New Zealand and has a population density of 14 per square kilometre compared to 21 for the rest of the North Island. Hospital resources are centralised in Whangarei with five smaller primary care hospitals distributed in the region. With a large and difficult terrain effective transport of the critically ill in the region relies heavily on the helicopter. The paramedics from the St. John's Ambulance Service and the nurses and doctors from the Intensive Care Unit at Whangarei Hospital work closely to provide efficient transit care of the critically ill.

**Results**: Over 3,000 patients have received this mobile ICU care in the last 10 years. The ICU at Whangarei acts as a one stop coordinating centre for Medivacs — transit care of the critically ill between hospitals. The ambulance control room acts as the coordinating centre for Casivacs — retrieval of trauma victims from the scene of trauma and from remote areas of accidents that happen during adventure pursuits. Over 80% of helicopter transfers have been for Medivac reasons — with patients receiving mobile intensive care from an ICU doctor and nurse on board. The remainder are Casivacs with paramedics providing prehospital management of serious trauma.

With over 3,000 patients in the last 10 years, an effective system of coordination between St. John's Ambulance and the Intensive Care Unit at Whangarei provides prompt and proficient critical care to victims of trauma and patients suffering from critical illness.

**Conclusion**: We believe this system is a model for regions with widespread geography. We will discuss the attributes of this coordinated helicopter service and highlight the lessons that may be of use to other non-urban areas in the world.

**Keywords**: coordination; critically ill; helicopter; intensive care; interfacility transfers; mobile intensive care; New Zealand; nurses; paramedics; physicians; scene responses; trauma

*General Session XII*

## Environmental and Nuclear Disasters

**Tuesday, 11 May, 10:30–12:00 hours**

**Chair:** ***Peter Zelnicek, Norifumi Ninomiya***

### G-56

### Haze '97 – A New Type of Disaster

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In May 1997, reports were received from weather monitoring stations in SouthEast Asia of the spread of smoke and haze from forest fires occurring in Indonesia (Kalimantan and Sumatra). The smoke and haze spread across SouthEast Asia and eventually also involved the countries of Malaysia, Singapore, Thailand, Brunei, Philippines, and even up to Hong Kong. Peat fires also contributed the smoke and haze and the dry weather conditions brought on by the El Niño phenomenon. The haze reached extremely high levels in various parts of the region, especially in Malaysia and Kalimantan. The effects of the haze were reflected in the following:

1) A markedly increased incidence of upper respiratory infections, sore eyes and exacerbation of asthma and chronic bronchitis in the region;
2) Poor visibility for many months until October 1997;
3) A drastic drop in tourist arrivals in the region;
4) Closures of airports and flight diversions in some countries; and
5) Occurrence of disasters such as ship collisions, air crashes due to poor visibility — these resulted in large numbers of deaths;

In addition, certain long-term effects such as chronic respiratory diseases and even drop in mental performance were postulated as a result of the haze. The main agent causing adverse medical effects was felt to be particulate matter below 10 microns size.

The economic loss to the affected countries was in terms of hundreds of millions of dollars.

Various interventions were attempted, such as fire fighting, satellite tracking of hot spots, litigation against persons causing such fires, cloud seeding efforts, use of various types of ventilators, and increased use of medications to treat adverse health effects of the haze. The event resulted in the countries of SouthEast Asia working together to jointly map out strategies to prevent and control future such incidents.

Long-term research also will be required to study the effects of chronic exposure to such particulate matter on the health of populations.

**Keywords**: accidents; air crashes; Asia, southeast; asthma; El Niño; fires; haze; respiratory diseases; ships; smoke

### G-58

### Haze and the Body

*Dr. G.H. Lim; Dr. K.S. Lim*

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**Introduction**: Training in the SAF always has been considered a strenuous activity. We know that the body is subjected to many adverse environmental factors during physical exertion, and air pollution is one such important factor.

**Aim**: The aim of this study was to analyse the impact on the body after exposure to different levels of air pollution.

**Method**: This is a retrospective study based on the attendance at the Dieppe Medical Centre (DMC) from October 1997 to April 1998. Five hundred soldiers, age between 18 to 24 years from the 1st Battalion, Singapore Guards were used as the study cohort. The measure of pollution used is the Pollution Standard Index (PSI) that was recorded by the Singapore Meteorological Station. The PSI measures five common pollutants in the atmosphere during the past 24 hours.

