

Could the Kornati Islands Firefighting Tragedy have been Avoided with Better Occupational Medicine and Safety?

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Abstract

The objective of this paper is to answer the question whether firefighters' tragedy on the Kornati Islands in Croatia could have been avoided or at least diminished by occupational medicine and safety measures. In August 2007 twelve firemen died fighting fire caused by burn-out of inhomogeneous gas mixture due to burning vegetation and strong wind. Only the thirteenth firefighter survived with serious burns. Three weeks later the volunteer fire company secretary hanged himself and captain underwent psychiatric treatment. The fire brigade chief has been under police investigation. There have been many victims, direct and indirect ones, bound to carry their scars for life. Obviously the roots of the disaster are deep, and here is an attempt to analyze them. If the principles of modern occupational medicine had been observed the tragedy might have been diminished, i.e. there would have been no underage victims. By recognizing the principles of occupational safety and fire protection many lives might have been saved.

Keywords: Occupational medicine; Firefighters; Kornati tragedy

Introduction

In their work firefighters are exposed to various accidents, traumas and poisonings, but mostly to burns [1]. To be able to cope with such dangers they undergo intensive training, simulating real interventions, which might lead to work-related injuries [2]. According to modern theories inhaling fire smoke develops reactive oxygen species (ROS), large particles containing more carbon radicals while ultrafine particles generate more OH radicals, Lipid peroxidation and DNA damage develops [3]. In bronhoalveolar lavage increased macrophage inflammatory protein-2 and gamma glutamyl transpeptidase were found [4]. That is an example of oxidative stress caused by environmental particles. Repeated stresses may be the beginning of bronchial tree cancer. The increased frequency of testicular cancer in firefighters has also been described [5]. To alleviate the consequences of burns and inhalation of particles adequate pre-hospital treatment of the injured is necessary, administration of infusion solution, sedation, analgesia, prevention of hypothermia and ventilation stimulation [6]. Regarding hospital treatment, special burn-care centers for specialized therapy would be a good solution [7]. The therapy of the severely burnt is always complex and medical staff is expected to make quick decisions and interventions [8]. Frequent education training courses for such staff have to be carried out [9]. Experience and preparedness are preconditions for alleviating disaster events [10].

The paper is trying to answer the question if the firefighters' tragedy on the Kornati Islands in Dalmatia, Croatia, in August 2007 could have been avoided or diminished, whether there could have been fewer causalities if the rules of safety at work and fire protection as well as the principles of modern occupational medicine had been observed.

Findings, on an extremely hot day August 30, 2007 the underbush on the island Veliki Kornat caught fire. Fire-fighting was ordered and 13 firemen were transported to the island by a helicopter. Soon after disembarkation they encountered a flame of unbearable heat (in retrospective the temperature was assessed at 1200°C and more). The fire blown by the wind in the direction of firemen caught all of them. Six died on the spot, the others were transported to hospitals in Zagreb and Split but they soon died due to severe burns. Only one firefighter survived in Split hospital.

Materials and Methods

The tragedy of 13 firemen from volunteer fire companies in Vodice and Sibenik has been accounted for retrospectively. Twelve of them died and only one survived in the Kornati fire with life-long consequences. He was transplanted the skin cultivated in Bratislava, Slovakia. He was discharged to home care in January 2008, followed by inpatient care at the physical therapy ward in Makarska. Of 13 firefighters two were under-aged, both 17, and a recruit serving civilian military service.

Retrospectively 3D method of fire simulation thermodynamic system was used developed by Croatian internationally recognized forensic expert professor Vojin Maštruko. The paper is based on the official results of investigation of August 22, 2008 presented by the National Security Council (NSC) founded on the investigation by the expert team headed by professor Maštruko.

Other sources have been used like Official Gazettes of the Republic of Croatia, Regulations on occupational medicine, safety at work and fire protection, and Croatian daily papers as the secondary sources.

Results

By the method of the forensic expert professor Maštruko it has been shown that the temperature at the fire site was over 1200°C and it explained the cause of such an extremely rare fire. The cause was the burn-out of an inhomogeneous gas mixture due to burning of vegetation which carried by a strong wind swept over the firemen.

The idea that the kerosene from the army helicopter caught fire

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was discarded as unfounded and improvable. It was the seasonal receptionist in the Kornati National Park whose cigarette butt started the chain of unfortunate events.

Discussion

An unprecedented firefighters' tragedy happened on the Kornati Islands in Dalmatia, Croatia on August 30, 2007. This is the most terrible disaster since Croatian War of Independence, with officials dying on duty. The underbush on the barren, uninhabited side of the island caught fire and firemen were called to help. As summer is season of fires Croatia had lent a fire-fighting plane to Greece to help fight their fires. So there was an urgent need for another means of transportation and a military helicopter was used to transport firefighters and a water container. The helicopter MI-8 MTV-1 disembarked the water container at one spot, firefighters at another and left. That military helicopter has remained the issue of later speculations. Namely, in "Novi tjednik", a Dalmatia daily, a shocking article by journalist Jelena Devcic was published entitled "Proofs buried, cleaning fluid on the ground". It has been speculated that the helicopter hit a rock during maneuvering, and beside a blown tire the tank was damaged with oil and petrol leaking because some oily stains were found on the rocks. The firefighters were soon surrounded by burning underbush and they burned out.

