

## **Mental health effects from radiological accidents and their social management**

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### **INTRODUCTION**

Large radiological accidents always induce health effects to affected populations. Effects are due not only to radiation exposure but also to society disruption, economic disorganization and environmental impacts. Somatic diseases, acute or chronic, appear jointly with sizeable and durable psychological disorders that cover psychic suffering, changes in risk perception and in individual and social behaviours. Psychic suffering can be simply the perception that the psychic well being has been deteriorated; but it can be also more severe and handicap daily life by the presence of well characterized clinical symptoms, defining sometimes a pathological state. All these different aspects are damaging health, as defined by WHO: a state of well being mental, physical and social (1). One must first specify the psychological effects studied and how they are assessed. Second, a brief survey will be done of the main effects observed in the aftermath of the three major radiological accidents occurred during the late twenty years, Three Mile Island (1979), Goiania (1987) and Chernobyl (1986). Third, one develops social responses which were brought to reduce the psychological consequences to affected individuals and communities.

### **THE PSYCHOLOGICAL EFFECTS AND THEIR EVALUATION**

A psychological impact has many features, generally in relation with the notion of stress. Stress corresponds to a permanent situation of biological, psychic and social disadaptation, which requires from the person alert, tension and energy (2). This physiological reaction depends on the situation experienced by the person. Stress can be measured by observing an increase of some hormones, modifications in mental concentration, symptoms (anxiety, depression, psychosomatic disease), deviating behaviours (abuse of drugs, alcohol, tobacco,...medical and psychological consultations; criminal acts...). If well being is damaged during a long time, then some pathologies, as generalized anxiety, panic attacks and depression, may appear. Freightened persons may experience post-traumatic stress disorder (PTSD). The PTSD syndrome associates accurate, repeated and intrusive memories with psychosomatic symptoms. However PTSD has rarely been mentioned in the literature devoted to health impacts of radiological accidents, one reason being that PTSD was not really searched for.

The definition of some psychological effects is still a matter of discussion. Nevertheless standardized approaches are available, as for example those suggested in the "Diagnostic and Statistical Manual of Mental Disorders, III Revision" (3) by the American Psychiatric Association and in the International Classification of Diseases 10 (4) elaborated by WHO.

Data can be collected either directly during individual interviews or indirectly by observing behaviours. At the individual level, in-depth interviews are conducted by medicine doctors or psychologists who can use standardized interview guides issued from DSM-III-R or ICD-10. Other interview guides exist, such as the "Schedule for Affective Disorders and Schizophrenia - Lifetime Version" (5) and the Munich Diagnostic Check-List (6) which refers to disorders ranging from anxiety and mood to psychotic and organic troubles. Measurement tools usually are symptom checklists that are designed for the scoring of various disorders. Responses are obtained during face to face interviews or through self-completed questionnaires. A common instrument is the "Symptom Check-List 90R" (7). The General Health Questionnaire based on 12 or 18 items (8) translated in various languages and validated for the general population, has been used in many studies on the Chernobyl consequences. Other scales are designed to detect PTSD, for example the Impact Event Scale (9). At the collective level, well being is evaluated by using indirect indicators, such as sales of alcohol, of drugs, the frequency of medical consultations, the statistics of criminal acts, etc.

Several factors can modify the seriousness or the nature of the effects. Most of them are demographic (sex, age,...). Others are perceptual: perception of the accident, of its consequences on health, of the authorities' competence. Influencing factors may be also beliefs about daily life and coping strategies. Others are sociological, for instance the management of the situation by the community, the affective support from family and relatives, the financial compensation to victims, etc.

## THE PSYCHOLOGICAL EFFECTS OBSERVED

From the studies performed in the aftermath of the Three Mile Island accident in the United States (10, 11), of the Goiania accident in Brazil (12, 13), of the Chernobyl accident in Ukraine (14, 15, 16, 17), a short synthesis of people reactions and mental health consequences can be made. For a detailed review, see (18).

In interviews, individuals show not only concern and worry, they insist upon the threat to their safety; they relate all their present health problems to radiation, the doses of which they do not know or doubt; they live in the threat of possible delayed effects. Some of them confess fears. Their well being has changed, as observed in self-assessed questionnaires. Regarding behaviour, demoralization affects many individuals. Life style is modified with changes in food consumption, substance abuse (alcohol, tranquilizers, sleeping pills), suppression of some activities, and new habits due to community disruption. Somatic complaints, as measured by symptom checklists, are reported. Coping actions of individuals in the public range from apathy, avoidance, denying, information seeking, search for a culprit, to leaving for other areas. All these individual reactions are more or less extended and intense, depending on the severity of the accident, the distance of individuals to the accidented site, and the global social context at the time of the accident. Individual reactions increase when social disturbances exist.

