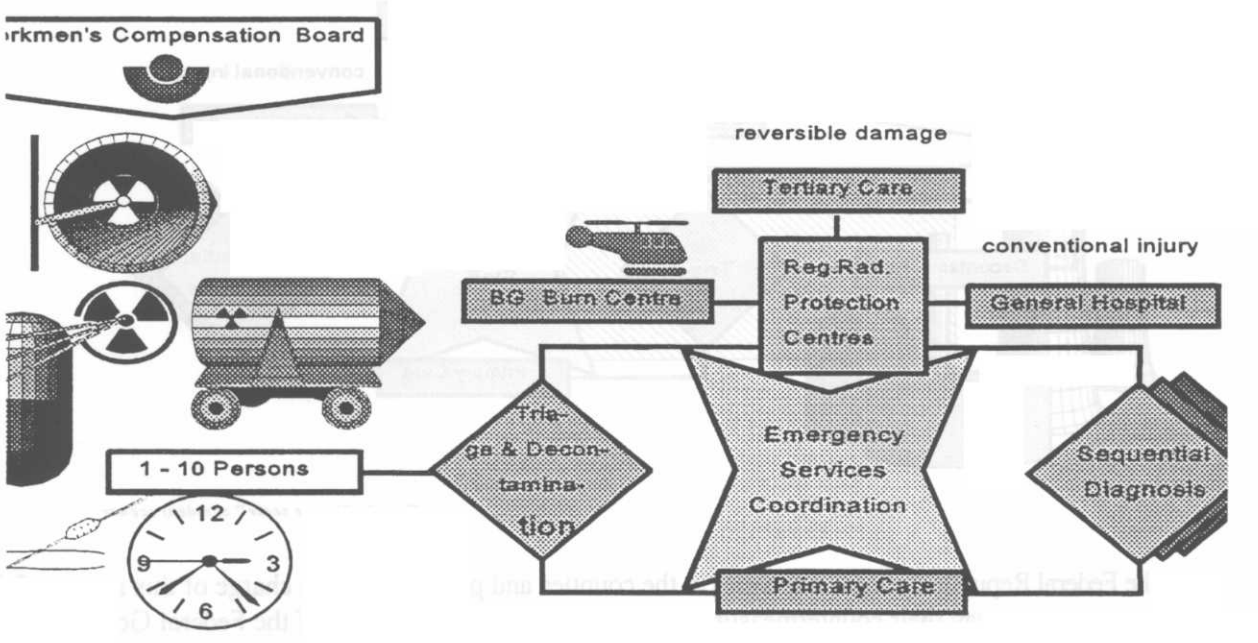

Fig. 1: "Small scale" accident scenario

5.2.2 "Large scale" accident scenario

The other principle accident scenario can best be described with mass casualties and even larger numbers of people presuming to be involved. These will certainly pose enormous problems to the regular emergency services, once people had become aware of a major radiation accident having occurred. Therefore, it is necessary that the authorities get into action in order to avoid panic, to prevent the regional general hospitals to become inundated by increasing numbers of involved and non-involved people.

