

## The 30-year mental health legacy of the Chernobyl disaster

Thirty years ago, on April 26, 1986, the Chernobyl nuclear power plant exploded, emitting tons of radionuclides into the atmosphere and exposing millions of people in Ukraine and neighboring countries to the fallout. Ultimately, 350,000 people living near the plant were permanently relocated, and 600,000 military and civilian personnel from throughout the Soviet Union were recruited as clean-up workers (locally referred to as liquidators). By the 20th anniversary (2006), ~6,000 children under age 18 in 1986 were diagnosed with papillary thyroid cancer<sup>1</sup>, an otherwise rare disease. At the 25th anniversary (2011), the liquidators were found to have increased rates of leukemia, other hematological malignancies, thyroid cancer, and cataracts<sup>2</sup>. Yet, from a public health perspective, the biggest impact of the Chernobyl disaster throughout the years has been on mental health, specifically major depression, anxiety disorders, post-traumatic stress disorder (PTSD), stress-related symptoms, and medically unexplained physical symptoms<sup>3</sup>. The most vulnerable segments of the population have been women from the Chernobyl region who were pregnant or had young children in 1986, and liquidators, particularly those who worked at the site in April to October, 1986.

The mental health effects were fueled in part by an exaggerated sense of the danger to health from presumed exposure to radiation, that was propelled by the local medical community and government officials. Liquidators, evacuees and people living in contaminated regions were officially labeled as “sufferers” or “Chernobyl victims”, terms that were adopted by the mass media. Being recognized as a Chernobyl “victim” entitled people to financial, medical and educational compensation, which, combined with continuous monitoring by local and international organizations, may have had an iatrogenic effect on psychological well-being<sup>1</sup>.

In our 25-year review of the impact of Chernobyl on mental health<sup>3</sup>, we concluded that the psychological consequences, especially for mothers and liquidators, continued to be a concern, and that mental health care in affected regions was not adequate to meet their needs. Given the extensive literature on comorbidity of mental and physical health, we also called on surveillance and long-term medical studies to integrate mental health measures into their assessment protocols. To our knowledge, the latter recommendations have not yet been fully embraced.

Between the 25th and 30th anniversaries, with a single exception, no new epidemiologic studies of the long-term mental health aftermath of Chernobyl were conducted. Rather, recent publications are based on data obtained prior to 2011. The exception is a health registry study in Tallinn, Estonia, that found an increase in clinical diagnoses of nervous system disorders and intentional self-harm in liquidators compared to controls<sup>4</sup>. Other recently published research on liquidators includes a survey from Tallinn that confirmed findings from Ukraine about elevated rates of common mental disorders and suicidal ideation<sup>5</sup>, and papers on neurocognitive abnormalities

in Ukrainian liquidators<sup>6</sup>. However, in sharp contrast to Chernobyl cancer studies, the results reported in the latter studies from Ukraine have not been verified by an international panel of experts.

Consistent with findings from early studies conducted in Gomel (Belarus) and Bryansk (Russia), two recent papers analyzed data from general population surveys conducted prior to 2011 and found poorer life satisfaction and socio-economic well-being among residents of areas with mildly elevated levels of radiation (albeit within normal limits of natural background radiation) compared to other areas. The authors also estimated that these socio-economic adversities had a substantial negative impact on Ukraine's global gross domestic product<sup>7,8</sup>. The authors inferred that these differences were a consequence of negative risk perceptions about radiation, though these perceptions were not measured directly. To our knowledge, no other reliably sampled, general population surveys of affected regions have been published.

In our 25 year review, we pointed out that findings regarding the cognitive functioning of children exposed *in utero* or as infants were inconsistent and suggested that any plans for continued monitoring of their health should include neurocognitive and psychological measures as well as indicators of social and occupational functioning. This cohort is now in their early 30s. No new light has been shed on this highly contentious issue. We maintain that the most reliable, direct and transparent evidence points to no significant impact of (low-level) radiation exposure on this cohort. However, we continue to advocate for a long-term study of the biopsychosocial and neuropsychiatric wellbeing of this cohort compared to demographically similar controls. This is particularly critical because early childhood exposure to major stress, which many of these children experienced as a result of their mothers' and physicians' concerns about their health and life expectancy, is a well-established risk factor for adult onset psychopathology. It is also imperative that such a long-term study be conducted collaboratively by international experts and local scientists, as was the case in our own research, and that dissemination of study findings be done by local authorities entrusted with the welfare of the population.

