ICU MANAGEMENT

THE OFFICIAL MANAGEMENT AND PRACTICE JOURNAL

VOLUME 8 - ISSUE 4 - WINTER 2008 / 2009

STROKE

PLUS:

- WARMING / COOLING UNITS
- CRITICAL CARE IN ITALY
- SHORTENING ANTIBIOTIC THERAPY DURATION
- COPING WITH STRESS IN THE ICU

9 771377 756029 12

Dräger medical
A Dräger and Siemens Company

Two in one

The new Evita XL - the combination of excellence in invasive and non-invasive ventilation

Smooth and comfortable - whether you're ventilating adults, pediatrics or even premature babies. **www.draeger.com**

Dräger. Technology for Life®

0170-2008

EDITORIAL

Jean-Louis Vincent

Editor-in-Chief
ICU Management

Head Department of Intensive Care
Erasme Hospital Free University of Brussels
Brussels, Belgium

jlvincent@ulb.ac.be

In the current financial climate, a more discerning eye has been placed on the costs of public services and the business practices attached to their allocation. As healthcare accounts for a considerable share of many countries' national budgets and we, as critical care practitioners, are in the frontline of the dispersion of often expensive, yet essential treatments, we must also be mindful of the costs associated with the treatment of patients in a broader sense.

In 2003, cerebrovascular diseases cost European Union healthcare systems 21 billion euros—with the inclusion of informal care and lost productivity, the cost to the wider economy is considerably higher. Stroke remains the third leading cause of death in the US, and the treatment of patients who suffer a stroke results in substantial health-care expenditures—the mean lifetime cost resulting from an ischaemic stroke is estimated at $140,000 per patient (Rosamond et al. 2007; 2008).

There is mounting evidence that early goal directed treatments in the emergency department are effective and centralised care in designated stroke centres is cost effective (Dion 2004; Douglas et al. 2005). Whether we in ICU Management have access to these rapid treatments at intake or work in facilities which tout specialised stroke units, or not, we continue to search for the most effective techniques in treating patients once they reach our units.

In this issue of ICU Management, Dr. Wartenberg provides an indepth overview of all the research and studies into improving stroke outcomes. She delves into current treatment strategies and accepted protocols in intensive care. Neuro-ICU nurses Heather Hand and Marya Searcy outline key strategies in early goal directed care of stroke patients, while in our continuing Hypothermia Series, Dr. Armonda discusses the current and future options of temperature management in the treatment of stroke.

Our special focus on care of the elderly highlights trauma care and Dr. Barraco discusses the need for interdisciplinary management for elderly trauma patients. Dr. Pugin returns to the pages of ICU Management to update us on current strategies to shorten antibiotic use in the ICU. And in a timely and well-appreciated bid to decrease our emotional distress in these troubled times, Dr. Granger suggests techniques to cope with stress in our units in the Management segment.

Italy is featured in this issues' Country Focus. ICU Management Correspondent Dr. Maurizia Capuzzo and Dr. Resi provide an overview of the complex healthcare system in their homeland, while Dr. Bertolini and colleagues from the GiViTI group outline the Project Margherita, launched for the continuous evaluation and improvement of the quality of care.

The ICU Management team is delighted to announce the addition of four new members to our esteemed Editorial Board. We welcome Prof. Julian Bion from Birmingham, United Kingdom; Prof. Peter Pronovost from Baltimore, Maryland (US); Prof. Paolo Pelosi from Varese, Italy; and Prof. Jeff Lipman from Brisbane, Australia. We hope that the combined wealth of intensive care knowledge and management expertise of these seasoned critical care professionals will serve to further enhance and enrich ICU Management's content and increase the journals' reach in the coming years.

Jean-Louis Vincent

29th International Symposium on Intensive Care and Emergency Medicine

BRUSSELS EXHIBITION & CONVENTION CENTER, MARCH 24-27, 2009

Plenary Sessions, Mini-Symposia, Workshops, Technical Forums, Round Tables, Tutorials

Endorsed by:

European Society of Intensive Care Medicine
Society of Critical Care Medicine
American Thoracic Society
European Society for Emergency Medicine
European Shock Society
The Institute of Critical Care Medicine
The Canadian Critical Care Society
Australian and New Zealand Intensive Care Society
International Pan Arab Critical Care Medicine Society
World Federation of Societies of Intensive and Critical Care Medicine

Meeting Chairman: JL Vincent
Email: jlvincen@ulb.ac.be

Manager: V De Vlaeminck
Email: veronique.de.vlaeminck@ulb.ac.be

Dept of Intensive Care
Erasme University Hospital
Route de Lennik, 808
B-1070 Brussels, Belgium
Phone 32 2 555 36 31, Fax 32 2 555 45 55
Email: sympicu@ulb.ac.be

Website: http://www.intensive.org

Posters: Deadline for abstract submission: December 15, 2008

TABLE OF CONTENTS

ICU Management

is the Official Management and Practice Journal of the International Symposium on Intensive Care and emergency Medicine and was previously published as Hospital Critical Care.

EUROPE

New Sudden Cardiac Death Database to Save Lives

www.dh.gov.uk

A database launched recently will help identify the incidence and causes of sudden cardiac death and save the lives of people who may currently be at risk from the inherited heart condition that can strike without warning. Designed by pathologists and cardiologists, and funded by the Department of Health, the database will be a key tool in understanding the incidence and causes of inheritable conditions that can cause sudden cardiac death.

Sudden cardiac death can happen unexpectedly in apparently fit and healthy people. The main cause for those under the age of 35 is an inheritable heart condition.

The new database will help pathologists record cases referred to them by coroners. This information will ultimately allow doctors to understand better where and why these inheritable heart conditions are occurring, and so help save lives.

With a greater knowledge of the incidence, prevalence and causes of sudden cardiac death, doctors will be able to identify better people at risk from one of these conditions and help them get access to the services they need. Close family members of victims of sudden cardiac death will be referred to specialist inherited cardiac conditions centres where they will be offered counselling and support.

Professor Roger Boyle, National Director for Heart Disease and Stroke said, "This database will provide invaluable information for doctors on the causes, incidence and prevalence of sudden cardiac death. As well as improving our understanding of inherited cardiovascular disease it will actually save lives by identifying young victims of sudden cardiac death and helping their families reduce their own risk."

Health Minister Ann Keen said, "This announcement shows that the Government is continuing to build on the very significant progress already made in the prevention of cardiovascular disease. We met our pledge to reduce deaths from cardiovascular disease by 40 per cent five years earlier than the 2010 target and are committed to going still further."

RESEARCH

Ultrasound Waves Aid In Rapid Treatment Of Deep Vein Thrombosis

www.emory.edu

The use of ultrasound waves for deep vein thrombosis (DVT) may help dissolve blood clots in less time than using clot-busting drugs alone, according to researchers at Emory University. "These clots are a main cause of both heart attacks and stroke and the more quickly you can eliminate them the better," says Karthikeshwar Kasirajan, MD, assistant professor of surgery in the Emory University School of Medicine.

A DVT is a blood clot that forms in a vein deep in the body, most often in the lower leg or thigh. A loose clot, called an embolus, can break off and travel through the bloodstream to the lungs and block blood flow. The life-threatening condition is called pulmonary embolism. The surgeon general's campaign estimates that every year, between 350,000 and 600,000 Americans get one of these clots - and at least 100,000 of them die.

"We now know that using ultrasound, along with the traditional method of using drugs to break up or dissolve blood clots, will help restore flow, prevent valve damage and also prevent the possibility of pulmonary embolism," says Kasirajan.

Researchers treated 37 patients with the clot-dissolving drug called tPA (tissue plasminogen activator), while using ultrasound to loosen the proteins in their blood clots and send the drug into the clots faster. Of the 37, 16 had DVT and 21 had acute in-situ arterial thrombosis. All the patients with arterial thrombosis had their clots completely dissolved, and all but six of the DVT patients had theirs completely dissolved. Four DVT patients had their clots partially dissolved and two saw no change. Only one of the 37 had a complication (neck hematoma). Most of the 37 (83 percent) were subsequently treated with angioplasty and stent placement.

VISIONARIES AND DREAMERS

The Story of the Founding Fathers of Israeli Anaesthesiology

BOOKS **in review**

Almost sixty years after the creation of the Israel Society of Anaesthesiologists (1952), a book containing the stories of the founding fathers of the profession in this country has been written and edited by Gabriel M. Gurman, MD.

Visionaries and Dreamers describes the endless efforts of anaesthesia's founding fathers in Israel to bring this profession to a level accepted all over the world.

Within its' pages, the reader will find stories, memories, and facts, as well as personal opinions, details of successes and failures of the pioneers of Israeli Anaesthesiology in the second part of the last century.

As Israeli Anaesthesiology is currently experiencing a serious manpower crisis, this book hopes to offer young Israeli physicians a real insight into the profession and guide them towards Anaesthesiology as a future professional carrier.

Gurman is professor emeritus at Ben-Gurion University of the Negev, a past president of the Israel Society of Anaesthesiologists and a former chairman of the Division of Anaesthesiology at Soroka Medical Center and Faculty of Health Sciences, Beer-Sheva, Israel. Sponsored by a series of scientific, professional and industrial organisations, this book was written in collaboration with Lior Granot, a young poetess and an alumna of Ben-Gurion University of the Negev, who edited the book and took part in a long series of interviews with the pioneers of Israeli Anaesthesiology and their families. It is printed in a bilingual edition – Hebrew and English.

