### Extending the Golden Hour of Hemorrhagic Shock Tolerance in Rats

*Samuel Tisherman; Peter Safar; Akira Takasu; Peter Carrillo; Robert Schlichtig; Seung H. Kim; Antonio Capone; David Crippen; S. William Stezoski*
Safar Center for Resuscitation Research, University of Pittsburgh, Pennsylvania USA

Protecting vital organs during hemorrhagic shock (HS) may extend survival time during untreated lethal HS, and increase survival rate after all-out resuscitation from HS, by preventing delayed multiple organ failure. We have pursued these hypotheses in rat models since 1990. Using a volume controlled HS model with hemorrhage rate of 3.25 ml/100g, moderate hypothermia or 100% oxygen breathing extended survival time and rate. Changing from breathing of air to 100% oxygen increased meant arterial blood pressure (MAP).

Using a new, three-phased outcome model of uncontrolled HS (UHS) (Phase 1) of 90 minutes (min.) (with tail amputation), hemostasis and all-out fluid resuscitation (FR) (Phase II), and observation to 72 h (Phase III), the survival rate was greater with minimal hypotensive FR (MAP 40 mmHg) by lactated Ringer's solution (LR) during UHS, as compared to no FR or normotensive FR with LR. Using the same resuscitation-outcome model, survival times and rates were greater when UHS was under moderate hypothermia (Hth) (30° C), and greatest with Hth plus minimal hypotensive FR.

In a preliminary study using the above UHS model phase I only (lethal UHS), survival time was about 1 h under normothermia and 2 h under moderate Hth, with a slight increase in survival time by 100% $O_2$ breathing. Visceral ischemia, monitored in terms of tissue $PCO_2$ rise, seemed less under 100% $O_2$ breathing.

In a definitive study of lethal UHS, in 9 groups X 6 (total 54) rats, mean survival time was 164 min. under moderate Hth plus 50% $O_2$, 134 min. under mild Hth (34° C) and 50% $O_2$ (NS); as compared to 51 min. under normothermia and air breathing ($p < 0.05$). Mild Hth is easier to induce and safer than is moderate Hth. Survival time compared to air breathing was slightly increased (NS) not only with 100% $O_2$ but also with 50% $O_2$ which is more readily available in the field than is 100% $O_2$. Survival time was longest with 50% $O_2$ plus 30° C. Visceral ischemia during UHS caused intestinal and liver surface $PCO_2$ to increase from about 50 to 70 mmHg baseline to over 200 mmHg before death, with lower values for a longer time under 30° C or 34° C compared to 38° C (NS), and lesser increase during HS under 50% $O_2$ compared to air breathing ($p < 0.05$).

Protective mild Hth during prolonged HS (with avoidance of shivering by insult or sedation) should be considered for clinical feasibility trials. A possible benefit from oxygen breathing in the field, which presents logistic obstacles in mass disasters or for military combat casualties, needs outcome studies.

**Key Words:** fluid resuscitation; hemorrhagic shock; hyperoxia; hypothermia; uncontrolled hemorrhage

### Capillarity in Burn and Wound Dressing

*Wahid Mikhail, MD*
King Fahad National Guard Hospital, Riyadh, Saudi Arabia

This technique for burn and wound dressing was developed during the past 20 years. It utilizes the theory of capillarity. Its use and application has generated considerable interest. It maintains a proper balance between humidity and absorption with a predetermined absorption capacity. The dressing is built up in four layers: 1) a non-adherent, oil-in-water impregnated viscose fabric product as the contact layer; 2) a non-woven swab made from viscose in a filamented form; 3) a non-occlusive material which allows free passage of gases; and 4) a gauze bandage or a light plaster cast. The first two layers are moistened with sterile, normal saline, and are applied on top of the contact dressing. The second layer exerts high capillarity and actively draws the secretions away from the contact layer, thus preventing pooling and maceration. The third layer is a hydrophobic material and, as such, does not become stained or impregnated with discharges while it controls the evaporative process from the wound surface.

This dressing is sterile and non-toxic. It allows air permeability with a non-adherent surface. Its thermal insulation results in high mitotic activity with rapid epithelialisation and improved granulation. It is impermeable to airborne micro-organisms with no passage of exudate from wound to surface. It also is free from particle and toxic wound contaminants.

The dressing is easily removable without causing pain to the patient. It should remain untouched for seven to ten days until healing is complete. It is simple to use, readily available, quickly applied, and in most cases, the patient can be discharged to home, thus effecting a huge saving in hospital bed occupancy, medical time, and material.

**Key Words:** burns; capillarity; dressings; epithelialization; healing

## Session 3A: Hospitals and Disaster

Chairpersons:
J. McGown (USA)
M. Gilbert (Norway)

### Experience of the Utrecht Emergency Hospital in Admission and Treatment of Groups of Victims in the Period 1991–1996

*V. Eijzenbach; K.J. van der Eijk; J. Meulenbelt; A.J. van Leusden; T.J.F. Savelkoul*
Utrecht, The Netherlands

The admission and treatment of large groups of patients or victims of mass casualties differ considerably from daily routine in any emergency department. For such situations, a clear disaster relief plan, well-trained personnel, experienced coordinating staff members, communication facilities, accurate patient administration, and possibilities to enlarge admission capacity are necessary.