It is unfortunate that not a single Chernobyl related mental health intervention trial has been published. On the other hand, it is important to emphasize that the majority of people we and others have studied in relation to Chernobyl did not have a psychiatric diagnosis or elevated psychiatric symptomatology. Indeed, what has been missing from past research is an emphasis on understanding resilience. The importance of identifying and treating psychologically vulnerable individuals after disasters is incontrovertible. However, it is equally important not to overstate the effect, as this may further contribute to a culture of victimhood.

There is growing concern in Ukraine about the neuropsychiatric effects of the war on the Eastern border on combat personnel. It is important to determine if rates of PTSD in this personnel

(particularly among combat soldiers who are the children of liquidators and the *in utero* Chernobyl exposed cohort raised in an atmosphere tainted by Chernobyl stress) are similar to those reported for other countries. International cooperation in a study of the long-term health and mental health effects of Chernobyl may not only be relevant to settling disagreements about the neurocognitive outcomes of exposed children generally, but may shed light on whether their early life exposure to stress is a risk factor for maladaptive response to extreme stress later in life.

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## Problem Management Plus (PM+ ): pilot trial of a WHO transdiagnostic psychological intervention in conflict-affected Pakistan

The mental health consequences of conflict and natural disaster are substantial and wide-ranging<sup>1,2</sup>. There is an urgent need for interventions by non-specialist workers that can address a range of mental health problems<sup>3</sup>. The World Health Organization (WHO)'s Problem Management Plus (PM+) is a brief transdiagnostic psychological intervention employing evidence-based strategies of problem solving, behavioural activation, strengthening social support, and stress management<sup>4</sup>.

We adapted the individual treatment format of this intervention for conflict-affected Peshawar in Pakistan. It consisted of five face-to-face sessions, with a key feature of being affordable in most settings, because it can be offered not only by specialists but also by supervised non-specialists with no prior training or experience in mental health care delivery. We used an apprenticeship (on-the-job learning) model for training and supervising the non-specialists<sup>5</sup>, which involved an initial 6-day training programme by a master trainer to local mental health specialists, who in turn provided an 8-day training programme to six non-specialists. Training of both supervisors and non-specialists was followed by four weeks of practice under supervision of the local trainers. The local trainers themselves were supervised 3-weekly through audio calls by the master trainer, building skills in the intervention as well as in training and supervision. All non-specialists were evaluated for their competency by independent assessors using a competency rating tool evaluating basic helping skills and use of PM+ strategies through observation of specially designed role plays. Competency was rated using a 5-point scale. In total, four out of six achieved scores indicating competency in all basic helping skills and five out of six achieved all competency scores on PM+ strategies. Following additional training and supervision, all non-specialists demonstrated adequate proficiency in requisite skills.

We conducted a single-blind pilot randomized controlled trial (RCT) to explore the feasibility and acceptability of the intervention in Peshawar. PM+ was compared to enhanced treatment as

usual, consisting of management by primary care physician who received one day of basic training in treatment of common mental disorders. The study was conducted from March to May 2014 in two primary care centres in Gulbahar Union Council, a low-income peri-urban locality in Peshawar district. Participants were primary care attenders aged 18 or above, referred for screening by the primary care physician. Screening was conducted by trained members of the research team following informed consent to recruit persons with both marked distress *and* impairment. Invited participants scored: a) 2 or above on the General Health Questionnaire (GHQ-12)<sup>6</sup>, a 12 item questionnaire of general psychological distress with a 4-point scale ranging from 0 to 3 scored bi-modally when used as a screener (possible range 0-12), and b) 17 or above on the WHO Disability Assessment Schedule (WHODAS 2.0)<sup>7</sup>, a screener for functional impairment with 12 items measured on a scale ranging from 1 to 5 (possible range 12-60). We excluded individuals with imminent suicide risk, severe cognitive impairment (e.g., severe intellectual disability or dementia) or with expressed acute needs/protection risks (e.g., recent abandonment by husband and his family). We also excluded individuals who reported having experienced a major traumatic event during the past month and individuals with severe mental disorder (psychotic disorders, substance dependence). Individuals meeting the exclusion criteria were referred to specialist centres depending upon their needs.

Ethical approvals were obtained from the Ethics Review Board at the Lady Reading Hospital, Peshawar, and WHO's Ethical Review Committee. Approval was also obtained from the district primary care administration. Participants were interviewed after voluntary written consent.

Out of 1,286 people seen by a physician during the study period, 94 were referred for screening, 85 met study criteria, 81 were accessible, and 60 consented to participate in the trial. Randomization to the PM+ intervention or enhanced treatment as usual was performed by an independent researcher not involved in the project