For the Three Mile Island accident, reactions in the local community increased sharply after the accident and dissipated rapidly. Few manifestations of chronic stress were observable one year after among the mothers of young children living close to the TMI nuclear plant (19, 20).

For the Chernobyl accident, all reactions remain at a high level in the groups of people concerned (communities evacuated or living in regions under strict radiation control, patients, plant personnel, liquidators), and their evolution over time has been studied. Their persistence causes long term mental health problems. Psychological distress (21), as a feeling mixing despair, devalorisation and deterioration of own health, is obvious. Distress is not equally distributed. Worsening factors have been identified; an old age, difficult living conditions, to be relocated, mother with young children, the loss of social marks contribute to amplify the individual detriment.

## MANAGEMENT OF PSYCHOLOGICAL CONSEQUENCES

In the post-accident phase, several social responses are available to reduce the psychological consequences.

### Medical responses

Some persons show real somatic diseases and more or less severe chronic symptoms of psychological distress which need treatment by medicine doctors, psychiatrists or psychologists. Persons affected are not only victims, they are patients. As seen before, most of them are found among first days intervenors, liquidators, plant personnel and mothers of young children. To solve these painful situations, an important medical team with extended skills must be installed in case of a large accident.

### Public Health follow-up

People well being will be damaged in many ways and for a long period of time. Impacts on mental health, risky behaviours, demands for treatment may vary dramatically over time. Public health authorities must follow the evolution of health indicators and obtain dosimetric information, at the individual level preferably, for the affected populations. This is necessary for three main reasons. The first one is knowledge about the seriousness of the health problems. The second one is to forecast the need of medical and psychological assistance. Medical support must be organized and provided by medical institutions, as regional hospitals, clinics, specialized dispensaries, radiation protection units, health resorts and sanatoriums...The third reason, and maybe the most important one, is to give answers to people who express fears and worries that are, by experience, not always well founded. Rumors and distortions amplifying the consequences are common in the aftermath of a large accident.

Only a structured public health follow-up can give responses based on observed facts, to people and to the media. The efficiency of a sanitary follow-up, or of an epidemiological survey (it is a better device, when possible), depends in great part on the authorities' capacity to activate the system as soon as possible after the accident and to keep it in operation for many years (22).

### Social assistance

It is well known that displacement of people has critical impacts on their psychism, social status and cultural habits, especially among the elderly. Displaced people express a very strong desire to return to the native land, even though it is contaminated and would endanger health and life. Evacuating and resettling reveal to solve only the physical problem but they do not reduce the level of social and psychological stress, because they create

series of new problems linked above all to the hardships of adjusting to new living conditions.

Populations living in contaminated territories suffer from a damaged environment and a greatly affected economic and social development. Strong limitations and constraints on daily life emerge: a) withdrawal of contaminated agricultural lands, forests, and water resources from economic exploitation; b) necessity of special reclamation measures on agricultural lands; c) withdrawal of some facilities from trade operation; d) necessity of continuing decontamination actions, storage of radioactive wastes, radioecological and sanitary control of manufactured goods and agricultural products; e) absence of recreational activities for the population.

These consequences can be partly reduced by the implementation of an emergency programme under state supervision. Special laws must be adopted. According to these laws, the populations affected are entitled to compensation payments for the damage inflicted to their health and property; to preferential medical care; to compensations and privileges for their working and living conditions. There is no doubt that such a programme is necessary and helpful. There is no doubt also that such a programme is extremely costly and cannot be sustained in the long term, particularly when the state has insufficient resources. No doubt also that populations concerned become assisted and lose adjustment capability and initiative capacity. The biggest challenge is then the restoration of people self confidence and trust in changing their own future, in brief to provoke the profitable move from a passive attitude to an active and voluntary management of the problems they are facing.