Aeroneb® Pro Aeroneb® Solo

Aerogen nebulizers deliver an incredible four times more medication than traditional jet nebulizers, offering you unsurpassed efficiency and allowing you to give your patients the very best care available. They work independently to the ventilator settings meaning there's no added flow, no nuisance alarms, no loss of PEEP when opened for refill and no drug wastage. Aerogen truly sets a new standard.

Aerogen
We deliver best

Breathe easy.

You're giving the best care.

www.aerogen.com International number: +353 91 502550

MANAGEMENT OF ACUTE STROKE:
ICU CARE AND EXTENDING THE TIME WINDOW FOR THROMBOLYSIS

Katja E. Wartenberg, MD, PhD

Division of Neurocritical Care and Cerebrovascular Diseases,
Department of Neurology, University Hospital Carl Gustav Carus Dresden,
Dresden, Germany

katja.wartenberg@uniklinikum-dresden.de

Stroke care in the intensive care unit is focussed on stabilisation of vital and metabolic parameters. Timely recanalisation by means of intravenous, intraarterial thrombolysis or mechanical clot disruption remains the most powerful treatment to improve the outcome of stroke victims.

Introduction

Stroke is the third leading cause of death, with a person dying every 3-4 minutes of a stroke. On average, every 40 seconds someone is experiencing a stroke (Rosamond et al. 2008). Approximately 3% of total healthcare expenditure is attributable to cerebral ischaemia with cerebrovascular diseases costing European Union healthcare systems 21 billion euros in 2003. The costs to the wider economy including informal care and lost productivity amount to 34 billion euros (Flynn et al. 2008).

Evidence is accumulating that patients treated in stroke centres with designated stroke and intensive care units focussed on detailed and expedited stroke care have better functional outcomes and that patient care is more cost effective (Roquer et al. 2008; Saka et al. 2008). With the development of complex acute stroke treatment targeting early reperfusion with intravenous and/or intraarterial thrombolysis, sonothrombolysis, mechanical clot disruption, and application of neuroprotective strategies, these units specialised in stroke patient care will become even more important.

About 5-20% of all ischaemic strokes develop into space-occupying, life-threatening strokes associated with a mortality rate up to 80%. These encompass internal carotid (ICA) or middle cerebral artery (MCA) infarctions covering about 50% of MCA territory, brain stem and cerebellar infarctions. Clinical deterioration can be expected from day 1 through 7 in approximately 50% of the patients (Aiyagari and Diringer 2002). Acute stroke patient care begins in the field with recognition of the symptoms and getting the patient to emergency department (ED) as soon as possible. There has been an attempt to centralise care in designated and certified stroke centres with the capacity for rapid stroke evaluation and treatment (Dion 2004; Douglas et al. 2005). In the ED, a computed tomography scan (CT) or magnetic resonance imaging (MRI) of the brain including a arteriogram and a perfusion sequence should be obtained along with blood work, electrocardiogram, chest radiograph, and a decision about the best strategy of thrombolysis or mechanical recanalisation should be made (Adams et al. 2007, 2008). The patients undergoing thrombolysis, at risk for neurological deterioration or development of massive space-occupying infarction should be monitored in an intermediate care stroke or an intensive care unit.

Early Reperfusion Strategies

Time is brain, i.e. the more time that passes between the beginning of stroke symptoms and a plan to recanalise the affected blood vessel, the more brain cells are going to die. Currently, the administration of intravenous (IV) recombinant tissue plasminogen activator (rtPA) 0.9 mg/kg, given within 3 hours of symptom onset is the only approved acute stroke therapy based on the NINDS trial (Table 1) (1995b, Adams et al. 2007). At first, 10% of the total dose is given as an IV bolus,

HAMILTON·C2

Safe ventilation – at rest and on the move

Download the free simulation

Intelligent Ventilation

The HAMILTON-C2 is designed for adults and children requiring invasive or noninvasive ventilation support. Due to its compact design, a weight of only 9.5 kg, built-in batteries and an ultra-quiet turbine, this ICU ventilator can accompany your patient everywhere within the hospital, independently of central gas and power supplies. You do not have to disconnect a patient for transport, increasing patient safety and comfort, while at the same time reducing your workload. Hot-swappable extended batteries permit ventilator operation for a virtually unlimited period of time. Equipped with the Ventilation Cockpit, the HAMILTON-C2 provides exactly the information you need and helps you focus on what is important. You can customize the Cockpit to show conventional waveforms, an ASV graphic or the Dynamic Lung or the Vent Status panel. These Intelligent Panel graphics visualize the patient's ventilator status and dependency in an easy-to-understand form.

For further information: info@hamilton-medical.ch

www.hamilton-medical.com/C2

HAMILTON MEDICAL

followed by infusion of the remainder over 1 hour. The earlier this therapy gets applied, the better the outcome (good outcome=modified Rankin Scale 0-1 at 90 days, Odds Ratio (OR) 2.8 for treatment from 0-90 min, OR 1.6 within 90-180 min, OR 1.4 within 180-270 min) (Hacke et al. 2004). A variety of randomised trials investigating the effect of IV rtPA, IV urokinase, or IV streptokinase applied within different time windows up to 6 hours did not demonstrate any improvement of outcome (Table 1). Attempts to improve safety and efficacy as well as to extend the time window lead to two recent trials, DEDAS and DIAS, which tested IV desmoteplase, a thrombolytic agent derived from bat saliva with higher fibrin specificity and reduced likelihood for neuronal damage in ischaemic brain. MRI diffusion/perfusion mismatch was applied to determine the existence of an ischaemic core (already infarcted tissue) and a penumbra (potentially salvageable tissue) within a 9-hour time window. In these two phase II trials, the outcomes of the desmoteplase-treated patients were significantly better (Table 1) (Furlan et al. 2006; Hacke et al. 2005). However, the DIAS II trial that randomised 193 patients to placebo, IV desmoteplase 90 mcg/kg or 125 mcg/kg, did not demonstrate any difference in neurological outcomes and an increased mortality rate in the group with the higher dose of IV desmoteplase (Hacke W et al. presented at ESC 2007). Another study that investigated the treatment effect of IV rtPA versus placebo 3-6 hours after stroke onset also evaluated MRI diffusion and perfusion mismatch criteria. Between the treatment and placebo groups among all patients and in the patient group with a diffusion and perfusion mismatch, there was no difference in neurological outcome and mortality (Davis et al. 2008). The DIAS III and IV trial is about to start. The aim is to compare the neurological outcome at 90 days of patients randomised to IV desmoteplase 90 mcg/kg or placebo 3 to 9 hours after symptom onset based on CT or MRI criteria including demonstration of arterial narrowing or occlusion on CT or MR Angiogram.

With advancements in the field of interventional neuroradiology, the focus shifted to recanalisation of larger intracranial arteries and more severe strokes. The results of the PROACT I and II trials investigating the effect of intraarterially applied urokinase were promising, showing significantly better functional outcome and a higher recanalisation rate with the treatment compared to placebo. These hopeful results did not lead to approval of this management approach, though. Most stroke centres have developed protocols that offer intraarterial (IA) treatment with either rtPA, abciximab (Ng et al. 2008), mechanical devices such as the PENUMBRA clot aspiration system and concentric MERCI clot retriever (Bose et al. 2008; Flint et al. 2007; Smith et al. 2008), clot disruption with guidewires and microcatheters, acute balloon dilatation and stent application (Ng et al. 2008). The choice of treatment is based on the individual patient's vasculature. The time windows are usually 6-8 hours from symptom onset for the anterior circulation and 12-24 hours for the posterior circulation. The IMS trial is the only randomised study investigating the effect of bridging of IV and IA thrombolysis. Patients with acute ischaemic stroke receive IV rtPA standard dose or 0.6 mg/kg rtPA followed by IA rtPA, application of the MERCI device, the EKOS small vessel ultrasound infusion system delivering low intensity ultrasound, or a combination of either device with IA rtPA up to 22 mg.

The combination of high frequency ultrasound (2 MHz) delivered by transcranial Doppler sonography (TCD) with IV thrombolysis within 3 hours of symptom onset was found to be even more effective. The CLOTBUST (Combined Lysis of Thrombus in Brain Ischaemia using Ultrasound and Systemic TPA) trial randomised 126 patients with MCA occlusion that received IV-rtPA to continuous TCD or placebo monitoring. The patients undergoing TCD monitoring in addition to IV rtPA achieved significantly more complete recanalisation and/or dramatic clinical recovery within 2 hours as well as a trend to improved functional outcomes at 3 months (Table 1) (Alexandrov et al. 2004). Ultrasound transducers have been incorporated into catheters for intraarterial delivery of thrombolytic drugs, which generate a 360° circumferential pulse to add to the effect of intraarterial thrombolysis. Ultrasound enhanced thrombolysis can be further amplified by adding gaseous microspheres (micron–sized lipid or albumin shells that expand and give stronger reflected echos when exposed to ultrasound). The combination of IV thrombolysis, 2 MHz continuous ultrasound, and Levovist air microspheres (Bayer Schering AG, Berlin, Germany) in patients with acute MCA occlusion lead to high sustained recanalisation rates (55%) (Molina et al. 2006). While this area is being explored with ongoing phase I and II trials, a large, randomised, placebo-controlled trial, ECASS III, was published recently. The study demonstrated that the time window of IV thrombolysis with rtPA after acute ischaemic stroke can be successfully expanded. Patients were enrolled 3-4.5 hours after symptom onset to receive IV rtPA 0.9 mg/kg or placebo, the treatment group had significantly better functional outcomes at 3 months (Table 1) (Hacke et al. 2008). If the extension of the time window from 3 to 4.5 hours gets approved, this treatment will offer more benefit to patients with acute ischaemic stroke who do not make it to the hospital early.