The Utrecht Emergency Hospital has some unique facilities to assist the staff in achieving most of the conditions above. In the Emergency Hospital, the Utrecht University Hospital, the National Poisons Control Centre and the Central Military Hospital collaborate. These organizations guarantee the know-how and expertise in case of mechanical or chemical accidents and in logistical support. In the Emergency Hospital, a triage unit, an intensive care unit (ICU), nursing wards, operating theaters with a recovery unit, and an X-ray department, are immediately available for up to 100 patients. To prepare personnel, there are different educational and training programs. For the admission of large groups of patients, an automated, patient registration system has been developed.

Since 1991, the Emergency Hospital was used 18 times for the treatment of groups of patients. These patients either were victims of mechanical or chemical accidents or were wounded soldiers who were transported from Bosnia. The largest group that was admitted at one time consisted of 143 patients following the evacuation of another hospital.

A major development was the role of the Emergency Hospital to establish cohort isolation of groups of patients in case of required isolation, e.g., multiple resistant staphylococcus aureus (MRSA). Based on the experience of the last 5 years, the importance of an accurate patient registration system, an automated telephone warning system, professional psychological guidance of patients, family and personnel, the handling of patients as a group, privacy of the patient, information to the press, the use of medical treatment protocols and training and education are strongly emphasized.

**Key Words:** disaster management; emergency department; hospital; mass casualty incident; patient registration

## Training Facilities for Disaster Medicine in the Utrecht Emergency Hospital in the Netherlands

*V. Eijzenbach; P. van Luyn; K.J. van der Eijk, J. Meulenbelt; A.J. van Leusden; T.J.F. Savelkoul*
Utrecht Emergency Hospital, Utrecht, The Netherlands

In order to prepare personnel for the admission and treatment of large groups of patients or victims of mass casualties, the medical and nursing staff must be educated and trained in this area, even when they are well-experienced in their own discipline. Most often, this training is provided in large-scale simulation exercises involving the use of many materials and personnel. Relative to the expenses of these exercises, the gain often is poor. In the Utrecht Emergency Hospital, which is the result of the collaboration between the Utrecht University Hospital, the National Poisons Control Centre, and the Central Military Hospital, a structured program was developed for the training of the personnel in Disaster Medicine. This program is used for the instruction of the nursing staff of the first-aid department and of one of the intensive care wards of the Utrecht University Hospital. Both of these departments play an important role in the disaster relief plan of the Utrecht Emergency Hospital.

This program also is used for the training of personnel from supportive services, the medical staff, and nurses from other departments. Furthermore, the training is used for military medical personnel who are dispatched for peace-keeping operations. The training program covers instruction on: 1) medical relief organization; 2) communication; 3) coordination and registration; 4) logistics; 5) triage; 6) medical treatment protocols; and 7) how to inform the press. There also is interest from other hospitals and organizations in the training program organized by personnel of the Utrecht Emergency Hospital.

Although the objective of the training program is to prepare personnel for exceptional occasions, the effectiveness of teamwork in the daily routines of the emergency ward also can benefit from use of this training program.

**Key Words:** disaster management training

## Surgical Emergencies in an Urban, Tropical Environment, University Hospital

*B. Imposo-Bofunga; J.B. Mputu Yamba; B. Kabwe-Mwilambwe*
Cliniques Universitaires de Kinshasa, Kinshasa, Zaïre

The knowledge of the respective frequency of surgical emergencies cases can help to make a diagnostic process and help to organize and to plan an emergency unit.

The authors of this study made a retrospective study in the Kinshasa University Hospital in order to determine the emergent surgical pathology. Some results are: 1) trauma is the most frequent surgical pathology (51%) encountered, followed by abdominal emergencies (23.5%) and smooth tissue infection (13.7%); 2) males are operated on more frequently than are females, especially young men under 30 years of age; 3) Kinshasa University Hospital, the first hospital of reference in the country, now has become inaccessible to the majority of the people in surgical emergency situation; 4) the emergency unit should be restored in: a) its concept; b) its welcome structures; and c) its equipment; and 5) a permanent educational programme should be available.

**Key Words:** emergencies; surgical; tropical environment; urban

## Patient Tracking and Registration in a Hospital in Case of Mass Casualty Incidents

*J.H. Bouman, BSc; A.J. van Leusden, MD; T.J.F. Savelkoul, MD, PhD*
Utrecht, The Netherlands

Admittance of groups of victims into a hospital after an accident easily can lead to chaos and disruption of the regular hospital organization. To ensure that the chaos that usually follows a mass casualty accident is not perpetuated inside of a hospital that receives a large number of victims, a correct and unique way for registration and continuous overview of registered patients can be very helpful.

The Emergency Hospital Utrecht which is part of the Utrecht University Hospital and the Central Military Hospital, has been confronted several times within