All of the soldiers who turned up at the DMC were examined thoroughly by the Medical Officer and given a diagnosis. The diseases selected were: 1) Upper Respirato-

ry Airway Disease; 2) Lower Respiratory Airway Disease; 3) Conjunctivitis; 4) Viral Fever; 5) Musculoskeletal Problem; and 6) Gastroenteritis.

**Results**: The results indicate that upper respiratory airway disease is not directly dependent on the PSI level ($p = 0.104$), while the incidence of lower respiratory airway disease and conjunctivitis show a significant direct correlation with the PSI level ($p = 0.037$ and $p = 0.020$).

**Conclusion**: The incidence of asthma, bronchitis, and conjunctivitis increases with the level of air pollution. Thus, more precautionary measures should be taken while engaged in strenuous physical activities.

**Keywords**: air, asthma; pollution of; bronchitis; conjunctivitis; effects; haze; impact; physical activity; pollution; Pollution Standard Index; Singapore

## G-59

## Tasks of Disaster Medicine Service in Radiation Accidents

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Qualitative and quantitative characteristics of an injured structure on stationary radiation hazardous facilities (NPP, other enterprises and organizations using nuclear and radiation technologies or scientific irradiation equipment) in local or general (large scale) radiation accidents, and in the transport of radiation and fission materials (transport accidents) generally are well-known.

We propose a useful classification scheme for persons involved in a radiation accident: 1) *Personnel* — specialists of radiation hazardous facilities, personnel of travel facilities, involved in radioactive materials transportation; 2) *Liquidators* — participants in relief operations (members of emergency-rescue teams, other persons enlisted to provide response measures); and 3) *Population* — persons living on affected territory. A person who in an emergency accidentally found her/himself within boundaries of sanitation/protective zone of emergency facility is called a "witness of the accident". The health response tasks for medical units in responding to a radiation accident are well-grounded.

The structure, purposes, and main tasks of All-Russian service for disaster medicine are presented.

**Keywords**: accidents; classification; facilities; radiation; relief; transportation

## G-60

## Disaster and Emergency Medical Systems in Nuclear Plant Accidents in Japan

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**Introduction**: There are more than 50 nuclear power reactors operating in Japan that generate more than 30% of the country's total electrical energy. At the Clinical Research Institute, a nuclear disaster-handling manual was developed two years ago, which was presented in the previous 10th World Association of Disaster and Emergency Medicine (WADEM) World Congress in Mainz, Germany in 1997. At that time, Disaster and Emergency Medical Systems adopted by nuclear plants in Japan were reported.

**Materials and Methods**: This study consists of two methods: First, a questionnaire was distributed to each nuclear plant; and second, a direct inspection of each nuclear plant. Themes studied were: 1) Primary medical systems; 2) Emergency transporting systems for serious patients; 3) Drills that deal with nuclear disaster; and 4) Communication or cooperation systems established between the plant and the medical facilities outside of the plant.

**Results and Discussion**: Data were obtained from eight nuclear plants among the 14 commercial plants (57%). Six plants were evaluated by questionnaire, and two plants were investigated by direct inspection. The details were:

1) The systems for detecting contamination and for decontamination of patients were excellent (8 among 8 plants);
2) The primary Emergency Medical System in the plants was considered to be good when patients were not seriously injured during the daytime;
3) There are problems with the Emergency Medical System when accidents occur during the night, on holidays, when the degree of injury is severe, and when the number of casualties is high;
4) An excellent emergency transporting car was equipped, although a more strict system should be prepared to avoid the spread of contamination in cases of decontaminated patients;
5) Disaster drills have been performed regularly; however, the frequency and the scale of the simulations were rather small; and
6) Communication systems established between the plants and the medical facilities outside of the plant varied with each plant, and so their evaluation was difficult.

**Conclusions**: Essentially, a medical system and a decontamination system for treating a few not seriously injured patients, either contaminated or not contaminated, were well-planned, especially inside the plant. However, it seems necessary to establish a medical system for accidents involving many casualties and to perform drills that involve many people on site, because the risk of larger scale nuclear plant disasters cannot be excluded. The significance of the nuclear disaster-handling manual made by the Clinical Research Institute also will be discussed.

**Keywords**: accidents; contamination; decontamination; disasters; drills; emergency medical systems; exercises; Japan; manual, disaster handling; nuclear reactors; transportation