ICU Care of Stroke Patients

Intensive care management of the stroke patient begins in the ED. Airway, breathing, and circulation should be assessed and managed. The patients should be intubated if they are unable to protect their airway due to oropharyngeal weakness.

Blood Pressure

When parts of the brain are ischaemic, then there are areas of disturbed autoregulation with tissue at risk and dependent on systemic blood flow for sufficient perfusion. This especially applies to patients with extra- and intracranial cerebral artery stenosis. Based on this background, several small studies postulated that induced hypertension with IV fluids and vasopressors may be beneficial in acute ischaemic stroke and is not associated with any severe adverse events (Hillis et al. 2003) (Schwarz et al. 2002). The vasopressor of choice is phenylephrine, a pure alpha-1 agonist. In absence of any randomised studies, the guidelines recommend to refrain from any blood pressure (BP) reduction, unless systolic BP exceeds 220 mm

Trial	Reference	N	Drug	Time from Stroke Onset	Early Death			Death/Dependency			Symptomatic Intracranial Haemorrhage			Details
					Drug (%)	Placebo (%)	P Value	Drug (%)	Placebo (%)	P Value	Drug (%)	Placebo (%)	P Value	
					At 7 days			At 3 months						
ASK	Donnan et al 1996	340	IV Streptokinase	<4 hours	17.8	10.9	unknown	42.3	44.6	NS	12.6	2.4	<0.01	Terminated early
					At 10 days			At 6 months						
MAST-E	MAST-E Study Group 1996	310	IV Streptokinase	<6 hours	34.0	18.2	P=0.002	79.5	81.8	NS	21.2	2.6	<0.001	Terminated early, Concomitant IV Heparin
					At 10 days			At 6 months						
MAST-I	MAST-I Group 1995	622	IV Streptokinase	<6 hours	26.5	11.7	<0.00001	62.6	64.7	NS	8.0	1.3	<0.01	Terminated early
					At 30 days			At 3 months						
ECASS 1	Hacke et al 1995	620	IV rtPA	<6 hours	17.9	12.7	NS	63.3	71.7	NS	19.8	6.5	<0.001	17.4% protocol violations
					At 30 days			At 3 months						
NINDS	NINDS rtPA Stroke Study Group 1995	624	IV rtPA	<3 hours	12.8	15.7	NS	57.4	73.9	<0.05	6.4	0.6	<0.001	Benefit up to 1 year (Kwiatkowski et al, 1999)
					At 7 days			At 3 months						
ECASS 2	Hacke et al 1998	800	IV rtPA	<6 hours	6.1	4.9	NS	59.7	63.4	NS	8.8	3.4	unknown	Patients with less severe strokes studied
					At 30 days			At 3 months						
ATLANTIS	Clark et al 1999	613	IV rtPA	3-5 hours	7.6	4.2	NS	58.3	59.5	NS	6.7	1.3	<0.001	
					At 10 days			At 3 months						
Chinese UK	Chen et al 2002	465	IV Urokinase	<6 hours	7.3	5.4	NS	40.0	41.2	NS	3.8	2.0	NS	
Cochrane Metaanalysis	Wardlaw et al 2003	5675	IV Streptokinase IV rtPA		14.9	9.4	<0.0001	53.3	58.0	0.004	8.7	2.5	<0.0001	
					At 90 days			At 3 months						
PROACT I	Del Zoppo et al 1998	46	IA Urokinase	<6 hours	26.9	42.9	NS	69.2	78.6	NS	15.4	14.3	NS	Change from high dose to low dose IV Heparin during the study, MCA occlusion only
					At 90 days			At 3 months						
PROACT II	Furlan et al 1999	180	IA Urokinase	<6 hours	25.0	27.0	NS	60.0	75.0	0.04	10.0	4.0	NS	MCA occlusion only
					At 90 days			At 3 months						
DEDAS	Furlan et al 2006	37	IV Desmoteplase	3-9 hours	6.9	12.6	NS	55.2	75.0	NS	0	0	NS	Based on diffusion/ perfusion mismatch on MRI
								At 3 months						
DIAS	Hacke et al 2005	104	IV Desmoteplase	3-9 hours			NS	61.3	77.8	NS	12	0		Based on diffusion/ perfusion mismatch on MRI
					At 90 days			At 3 months						
EPITHET	Davis et al 2008	101	IV rtPA	3-6 hours	25.0	14.0	NS	55.0	60.0	NS	7.7	0		Based on diffusion/ perfusion mismatch on MRI
					At 90 days			At 3 months						
CLOTBUST	Alexandrov et al 2004	126	IV rtPA to all patients,random-ised to continuous 2 MHz-TCD	3 hours	15.0	18.0		49.0	63.0	NS	4.8	4.8	NS	
					At 7 days			At 3 months, mRS>1						
ECASS III	Hacke et al 2008	821	IV rtPA	3-4.5 hours	2.9	3.2	NS	47.6	54.8	0.04	2.4	0.3	0.008	

Death and dependency was defined as modified Rankin score >2 in most studies. MCA = middle cerebral artery; MRI = magnetic resonance imaging

Table 1: Randomised controlled trials of intravenous/intraarterial thrombolysis in acute ischaemic stroke

Simple

Solid

Secure

GemStar® brings simplicity to a complex environment

Simple, solid and secure – The GemStar® Ambulatory Infusion System allows for Medication Management everywhere and at all times. Its small, lightweight design provides versatility for bedside infusion or ambulatory use. To meet your different clinical requirements, the GemStar® provides multiple program options from Pain Management to Variable Time Dosing Programming and TPN amongst others.

To learn more about the Hospira GemStar® Ambulatory Infusion System
visit www.hospira.com

Hospira

Advancing Wellness™

EMEA-GS-EN-1
Date of preparation: April 2008
EMEA 08/011

Hg and the diastolic BP 120 mm Hg (systolic >180 mm Hg, diastolic >110 mm Hg within 24 hours after thrombolysis) (Adams et al. 2007, 2008; Oliveira-Filho et al. 2003).

Glucose

Up to 60% of the patients have increased plasma glucose levels within the first 2 hours after stroke, about half of those have no history of diabetes mellitus. There is an association between hyperglycaemia and larger infarct volumes, increased mortality and poorer long term functional outcome after stroke as well as higher intracerebral haemorrhage rates. It is unclear whether hyperglycaemia is a marker of the severity of injury as stress response or a true cause of additional cerebral injury (Williams et al. 2002; Bruno et al. 2004; Capes et al. 2001; Baird et al. 2003; Gray et al. 2004).

The UK Glucose Insulin Stroke Trial (GIST-UK) randomised patients 933 patients within 24 hours of acute stroke to continuous glucose-potassium-insulin (goal: 4-7 mmol/L) or saline infusions for 24 hours. The trial was stopped prematurely due to slow enrolment and failed to demonstrate a difference in mortality and functional outcome at 90 days, but mean systolic blood pressure was significantly lower in the treatment group (Gray et al. 2007). As the benefit of maintaining euglycaemia has been substantiated in certain medical and surgical ICU patient populations (Van den Berghe et al. 2006), there is hope that other studies will show an advantage in functional outcome for patients kept normoglycemic in the future. In the meantime, severe hypoglycaemia <2.8 mmol/L should be treated with dextrose or 10-20% glucose infusions, serum glucose levels > 10 mmol/L should be lowered with insulin infusions according to the guidelines (Adams et al. 2007, 2008).

Fever

Increased body temperature after ischaemic stroke and neurological injury is significantly associated with higher mortality, worse functional outcome, and increased ICU and hospital length of stay (Greer et al. 2008). Fever should lead to a search of an infection focus, but routine use of antibiotics without a source of infection is not recommended (Adams et al. 2007, 2008). Several feasibility trials demonstrated that reduction of hyperthermia by means of pharmacological measures (paracetamol, nonsteroidal anti-inflammatory drugs), surface and intravascular cooling devices is safe. Shivering and rebound cerebral oedema remain of concern. Neurological performance tends to be improved at normal temperatures (Mayer et al. 2004), but so far it remains to be shown that maintenance of strict normothermia improves outcome after stroke.

Cerebral Oedema and Intracranial Pressure

Patients that experience neurological deterioration after a massive stroke should receive treatment for brain swelling and high intracranial pressure (ICP). For patients with large ICA or MCA infarctions

→ Continued on page 22.

References

Adams HP JR, Del Zoppo G, Alberts MJ, Bhatt DL, Brass L, Furlan A, Grubb RL, Higashida RT, Jauch EC, Kidwell C, Lyden PD, Morgenstern LB, Qureshi AI, Rosenwasser RH, Scott PA, Wijdicks EF (2007) Guidelines for the early management of adults with ischaemic stroke. Stroke, 38, 1655-711.