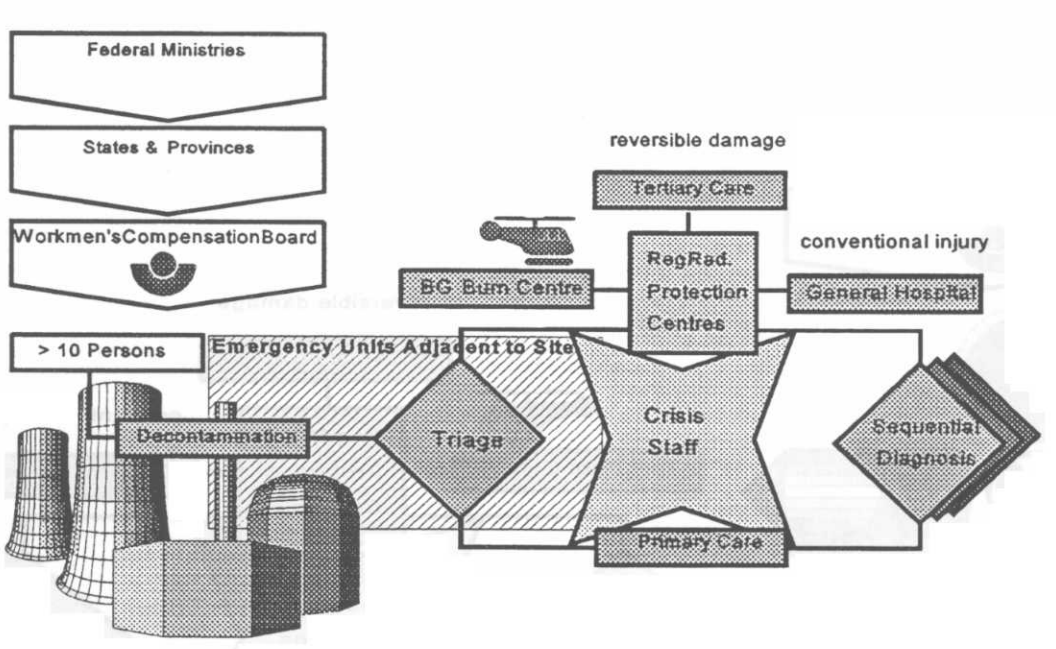

Fig. 2: "Large scale" accident scenar

In the Federal Republic the local authorities in the counties and provinces are in charge of this aspect of the crisis management. The way their countermeasures are enacted under the auspices of the Federal Government is depicted in fig. 2. The means required are mainly under control of the provincial governors (Regierungspräsidenten) and the state governments (Landesregierungen). The Federal government with its tools, e.g., Federal Armed Services etc. will not be called into action, unless, the general state of emergency is declared by the regional authorities.

The ensuing map gives some idea on the distribution of the regional radiation protection centres (fig. 3). It does not encompass all the hospitals prepared to deliver care to radiation exposed individuals.

Fig.3 Regional radiation protection centres

5.3 Institutions Involved in Taking Care for the Exposed Individuals

5.3.1 Burn Centre of the Workmen's Compensation Board at Ludwigshafen (BG Burn Centre)

- Recipient hospital for all accidents with less than 5 victims.
- Decontamination, incorporation, admission to treatment units with reverse isolation, laboratory facilities for all clinical chemistry.
- Local medical, ancillary, and technical staff.
- Advisory board of medical experts to be convened on short notice.

5.3.2 Hospitals with Willingness to Co-operate - Triage indicating "reversible damage category"

About 70 hospitals have enlisted so far, usually offering oncology and or hematology services with nuclear medicine backup.

	Beds after 6 hours	Beds after 24 hrs	Beds after 72 hrs
Intensive Care Unit for Hematology Treatment	10	20	30
General Internal Medicine Department	275	500	1,000

5.3.3 Hospitals with Willingness to Co-operate - Triage indicating "irreversible damage category"

At the time being, fourteen hospitals have been registered in our database. They employ maximal care and stem cell transplantation facilities "around the clock".

	Beds after 6 hours	Beds after 24 hrs	Beds after 72 hrs
Bone Marrow Transplantation Units	30	35	50
Intensive Care Unit for Hematology Treatment	40	50	50
General Hematology Department	100	150	165

5.3.4 Hospitals with Willingness to Co-operate - Management of Large Scale Nuclear Accidents

All hospitals previously mentioned serve as a basis for the emergency planning. Additionally, backup by the German Armed Forces Medical Corps with 10 Hospitals with a capacity of approximately 3,000 regular hospital beds and additionally several Army Reserve Hospital Groups. Each of them is able to install a hospital in existing buildings with a capacity of 1,000 beds.

5.4 Expertise Available for Radiation Accident Treatment

5.4.1 Radiation Protection Physicians

All physicians licensed to perform regular check-up of radiation workers have undergone a basic training in radiation protection. About 1,000 radiation protection physicians are licensed by the Federal authorities at the moment.

5.4.2 Radiation Protection Physicians with Special Emergency Training

In special courses physicians were given additional radiation accident management training. About 50 radiation protection physicians are licensed by the Federal authorities at the moment.

5.5 Conclusion

Although in principle, there are enough facilities available for small to medium scale radiation emergencies in the Federal Republic of Germany certain shortcomings can be identified. On the one hand little has been done in recent years for large scale accidents, especially for those that require transnational assitance. The other addresses to the education and training of emergency personnel. The hereinbefore mentioned emergency training for radiation protection physicians has not been repeated for years and there is little training in terms of exercises. Also, little attention is paid to the training of paramedics and fire fighthers who are primarily responsible for actually rescuing the exposed individuals. These issues have to be addressed in future to strengthen the German capabilities in the realm of radiation emergency preparedness.