### Government action guidelines

The analysis of the large nuclear accidents carries out information on how public authorities, at the national or regional government level, managed the accident. Their actions to protect the public led to positive results but also to negative ones. Applying pre-established radiation protection dose criterias, and even making them more severe as in the Chernobyl case, did not significantly modify the social acceptability of the situation. Communication was always deficient in the acute phase of the accident and increased personal anxiety and distrust in authorities. How to make people tolerate the post-accident situation, which is in some ways a positive attitude ? How to avoid rejection which throws people into despair and depression ? Some aspects connected to the return to “normality” are pointed out in (23). The temporal aspect refers to the many years that are necessary to observe an appreciable decrease of the soil contamination, which looks like a no end process. The zoning, justified and useful to protect against radiation, creates ghettos. The land is marked but the population too; there are those who live in and those who stay out. The reference to the dose limit for normal conditions is prominent in people’s minds and it constitutes the final goal to reach to end with this nightmare. To take these aspects into account, the authors propose some general guidelines for government action:

“ 1. The acceptability of the situation by the population directly affected by the contamination is largely dependent on its confidence in the ability of the system to restore tolerable conditions and to progress toward normality within a reasonable period of time.

2. One main concern of the affected public is to restore, as much as possible, normal living conditions in order to avoid the ghetto effect induced by the zoning of areas and by different treatment from the rest of the population.

3. For society, a key parameter is the duration of exceptional conditions. These conditions cannot last too long in order to maintain the feeling of time as a cyclic rather than a linear phenomenon.

4. From the radiological protection management point of view, except for the early phase after the accident during which the population is able to support exceptional levels of risk, the residual level of exposure is only tolerable if it remains close to the values considered for normal practices. ”

### Community responsabilization

If some few individuals are able to recover personal confidence and reorganize positively their life, most of them are influenced by the ambient mood existing among their relatives and in their community. Stress can be reduced as the result of favourable conditions and of a problem solving positive behaviour adopted by the community. Representations of the contamination can then evolve. Contamination can be dealt with at the community level only when it is recognized, identified and associated with particular places, particular activities, particular living habits. This implies that the community is equipped with instruments measuring radiation and knows the technical solutions to reduce or avoid the doses. Some successful experiences of a responsible management at the community level exist in Russia, Belarus and Ukraine. Two of them will be briefly mentioned.

One initiative is the creation by UNESCO of the Chernobyl Community Centres: Nikolskaya Sloboda, Uzlovaya, and Bolkhov in Russia; Alsokovshyna, Strechyn, and Pershey in Belarus; Borodyanka, Slavutych, and Yvankyv, in Ukraine. Their programme is defined as follows :

“ The psychological objectives assigned to the Centres are: to improve the mental health of all age and social groups in the community; to promote family cohesion and parenting skills; to favor interactions within the community; to empower community members and encourage them to take control over their lives; to develop social responsibility; to promote problem solving. ... the Centres’s staff continually re-define the range of their

activities according to the needs and demands of the specific communities in which they are located. Their actions come under four broad categories: case work, with a focus on individual and family therapy; group therapy for adults and adolescents with special attention to the needs of at-risk groups; play and art-therapy for children and adolescents; social support through empowerment and capacity building at the community level with the creation of local organisations, neighbourhood groups and associations." (24).

The project ETHOS in Belarus, under supervision of the CEC, is an other example of a community based approach to solve problems arising in a contaminated territory. In the small village of Olmany (Stolyn district), the project aims at helping the residents in the search of rehabilitation actions which ensure radiological protection and favour new living conditions. Various groups in the community are in charge of improving life at their own level. Milk producers control their own milk, and optimize the ways to feed the cows in order to respect the milk sanitary limit. Young mothers must improve the radiological situation of their children. So, they first worked to reduce the external exposure of children, measuring doses due to the deposits in all the places. Also, they considered the consumption of foodstuffs and modified, consequently, their family diets. Meat producers reduce the radionuclide concentrations in meat. Adolescents of the village are solicited to propose a new image of the village. Teachers are involved in learning about radiation management. Each group has to improve one particular domain that could be useful to the others members of the community (25). This approach, more sociological than psychological, privilegiates the action, which is seen as the better way to avoid people to focus on their personal worries and disadaptations, and to escape their mental distress.

## CONCLUSION

The possibility of a large nuclear accident, or its existence, is an important factor in formulation of an individual's perception of radiation risks. In such a case, responsibilities must be relegated to authorities. Trust in authorities, always given with reservation, is rapidly withdrawn when authorities show inefficiency in managing the crisis that follows an accident. But large radiological accidents provoke more than changes in perceptions.

They lead to psychological problems that are now clearly identified and which extent is both severe and durable in the affected populations. There are no obvious means to reduce psychological distress when it is established. Among the possible responses, the best one remains the restoration of self confidence which allows individuals in their community to re-think a better future.

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