Aiyagari V, Diringer MN (2002) Management of large hemispheric strokes in the neurological intensive care unit. Neurologist, 8, 152-62.

Alexandrov AV, Molina CA, Grotta JC, Garami Z, Ford SR, Alvarez-Sabin J, Montaner J, Saqqur M, Demchuk AM, Moye LA, Hill MD, Wojner AW (2004) Ultrasound-enhanced systemic thrombolysis for acute ischaemic stroke. N Engl J Med, 351, 2170-8.

Baird TA, Parsons MW, Phanh T, Butcher KS, Desmond PM, Tress BM, Colman PG, Chambers BR, Davis SM (2003) Persistent poststroke hyperglycemia is independently associated with infarct expansion and worse clinical outcome. Stroke, 34, 2208-14.

Bose A, Henkes H, Alfke K, Reith W, Mayer TE, Berlis A, Branca V, SIT, SP (2008) The Penumbra System: a mechanical device for the treatment of acute stroke due to thromboembolism. AJNR Am J Neuroradiol, 29, 1409-13

Bruno A, Williams LS, Kent TA (2004) How important is hyperglycemia during acute brain infarction? Neurologist, 10, 195-200.

Capes SE, Hunt D, Malmberg K, Pathak P, Gerstein HC (2001) Stress hyperglycemia and prognosis of stroke in nondiabetic and diabetic patients: a systematic overview. Stroke, 32, 2426-32.

Davis SM, Donnan GA, Parsons MW, Levi C, Butcher KS, Peeters A, Barber PA, Bladin C, De Silva DA, Byrnes G, Chalk JB, Fink JN, Kimber TE, Schultz D, Hand PJ, Frayne J, Hankey G, Muir K, Gerraty R, Tress BM, Desmond PM (2008) Effects of alteplase beyond 3 h after stroke in the Echoplanar Imaging Thrombolytic Evaluation Trial (EPITHET): a placebo-controlled randomised trial. Lancet Neurol, 7, 299-309.

Dion JE (2004) Management of ischaemic stroke in the next decade: stroke centres of excellence. J Vasc Interv Radiol, 15, S133-41.

Diringer MN (2004) Treatment of fever in the neurologic intensive care unit with a catheter-based heat exchange system. Crit Care Med, 32, 559-64.

Douglas VC, Tong DC, Gillum LA, Zhao S, Brass LM, Dostal J, Johnston SC (2005) Do the Brain Attack Coalition's criteria for stroke centres improve care for ischaemic stroke? Neurology, 64, 422-7.

Flint A, Duckwiler GR, Budzik RF, Liebeskind DS, Smith WS (2007) Mechanical thrombectomy of intracranial internal carotid occlusion: pooled results of the MERCI and Multi MERCI Part I trials. Stroke, 38, 1274-80.

Flynn RW, Macwalter RS, Doney AS (2008) The cost of cerebral ischaemia. Neuropharmacology, 55, 250-6.

Gray CS, Hildreth AJ, Alberti GK, O'Connell JE (2004) Poststroke hyperglycemia: natural history and immediate management. Stroke, 35, 122-6.

Gray CS, Hildreth AJ, Sandercock PA, O'Connell JE, Johnston DE, Cartlidge NE, Bamford JM, James OF, Alberti KG (2007) Glucose-potassium-insulin infusions in the management of post-stroke hyperglycaemia: the UK Glucose Insulin in Stroke Trial (GIST-UK). Lancet Neurol, 6, 397-406.

Greer DM, Funk SE, Reaven NL, Ouzounelli M, Uman GC (2008) Impact of fever on outcome in patients with stroke and neurologic injury: a comprehensive meta-analysis. Stroke, 39, 3029-35.

Hacke W, Donnan G, Fieschi C, Kaste M, Von Kummer R, Broderick JP, Brott T, Frankel M, Grotta JC, Haley EC JR, Kwiatkowski T, Levine SR, Lewandowski C LU, M, Lyden P, Marler JR, Patel S, Tilley BC, Albers G, Bluhmki E, Wilhelm M, Hamillton S (2004) Association of outcome with early stroke treatment: pooled analysis of ATLANTIS, ECASS, and NINDS rt-PA stroke trials. Lancet, 363, 768-74.

EARLY GOAL DIRECTED CARE OF THE ACUTE ISCHAEMIC STROKE PATIENT:
A NURSING PERSPECTIVE

Heather Hand RN, CCRN, CNRN
Clinical Staff Nurse
Tampa, FL USA
sierrad3@yahoo.com

Marya Searcy RN, BSN, CCRN, CNRN
Clinical Staff Nurse
Tampa, FL USA

The authors work in a 32-bed neurosciences ICU, a state-of-the-art facility located at a level 1 trauma centre on the west coast of Florida.

As neuroscience nurses we encounter a multitude of challenges in caring for the acute stroke patient. Early goal directed treatment is the key to improving patients' long term outcomes. Our goal as the bedside practitioner, in conjunction with the medical staff, is to minimize cerebral injury and preserve pneumbral tissue.

Acute Ischaemic Stroke (AIS) is the third leading cause of death in the United States and literature cites the percentages of AIS to be upwards of 85%. In an ischaemic stroke, injury occurs when a region of brain tissue has a reduced blood flow for a period of time sufficient enough to cause ischaemia and infarction. The infarcted tissue, which is unsalvageable, is known as the umbra (infarct core) and the ischaemic tissue, which is hypoperfused, but not irreversibly damaged, is known as the penumbra. The timely restoration of blood flow to this penumbral tissue is the ultimate goal of all medical and nursing management.

In the care of the stroke patient, the bedside practitioner should allow the ABCs of assessment to guide their treatment and monitor their clinical exam.

Airway/Breathing

In close frequent patient assessment, airway management must always remain a priority. Intubation may be necessary for a Glasgow Coma Scale (GCS) of 8 or less. Frequent ABG's are necessary to follow PaO2 levels and CO2 levels, since these two values play a critical role in the ischaemic brain. The more alert stroke patient may only require supplemental oxygen to augment O2 delivery to the penumbral tissue.

Circulation

Careful monitoring of patients' vital signs is crucial. This valuable data may be one of the first signs of clinical neurological deterioration. AIS patients present with acute hypertension that often improves over the first 24-48 hours after symptom onset. Management of this hypertension can be labour intensive for the bedside nurse. In a patient who has received IV-tPA, the literature guides us to keep their BP <185/100 to prevent a haemorrhagic transformation, but one must be sensitive to a patient's baseline BP parameters to prevent decreasing penumbral perfusion, especially since this hypoperfused tissue loses its autoregulation abilities and perfusion is directly linked to the patient's Mean Arterial Pressure (MAP). IV Labetolol, Hydralazine, or Cardene are often used to manage this hypertension, secondary to their short-acting nature. When an ischaemic stroke patient does not qualify for tPA administration, the acute, often transient, hypertension is often only treated when the BP is over 220/110. Literature recommends lowering BP by 15% while closely monitoring patients for symptoms of clinical deterioration. The guidelines suggest restarting patients' home antihypertensive regimen on day 2 if they are neurologically stable. Positioning the head of the bed flat to 15 degrees can augment circulation to the ischaemic penumbra. This improves blood flow through often stenotic vessels and helps to improve collateral flow.

Temperature Management

Maintaining euthermia is important for the AIS patient. Fever is cited to dramatically worsen cerebral ischaemia and worsen long term patient outcomes. Antipyretics, such as acetaminophen are often standard practice, but frequently prove ineffective in controlling fever in the brain injured patient. The bedside practitioner, in conjunction with medical staff, must rule out possible sources of infection, while actively working to maintain euthermia or even mild hypothermia. Goal temperatures of 35-37 degrees Celsius have been shown to be neuroprotective in nature and can often be achieved through either surface cooling or intravascular temperature management modalities. In our experience, intravascular cooling has been the method of choice due to its speed, accuracy, and ease of use, with noted reductions in patient shivering. Hyperthermia has been shown to increase the release of neurotransmitters, increase oxygen free radical production, increase the blood brain barrier breakdown, and increase damage to the penumbral tissue secondary to ischaemic depolarisation and cellular calcium ion influx. Temperature management is a vital part of caring for the AIS patient.

Nutrition

In patients with AIS, it is prudent to assess swallowing function prior to initiating any PO intake. Early nutrition is important secondary to increased energy demands, and maintenance or replacement of albumin levels, which directly affect osmotic pressure, helping to keep fluid in the intravascular space. Placement of a nasogastric or feeding tube should be initiated within the first 24 hours of admission, followed by appropriate caloric assessment by a hospital dietician. Tight blood glucose control is imperative to prevent anaerobic metabolism and local cellular lactic acid production, which directly affects penumbral tissue.

Mobility /DVT Prophylaxis

Patients suffering from AIS are often immobile for the first several days of hospital admission and are at an increased risk for DVT/PE formation. Patients often receive SQ administration of Heparin or Lovenox, and also the application of sequential compression devices.