According to the official expertise that was done later, it was concluded that it was a burn-out of inhomogeneous gas mixture which occurred by burning vegetation accompanied by a strong wind. A similar rare phenomenon was described in Australia in 2003 near Camberra and in Corsica in 2000 near the place Palasca. Besides our leading forensic experts, also the leading world firefighting experts were invited to the Republic of Croatia who came to reconstruct the disaster, to find out dynamics and kinetics of fire, its speed and direction of spreading, height and position of flame and to assess the freed thermal energy.

But the immediate families of the casualties have been active. High indemnities have been required. Families of nine deceased firemen demand the total of 6.25 million kunas i.e. about 856.000 euros, and the families of two minors and the recruit demand the total of 2.13 million kunas which is about 292.000 euros, so the overall amount is 1.148.000 euros. The state of Croatia has been sued for allowing the recruit serving civil military service to participate in the intervention, leaders of the towns Sibenik and Vodice, as well as officials of Public fire brigade and Volunteer fire company were sued.

It is not allowed to employ minors in jobs under special working conditions, which includes firefighting - People's Gazette 1984, article 3 item 14. Nothing regarding that matter was changed in the regulations in 1999, 2007 and 2010. So the question in the title may partially be answered immediately - if the valid basic regulations, i.e. the fundamental principles of occupational medicine had been observed the minors' participation in the firefight should not have happened. No occupational medicine specialist can issue a certificate on working ability to a minor for jobs under special working conditions. Also, a fire brigade cannot employ a fireman without an occupational medicine certificate to say nothing of sending him to a fire site. Firefighters have to be qualified. They must complete at least secondary firefighting school and they have to pass professional exam [11]. Many oversights have been made at that level. Furthermore, occupational medicine examines firemen on the basis of assessing dangers at the working place, which is decided in collaboration with safety at work. The procedure in an intervention is prepared together by safety at work and fire department chiefs. Therefore it was another oversight for surely it was not prescribed that water had to be unloaded separately from firemen so that they would struggle through fire to reach it. The last question refers to the events after the disaster - why did it take hours to transport the casualties from the island to the mainland, late at night by a naval vessel. Only one fireman survived. Because of the developed PTSD and the undergoing treatment he is not able to comprehend the whole event but he is aware of his colleagues' death. He was transplanted the skin cultivated in Bratislava, Slovakia. He wishes to return to everyday life but has a long rehabilitation before him. In principle, most patients return to work after burn injuries [12]. Of course, it depends on the type and severity of injury, which often requires a long and intensive hospital therapy as well as other out-hospital treatments [13]. Major burns consequentially lead to failure of organs, sepsis and shock [14]. The survivors often get damaged muscle-skeletal and circulation systems, but also mental disorders [15]. Deformities, loss of part of body (like the Kornati survivor with finger handicap), may trigger serious psychological problems [16]. Social support, the role of family and partners is of great importance [17]. It is not only the direct victims that are mentally scarred. Three weeks after the Kornati tragedy the volunteer fire company secretary hanged himself. He was a high-school teacher and he knew the young victims who used to be his students. Captain of volunteer fire company needed psychiatric treatment.

Accidents and disasters happen all over the world. Preparedness for unwanted occurrences and permanent work on prevention is required. In some countries preventive strategies have not managed to decrease the number of work-related burn injuries [18], while governments of certain countries have succeeded in diminishing the incidence of such injuries [19]. Serious occupational burn injuries cost some state budgets millions of dollars [20].

Finally, the question in the paper's title has to be answered. It is obvious that occupational medicine cannot prevent fire as a natural phenomenon (or arson) but if the principles of occupational medicine were observed minors would not be allowed to perform jobs that require special working conditions which would automatically avoid causalities. On the other side, Safety at work by implementing its regulations referring to firefighting (the quoted People's Gazette 106/1999) must not tolerate the work of inadequately qualified firemen or their untrained leaders whose poor coordination leads to fatal consequences. Quicker evacuation of the injured, unloading firefighting equipment together with the men, would have surely diminished the mentioned consequences. In its Regulation the Republic of Croatia has given detailed instructions on firefighting, as well as the rules of safety at work and occupational medicine were not obeyed.

In conclusion, it has been established that occupational medicine must be recognized as a preventive branch of medicine, significant in prevention of occupational injuries. It is the "guardian" of minors preventing their employment in risky jobs. Unfortunately, noncompliance with occupational medicine regulations has in this case proved fatal for minors. Cooperation of occupational medicine and safety at work must be felt on the ground because if it remains only declaratory the consequences of failure to comply with regulations will be long lasting.

Competing Interests

The paper was completed by the author's own means, using the Republic of Croatia Official Gazettes, the Survey of the National Security Council's official results, public means of information, Internet for retrieving data and on the basis of long term experience in daily work in the domain of occupational medicine and teaching occupational health medicine.

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