Fluid Volume Status

Maintaining euvolemia is essential to maintaining effective pneumbral circulation with the AIS patient. In our facility, we often account for insensible fluid loss by calculating a patients hourly output and replacing that output the next hour plus and extra 20ml of crystalloid solution. This diligent replacement of insensible fluid loss prevents the collapse of the thin walled arterioles of the ischaemic penumbra. Patients with extensive strokes with significant cerebral oedema may also require intermittent Mannitol administration or hypertonic saline (3% NS) administration to aid in the management of increased intracranial pressure. Acute ischaemic strokes in the posterior fossa region often require placement of an external ventricular device to help manage the symptoms of hydrocephalus from fourth ventricle outflow obstruction.

Acute Anticoagulation

There is conflicting information in the literature regarding the practice of anticoagulation therapy. In the past, it was standard practice to place patients with a history of atrial fibrillation or other high-risk conditions for secondary clot formation on IV Heparin therapy. Studies have shown that these older anti-coagulation practices put patient at a high risk for haemorrhagic transformation of the original injury and that heparin therapy does not aid in revascularisation of the initial injury site; it only decreases incidence of new clot formation. Early administration of antiplatelet drugs, such as aspirin and Plavix, has become the favoured approach in treating ischaemic strokes. If heparin therapy is initiated, careful patient and lab monitoring are essential. Hourly neurological assessments are essential to monitor for any clinical decline. The bedside nurse must be wary of the possibility of a haemorrhagic transformation. In the event this devastating event does occur, the Heparin must be shut off immediately, the MD notified, a head CT should be performed and the coagulopathy should be corrected to baseline.

Revascularisation Therapies

Revascularisation is the key to long term functional outcomes. There are several options available to AIS patients to reperfuse the occluded vessel, assuming they present to the hospital in the predetermined time frame, from the onset of stroke symptoms. If a patient presents within three hours of symptom onset and they meet all the inclusion criteria, they may receive IV-tPA in attempt to restore blood flow to the blocked artery. Literature states this drug may be administered outside of the standard three-hour window, but its efficacy is decreased dramatically. ER staff must be proactive and place several large-bore IV's, a Foley catheter, and a feeding tube before administering this medication, because once the IV-tPA is administered, all invasive procedures should be avoided for 24 hours secondary to the increased risk of bleeding. If a patient presents within six hours of symptom onset, intra-arterial TPA administration is an option coupled with other various cutting-edge interventional revascularisation therapies.

Conclusion

Ultimately the fate of the patient lies in the diligence of the bedside nurse and medical staff. Aggressive treatment, including oxygenation status, airway protection, blood pressure control, temperature management, frequent neurologic assessments, intracranial pressure management, anticoagulation therapy and good supportive nursing care make all the difference when it comes to salvation of the penumbral tissue. Decreasing stroke size is key to limiting a patients' lifelong disabilities, improving outcome, and ultimately, improving overall quality of life.

References

Adams H, Adams R, Del Zoppo G, et al. Guidelines for the early management of patients with ischaemic stroke: 2005 guidelines update a scientific statement from the Stroke Council of the American Heart Association/American Stroke Association. Stroke. Apr 2005;36(4):916-923.

Adams, RJ. et al., Update to the AHA/ASA recommendations for the prevention of stroke in patients with stroke and transient ischaemic attack. Stroke, 2008. 39(5): p. 1647-52.

Benavenot, Oscar, Hart, Robert. Stroke:Part II. Management of Acute Ischaemic Stroke. America Family Physician. May 15, 1999.

Brott TG, Clark WM, Fagan SC. Stroke: The first hours. Guidelines for Acute Treatment. Stroke Association; 2000.

Gubitz G, Sandercock P, Acute ischaemic stroke. BMJ/ 2000;320:692-696.

Hewko C. Acute ischaemic stroke - swift assessment and quick action produce optimal outcomes. JAAPA July 2004;17:19-25.

Sterzi R, Candelise L, Gattinoni M, Bersano A, Micieli G. Stroke-unit care for patients with stroke. Lancet. Apr 14 2007; 369(9569):1255.

Saving Lives with the Use of Anti-Inflammatory Lipids

Alessandro Pontes-Aruda MD, MSc, PhD
Head of Intensive Care and Nutrition Department
Fernandes Tavora Hospital
Fortaleza, Ceara, Brazil

pontes-arruda@secrel.com.br

The use of an inflammation-modulating diet enriched with EPA, GLA and enhanced levels of anti-oxidant vitamins can modulate the systemic inflammatory response by several well documented mechanisms of action. The use of such formulation in the clinical setting has been tested for critically-ill patients with ALI and ARDS associated or not with severe sepsis and septic shock and was associated with numerous benefits including impressive improvements in the oxygenation status, enhanced ICU and mechanical ventilation-free days and important reduction in mortality rates.

Acknowledgements of Connections

Dr. Pontes-Arruda has served as a paid consultant to Abbott Nutrition International participating in advisory board activities and is currently scientific advisor for Baxter Healthcare. He also received research grants from Abbott Nutrition International and from Baxter Healthcare.

Introduction

Enteral nutrition is becoming an important adjuvant therapy in a variety of critically ill-treated diseases. Among available specialty formulations, the so-called "immune-enhancing" diets, which are supplemented with arginine as a common pharmaconutrient, have been extensively evaluated in clinical studies over the past two decades. Though a good deal of debate still exists in the clinical community regarding the potential role of such formulas, most authors agree that "immune-enhancing" diets should not be used routinely in critically ill patients[1]. On the other hand a new enteral formulation enriched with lipids possessing anti-inflammatory properties and with no added arginine has been used to modulate inflammation in the clinical setting. Moreover, since inflammation, through the release of arachidonic acid (AA) and its pro-inflammatory metabolites is considered the key feature of certain diseases such as ALI, ARDS and sepsis[2], the use of lipids such as eicosapentaenoic acid (EPA, from fish oil) and gamma-linolenic acid (GLA, from borage oil) to modulate the inflammatory response is gaining acceptance as an important improvement in the daily management of patients with acute lung inflammation requiring mechanical ventilation[3]. This enteral diet enriched with EPA, GLA and enhanced levels of antioxidant vitamins (mainly vitamins C and E) and containing no arginine, has recently been found to decrease morbidity and also mortality in critically ill, mechanically ventilated patients suffering from ALI and ARDS associated or not with severe sepsis and septic shock. This type of formula inhibits the systemic inflammatory response through several mechanisms. The first described mechanism of action is a decrease in the levels of arachidonic acid (AA), an omega-6 lipid involved in the production of various pro-inflammatory eicosanoids such as prostaglandin E2 (PGE2) and thromboxane A2 (TXA2). High levels of these AA-derived pro-inflammatory eicosanoids can produce systemic inflammation, enhanced chemotaxis and platelet aggregation, as well as microvascular thrombosis and immune suppression. EPA and GLA help decrease this inflammation by rebalancing proinflammatory and anti-inflammatory eicosanoid production. Most recently it has been demonstrated that inflammation modulating lipids can downregulate the activity of important transcription factors associated with the inflammatory response (such as NFkB) and are used as a substrate of resolvins, a new class of inflammatory mediators with actions associated with the resolution of the inflammatory response[4].

Summary of Clinical Benefits Associated with the Enteral Use of EPA and GLA

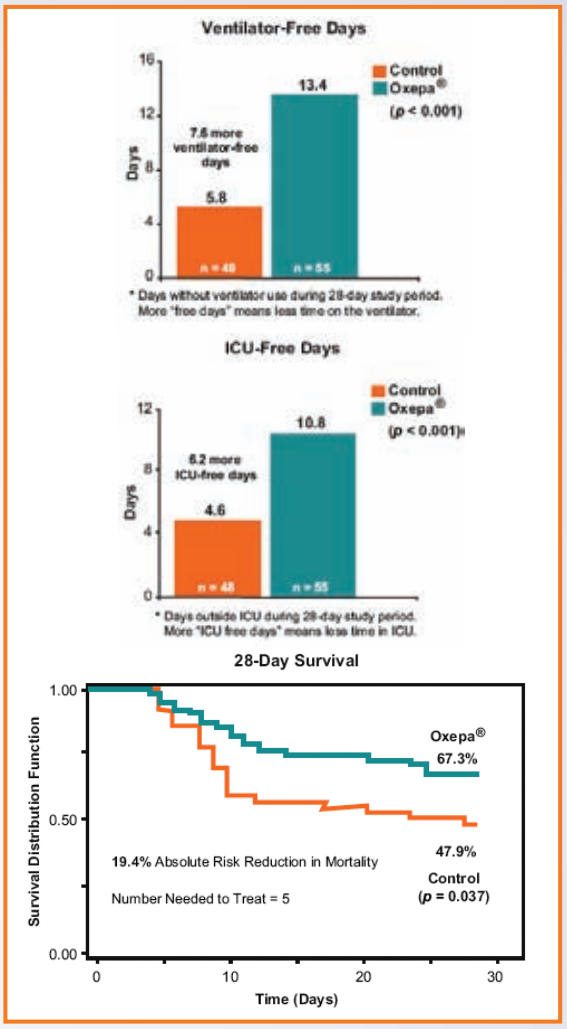
Three independently conducted, prospective, randomised controlled studies were performed using an enteral diet enriched with EPA+GLA and enhanced levels of antioxidant vitamins in patients suffering from ALI and ARDS either associated or not with severe sepsis and septic shock [5,6,7] Gadek and colleagues [5] randomised 146 patients with ARDS to receive enteral

nutrition with an EPA +GLA formula versus an isonitrogenous, isocaloric, high-lipid control diet that differed from the intervention diet only in terms of its lipid composition (although still a well balanced standard n-3/n-6 diet) and levels of antioxidant vitamins. The investigators demonstrated an important improvement in oxygenation status (described as the ratio of partial pressure of arterial oxygen [PaO_2] to percentage of inspired oxygen [FiO_2], or "P/F" ratio) by study day 4 and maintained until study day 7 in the population of patients fed the EPA+GLA diet, whereas the control group experienced no improvement. This important finding was associated with a reduction in the number of days patients required mechanical ventilation (11 days in the EPA+GLA group versus 16.3 days in the control group, p = .011) and a decrease in length of ICU stays (12.8 days in the EPA+GLA group versus 17.5 days in the control group, p = .016). Although there was a clear trend towards mortality reduction, this decrease was not statistically significant. This study also demonstrated an important decrease in the number of new organ failures in the population nourished with the EPA+GLA diet compared to the control population (8% versus 28%, p = .015).This is of particular importance since the development of multiple system organ failure is the pathway that leads from systemic inflammation to death.

Almost seven years later a second study was conducted in Israel by Singer and colleagues[6] in a population of critically ill patients suffering from ALI (with a P/F ratio below 300). This study also demonstrated important improvements in the oxygenation status of the patients nourished with the EPA+GLA diet, as well as an improvement in the static pulmonary compliance and resistance. In addition, patients receiving the EPA+GLA diet spent significantly fewer days on mechanical ventilation. But the most relevant finding in this second study was a clear reduction in 28-day all cause mortality; the survival rate was 72% for the EPA+GLA group versus 43% for the control group.

Shortly after Singer et al.published their findings, Pontes-Arruda and colleagues[7] published a trial using very same intervention and control diets from the previous studies in a population of 165 patients withARDS secondary to severe sepsis or septic shock. This third trial confirmed the same benefits already described, including an important improvement in the oxygenation status (P/F ratio), significant reduction in the number of days requiring mechanical ventilation, reduction in the number of days in the ICU and in the total number of new organ failures, as well as improvement in the survival rates of patients receiving the EPA+GLA diet (with an absolute reduction in mortality risk of 19.4%) (see figure 1).

Figure 1: *Summary of the clinical outcomes benefits for patients with severe sepsis and septic shock.*



Since the three studies used the same study and control diets and were performed in similar populations (critically ill and mechanically ventilated patients suffering from ALI/-ARDS), a meta-analysis evaluation of the outcomes was recently performed[3].The evaluation, which analysed results from 411 patients included in the three adult clinical studies, confirmed the benefits associated with the use of the EPA+GLA diet: improvement in oxygenation status, more ventilator-free days, more ICU-free days, less development of new organ failures and an impressive 60% reduction in the risk of mortality (OR = 0.404, 95% CI 0.201-0.985, p = 0.001). It is very important to notice that the currently available evidence supports the use of only one specific enteral formulation containing two anti-inflammatory lipids (EPA and GLA) with synergistic properties, as well as elevated levels of antioxidant vitamins. There is no evidence to suggest that an enteral formulation containing either EPA, GLA or antioxidants alone can produce similar clinical outcomes.

References on page 17.

James Lee, MS
Director, Medical Care Systems
Altarum Institute
Ann Arbor, Michigan, USA
jim.lee@altarum.org
www.altarum.org

Severe Sepsis Patients
Saving Lives and Costs

Patients with severe sepsis or septic shock can be treated more effectively with a diet rich in EPA, GLA, and antioxidants because it reduces days of intensive care and mechanical ventilation.

Severe sepsis is prevalent in medical intensive care units (ICU). It ranges from 10 to 27% of the ICU census for several European countries, and it continues to be a leading cause of death for these patients. The costs and economic benefits of treating these patients have not been clear until recently.

A technology assessment by Green and others (2006) of treating severe sepsis in the United Kingdom yielded the data in Table 1.

A Cost-Effective Treatment

Recent studies found notable benefits from an inflammation-modulating diet enriched with eicosapentaenoic acid (EPA), gamma-linolenic acid (GLA), and antioxidants (the ingredients found in Oxepa®). This diet, enterally fed to severe sepsis patients, reduced days in intensive care, time on mechanical ventilation, plus new organ failures and therefore reduced costs.

Element / Parameter	Value
Hospitalisation cost	€ 19,658*
Mean cost per ICU day	€ 1,576
Mean cost per day in other ward	€ 256
ICU length of stay	7.8 days
Overall length of stay	36.6 days
*Converted to euros using an exchange rate of 1.28 euros per pound	

Table 1. Severe Sepsis Survivor Costs

A study by Dr. Pontes-Arruda (2006) found the following clinical benefits of Oxepa for severe sepsis patients:

- Increased ICU-free days (from 4.6 to 10.8 for the 28-day study period)
- Absolute reduction in mortality of 19.4% and relative reduction of 38%

Other clinical studies (Gadek et al. 1999) also demonstrated that more expensive ICU days decreased significantly, although the overall length of stay did not decrease. Based on these studies, the observed 27% reduction in ICU days is applied to estimate savings. Table 2 also presents a calculation assuming only a one-day reduction in the ICU stay.

The economic analysis reported here follows the clinical protocol that the patients in Table 1 are enterally fed the immune-modulating diet. Thus, the cost of intervention is conservatively estimated to be the daily cost of the immune-

Category	Calculation	Savings
Cost of Intervention	€ 33 per ICU day x 7.8 days in ICU	€ 257.40
Reduction in ICU Stay	7.8 days in ICU x 27% Reduction	2.1 days
Difference in Cost of ICU and General Ward Day	€ 1,576 – € 256	€ 1,320 per ICU day
Estimated Cost Reduction	2.1 days x € 1,320 per ICU day avoided	€ 2,772
Estimated Savings After Cost of Intervention	€ 2,772 – € 257.40	€ 2,514.60 per patient

Table 2. Benefits of Oxepa Diet

modulating diet (appro ximately €33) less the cost of the standard diet.

The resulting return on investment (ROI) is 9.8:1, with a 2.1-day reduction in the ICU stay. Following similar calculations, ev en if the ICU reduction is only one da y, the estimated sa vings per patient is €1,062.60 with an R OI of 4.1:1. Table 3 summarizes data f or the UK, Ger many (Neilson et al., 2003) and Spain (Sacristan et al. 2004).

Country	Per Patient Savings (ROI) with 1-Day Reduction in ICU Stay	Per Patient Savings (ROI) with 27% Reduction in ICU Stay
United Kingdom	€ 1,063 (4.1)	€ 2,515 (9.8)
Germany	€ 1,153 (3.7)	€ 3,450 (13.1)
Spain	€ 726 (2.0)	€ 2,000 (7.2)

Table 3. Potential Per Patient Savings

For the United Kingdom and Ger many, with approximately 10,000 to 20,000 sev ere sepsis patients admitted to the ICU ann ually, this translates into €10.6 million to €21.2 million in potential annual savings, assuming only a one-day reduction in ICU stay, and €25 to €50 million, given the expected reduction in ICU da ys.

Acknowledgements of Connections

Mr. Lee is an employee of the non-profit Altarum Institute who has consulted with Abbott Laboratories to perform pharmacoeconomic analyses regarding diagnostic and n utritional products including Oxepa®.

The return on investment for enterally feeding Oxepa to severe sepsis patients in the ICU is at least 2 to 1; the lives saved are priceless

References - Severe Sepsis Patients - Saving Lives and Costs (James Lee)

Gadek J et al. (1999). Effect of enteral feeding with eicosapentaenoic acid, gamma-linolenic acid, and antioxidants in patients with acute respir atory distress syndrome. Crit Care Med 27:1409-1420.

Green C. et al. (2006). Evaluation of the cost-effectiveness of drotrecogin alfa (activated) for the treatment of sev ere sepsis in the United Kingdom. International Journal of Technology Assessment in Health Care, 22:1 90-100.

Neilson AR et al. (2003). Cost-effectiveness of drotrecogin alfa (activated) for the treatment of sev ere sepsis in Germany. Journal of Critical Care, 18(4): 217-227.

Pontes-Arruda et al (2006). Effects of enteral feeding with eicosapentaenoic acid, γ-linolenic acid, and antioxidants in mechanically ventilated patients with sev ere sepsis and septic shock. Crit Care Med 34:2325-2333.

Sacristan JA et al. (2004). Cost-effectiveness of drotrecogin alfa (activated) in the treatment of sev ere sepsis in Spain. Gaceta Sanitaria. 2004 Jan-Feb;18(1):50-7. (Spanish)

References - Saving Lives with the Use of Anti-Inflammatory Lipids (Alessandro Pontes-Arruda)

1. Heyland DK, Dhaliwal R. Immunonutrition in the critically ill: from old approaches to new par adigms. Intensive Care Med 2005 31:501-503.
2. al Saady NM, Blackmore CM, Bennett ED. High fat, low carbohydrate, enteral feeding lowers PaCO2 and reduces the- period of ventilation in artificially ventilated patients. Intensive Care Med 1998 15:290-195
3. Pontes-Arruda A, DeMichele S, Anand S, Singer P. The use of an inflammation-modulating diet in patients with acute lung injury and acute respiratory distress syndrome: a meta-analysis of outcome data. JPEN J Parenter Enteral Nutr 2008 32:596-605
4. Pontes-Arruda A. DeMichele SJ. Enteral nutrition with anti-inflammatory lipids in acute lung injur y and acute respiratory distress syndrome: is the evidence enough to change the clinical practice? In Vincent J.-L.(ed) 2009 Yearbook of Intensive Care and Emergency Medicine. 1st Ed. Berlin. Springer-Verlag, in press.
5. Gadek J, DeMichele S, Karlstad MD, et al. Effect of enteral feeding with eicosapentaenoic acid, gamma-linolenic acid, and antioxidants in patients with acute respir atory distress syndrome. Crit Care Med 1999 27:1409-1420
6. Singer P, Theilla M, Fisher H, et al. Benefit of an enteral diet enriched with eicosapentaenoic acid and gamma-linolenic acid in ventilated patients with acute lung injury. Crit Care Med 2006 34:1033-1038
7. Pontes-Arruda A, Aragão AMA, Albuquerque JD. Effects of enteral feeding with eicosapentaenoic acid (EPA), γ-linolenic acid and antioxidants in mechanically ventilated patients with severe sepsis and septic shock. Crit Care Med 2006 34:2325-2333

TEMPERATURE MANAGEMENT IN STROKE:

CURRENT AND FUTURE OPTIONS

Col. Rocco A. Armonda, MD

Director Cerebrovascular Surgery & Interventional Neuroradiology,
Neurocritical Care National Capital Neurosurgery Consortium
Bethesda, Maryland, USA

rocco.armonda@med.navy.mil
rarmonda@hotmail.com

Introduction

The combination of enhanced care provided by stroke units combined with advanced temperature technology allows for a more precise control of a patient's temperature with ultimately improved clinical outcomes. Temperature management has been an arduous, labour intensive process with traditional antipyretics and unregulated cutaneous cooling blankets. More recently the use of closed loop, self-regulating cutaneous hydrogel pads and endovascular cooling catheters have greatly improved the precision of temperature control and reduced the time and labour involved. Additional neuroendovascular and neurosurgical treatments have improved the ability to revascularise ischaemic patients as well as decompress life-threatening infarcts. However, room for improvement exists with life-threatening reperfusion haemorrhages, functional limitations after decompressive surgery, and secondary infarct extension.

Goals of Stroke Care

The goals in stroke care include, when possible, reversing the clinical deficit, limiting the zone of injury, and reducing increased intracranial pressure in the face of a large infarct. Hypothermia combined with modern neurointerventional techniques, and when indicated, decompressive hemicraniectomy can achieve these goals. Although no randomised control trial combining hypothermia for stroke care has been performed, 9 feasibility studies with 215 patients have demonstrated promising results. These have been single-centred studies with a variation in the time of cooling from 4-75 hours as recently reviewed by Polderman in the Lancet and others combining induced hypothermia with hemicraniectomy (Polderman 2008; Bardutzky and Schwab 2008; Oehm et al. 2006). This includes limiting secondary life-threatening oedema from severe middle cerebral artery infarcts. However, during the rewarming phase rebound intracranial pressure resulted in death in a third of patients (Georgiadia et al. 2002). This emphasises the need for precise, slow and controlled rewarming.

This suggests there is role for combined therapies as recently proposed by Dr. Juan Sahuquillo from the Department of Neurosurgery at Vall D'Hebron in Barcelona, Spain. In his pilot trial, Cool-Stroke, hypothermia was induced using endovascular cooling during the first 24 hours, with intracranial monitoring at 32-34°Celsius and was followed by hemicraniectomy in those patients who demonstrated >/= 5mm of midline shift during the subsequent days (Delgado et al. 2006). This proposed combination of treatments has several clinical and experimental supports. Meta-analysis of experimental data in stroke supports the role for 33°C to reduce infarct size. A dose-dependent relationship exists with response <35°C in infarct volume reduction (Van Der Worp et al. 2007).

Additional clinical support for this combined treatment has been reported by investigators in a safety trial of 25 patients with an improvement in functional outcomes when compared with hemicraniectomy alone. In Els' study, hemicraniectomy with hypothermia less than 35°C was applied with in 3 hours of a decompressive hemicraniectomy performed an average of 15 hours after presentation. Unlike other studies, no patients expired from intractable ICP during rewarming. No increased complications were noted in the hypothermia group and the overall mortality was lower than prior reports utilising hemicraniectomy or hypothermia alone. In addition to the early application of hemicraniectomy (14.9 +/- 5.6 hours) verses 24 hours in Georgiadias, 21 hours in Schwab, and 60 hours in Walz, mild hypothermia was applied (<35) vs. moderate (33°Celsius), with a rigorous standard ICU management. This included maintenance of corrected PaC02 36-40, glucose 120-150, mean arterial pressure 90-110, central venous pressure 8-12. In the hypothermia group 10 of the 12 patients achieved hypothermia with the use of endovascular cooling catheters and two patients with surface cooling. Patients were cooled for 48 hours with achieving target temperature within 1.5-3.5 hours, with continuous ear and oesophageal temperature monitoring. Controlled rewarming was performed no faster than one degree celsius/day. Hypothermia side-effects including pneumo-

nia, electrolyte changes (q 2 hour labs), hypotension (MAP<80), and cardiac effects including bradycardia and arrhythmias were controlled. No immediate differences in outcome were noted. However at 6 months there was a trend for improved results in hypothermia treated patients compared to hemicraniectomy alone with a NIHSSS (10 +/- 1 and 11+/-3) and Barthal Index (81 +/- 14 vs. 70 +/- 17) (Els et al. 2006).

Fever Control

The ICU is the perfect setting to apply temperature management in stroke care. Up to 47% of stroke patients will have a persistent temperature >38.5°C. Preventing fever as an initial step is a major accomplishment in limiting secondary injury. A high correlation exists for poor outcome, prolonged length of stay, and decreased functional recovery directly related to a patient's fever burden. In a recent comprehensive meta-analysis fever was associated with increased mortality, intensive care unit stay, hospital length of stay and lower functional recovery (Greer et al. 2008; Ginsberg and Busto 1998). This relationship of poor outcome is also seen in SAH with fever burden and independently associated with poor outcome and mortality, as well as fever in ICH with duration of fever >37.5°C associated with poor outcome especially in the first 72 hours.

Current Treatment Advances

Current advances in intensive care medicine, temperature control technology, and neuroendovascular treatment of stroke have created a pivotal opportunity to improve stroke care and outcome. In the US, a rapidly aging population, an increase in stroke risk factors and more sedentary lifestyles have led to the continued rise of stroke occurrence. Technology has advanced to include improvements in controlled, closed loop systems, both invasive and non-invasive, which allow precise temperature reduction, control and rewarming. These drastic technological modifications allow the inclusion of patients with traumatic brain injury and stroke in temperature management treatments, where they were generally excluded the in the past. The first line of temperature intervention in the neurologically compromised patients is in decreasing fever burden. In Diringer's report of 296 patients from 13 neurocritical care centres (The Neurocritical Care Fever Reduction Trial Group) was a prospective, randomised, non-blinded study comparing endovascular cooling using the CoolGuard/Cool Line central line catheter (n=142) to traditional surface techniques (n=154). This included patients with subarachnoid haemorrhage (41%), intracerebral haemorrhage (23%), ischaemic infarction (13%), or traumatic brain injury (24%). Temperature was >38 degrees Celsius on two occasions or for >4 hours continuous, and required central venous access. He demonstrated a significant 64% reduction in fever burden (2.87 vs. 7.92°C-hrs) and no higher rate of complications when compared to the standard use of a central line catheter. No increased rates of antibiotics, infections, sedatives or narcotics were noted. (Diringer et al. 2004).

In selected patients revascularisation can be performed with either chemical or mechanical thrombolysis, however, resulting devastating reperfusion haemorrhage limits the application of revascularisation. The advantage of hypothermia in preserving the blood brain barrier and limiting the risk for reperfusion haemorrhage presents a unique combined advantage.

The role for combination treatment includes the use of hypothermia with both endovascular and open surgical techniques. Specifically, endovascular revascularisation with both chemical and mechanical thrombolysis allows the use of revascularisation with neuroprotection afforded with hypothermia. Additional intraoperative use of hypothermia during revascularisation with selected extracranial-intracranial bypass patient allows cerebral protection during the anastamosis. The benefits from hypothermia include decrease metabolic rate, decrease inflammatory cascade, decrease 02 free radicals, excitotoxic neurotransmitters, and limited programmed cell death. Microdialysis monitoring during induced hypothermia was comparable to the beneficial effect of decompressive hemicraniectomy in a recent clinical study (Berger et al. 2008).

The use of hypothermia should be considered a spectrum of temperature control, which included moderate, mild, and normothermia. Different levels of ischaemia/infarction may require a different depth of hypothermia. The use of temperature control including normothermia is also significant for the strong association of poor outcome in stroke and fever.

A range of temperature management strategies is available for acute ischaemia stroke and includes moderate hypothermia (32-34°C), mild hypothermia (35°C), and maintenance of normothermia (</=37°C). The metabolic, electrolyte and hemodynamic changes associated with therapeutic hypothermia can be readily addressed in a modern ICU focused on stroke care and recovery. These changes are part of the expected side-effects associated with moderate hypothermia between 32-34°degrees Celsius and once managed enhance the neural recovery from injury and insult (Polderman 2004). This range of treatment options from normothermia to moderate hypothermia allows the tailored management for different stroke patients in different stages of their ischaemia.

Utilisation of Current Therapies

Recent large randomised studies have demonstrated improved neurological outcome after cardiac arrest. Significant acceptance and application has occurred in over 77% of Scandinavian countries with less than 25% application in most US centres (Polderman 2008). This is a problem not only with education, but changing healthcare implementation. Physicians tend to resist change. New techniques, procedures and standards progress slowly through medical circles due to this resistance. Overcoming institutions resistance requires coordinated leadership at many levels to include administration, nursing and physicians partici-

Cooling and Warming

From the Inside Out

THERMOGARD XP

Intravascular Temperature Management™

Alsius Intravascular Temperature Management has been recognized as superior to all other cooling methods for achieving and maintaining target temperature.[1]

- Superior temperature control
- Improved patient access
- Reduced nursing time
- Triple lumen central venous access

1 "Comparison of different cooling methods to induce and maintain normo-and hypothermia in ICU patients: a prospective intervention study", Hoedemaekers, et al. Critical Care 2007, 11:R91."

Xtra Power.
Superior Clinical Efficiency.

Visit our website for Indications for Use of Alsius Products by country.

ALSIUS

www.alsius.com

Temperature is Vital to Life™
Alsius is Vital to Temperature Management

104172 Rev A

pation. Through far-forward thinking individuals these ideas of limiting secondary neural injury in the vulnerable ischaemic brain is both practical and achievable.

More advanced therapeutic neuroendovascular procedures have also been combined with temperature management in stroke. Additional protocols have been designed combining hypothermia with neuroprotecting agents to enhance recovery, protect the brain blood barrier, limiting reperfusion haemorrhage and cerebral oedema. These include the combination of both mechanical and chemical thrombolysis with endovascular cooling: ICTUS-L, ICTUS-C and Cool-Aid II. During Cool-Aid II target was achieved in 13/18 patients, 5 limited due to shivering side effects. Current protocols using selective palm and sole surface rewarming combined with Demerol, Magnesium, Dexmetomidine and sedation protocols has limited the occurrence of shivering (Mayer, Neurocritical Care).

Recent use of endovascular devices has been reported to decrease the time and labour to achieve target temperature in malignant MCA stroke. In a series of 35 patients in over 5 years using an 8.5 French, 35 cm catheter (ICY, Alsius Corporation) closed-looped regulated induced hypothermia at 33°C (32.1-33.6) was performed. Patients were kept at target temperature >72 hours with a slow rewarm not exceeding 0.1°C/hr (duration of cooling 85 +/- 10 hours). Patients were cooled 17+/-9 hours after onset of their stroke with target achieved in 2.7 +/-0.6 hours. Mortality was reduced with a 57% survival and mean Barthel index of 65 (40-85), Rankin Score of 2.9 (Bardutzky and Schwab 2008; Els et al. 2006; Georgiadia et al. 2002). However, uncontrollable rebound ICP occurred in 11/35 patients resulting in death (Bardutzky and Schwab 2008).

Future Options

A novel advanced therapy has also been proposed by researchers at Columbia University in New York and Xuan Wu Hospital, Capital Medical University in Beijing China. Drs. John Pile-Spellman and Feng Ling are examining the application of simultaneous intra-arterial selective rapid cerebrovascular cooling with cold saline injection during revascularisation and cerebral angiography (Chen et al. 2008). This robust study incorporates MR-imaging, which assesses local brain temperature and metabolism, transcranial dopplers, cerebral angiography with intra-arterial cooling and neuropsychological assessments. This protocol involves the use of selective short-term early brain cooling (33-35°C) to avoid reperfusion haemorrhagic transformation and systemic side effects while also utilising advanced neuroimaging techniques to measure brain temperature and metabolic effects. The neuroimaging techniques utilise MR spectroscopy (3T) as MR-Thermometry and CBF measurements using cold saline as a contrast medium. They also plan to evaluate the neuropsychological effects of selective brain cooling on attention. Their proposal would utilise selective cerebral hypothermia as a bridging procedure prior to systemic hypothermia and as an adjunct to other neuroendovascular recanalisation techniques. Additionally, they would add a mean of anatomic localisation to measure different temperatures, metabolic rates and CBF in the brain whereby combining both physiologic and anatomic data in stroke management using selective hypothermia.

Conclusion

The future for hypothermia in stroke care will eventually lead to less invasive and more selective means of cooling the brain. Such techniques may include pharmacologic agents such as variations of H2S, which induced hypothermia in laboratory animals mimicking hibernation. Combining this with other revascularisation techniques increases the therapeutic window for other neurovascular and surgical therapies to perform neuro-rescue. Future enhanced multi-modal monitoring of patients with stroke who are undergoing induced hypothermia will better elucidate the metabolic crisis and role for combined therapies in this ever increasing and vulnerable population.

References

Bardutzky J and Schwab S. Endovascular Cooling for hypothermia after severe hemispheric stroke: Report of 5 years of experience: SCCM poster presentation Feb '08.

Berger C, Kiening K, Schwab S. Neurochemical Monitoring of Therapeutic Effects in Large Human MCA Infarctions. Neurocritical Care 2008.

Chen J et al. A novel approach to reduce hemorrhagic transformation after interventional procedures. Medical Hypothesis 2008.doi: 10.1016/j.mehy.2008.07.056.

Delgado P, Shuquillo J, Poca M A, Alvarez-Sabin J. Neuroprotection in malignant MCA infarction. Cerebrovascular Dis 2006:21 (suppl 2); 99-105.

Diringer MN, Neurocritical Care Fever Reduction Trial Group. Treatment of fever in the neurologic intensive care unit with a catheter-based heat exchange system. Crit Care Med 2004; 32: 559–64.

Diringer MN, Reaven NL, Funk SE, Uman GC. Elevated body temperature independently contributes to increased length of stay in the neurologic intensive care unit patients. Crit Care Med 2004; 32:1489-95.

Els T, Oehm E, Voigt S, Klisch J, Hetzel A., Kassubek J. Safety and Therapeutic Benefit of Hemicraniectomy Combined with Mild Hypothermia in Comparison with Hemicraniectomy Alone in Patients with Malignant Ischaemic Stroke. Cerebrovasc Dis; 21: 79-85,2006.

Georgiadia D, Schwarz S, Aschoff A, Scwab S. Hemicraniectomy and Moderate Hypothermia in patients with severe ischaemic stroke. Stroke 2002, 33:1584-1588.

Ginsberg MD, Busto R. Combating hyperthermia in acute stroke: A significant clinical concern. Stroke 1998; 28:529-34

Greer DM, Funk SE, Reaven NL, et al. The Impact of Fever on Outcome in Patients With Stroke and Neurologic Injury. A Comprehensive Meta-Analysis. Stroke 2008: epub ahead of print Aug. 1-15.

Kilpatrick MM, Lowry DW, Firlik AD, Yonas H, Marion DW. Hyperthermia in the neurosurgical intensive care unit. Neurosurgery 2000; 47:850-5, discussion 855-6.

Mayer SA, Sessler DI, eds. Therapeutic hypothermia, 1st Ed. New York: Marcel Dekker, 2005

Polderman KH. The Lancet 2008; Vol 371; 1955-69.

Polderman KH. Therapeutic hypothermia in the intensive care unit: Problems, Pitfalls, and Opportunities (review). Part 1: Indications and Evidence. Intensive Care Medicine 2004; 30:556-75.

Van Der Worp et al. Hypothermia in animal models of acute ischaemic stroke: A systematic review of and meta-analysis. Brain'07: 130: 3063-3074.

→ Continued from page 11.

less than 60 years old, hemicraniectomy will improve mortality and neurological outcome if performed within 48 hours of symptom onset (NNT 2) (Vahedi et al. 2007). Osmotherapy with IV mannitol or IV hypertonic saline given as bolus or continuous infusion and hypothermia (33-35°C) are treatment options for patients developing cerebral oedema who are not suitable for a hemicraniectomy. Monitoring of ICP in these patients may be misleading as development of midline shift to the other hemisphere and subsequent herniation may proceed while the ICP is normal.

Cerebellar infarction can cause secondary neurological deterioration due to additional brain stem ischaemia or development of cerebellar hemispheric swelling with hydrocephalus and compression of the brain stem. Delayed deterioration may be rapid, therefore the decision to intervene should be made early in the course. There are no randomised, controlled trials to evaluate timing or method of intervention. Small trials suggested a staged approach based on the appearance of the fourth ventricle:
1. Normal size and no neurological deterioration fi observation
2. Normal size and neurological deterioration of the patient fi external ventricular drain (EVD) if hydrocephalus, suboccipital decompression if no hydrocephalus
3. Compression, but no effacement of the fourth ventricle and no neurological deterioration (alert, awake) fi observation, suboccipital decompression and/or EVD at the time of neurological deterioration
4. Compression and effacement of the fourth ventricle fi immediate suboccipital decompression and EVD (Kirollos et al. 2001).

Another study suggested placing an EVD for management of obstructive hydrocephalus after cerebellar stroke and proceeding with suboccipital craniotomy if there is no clinical improvement (Jensen and St Louis 2005). However, there is usually brain stem compression at various degrees mandating suboccipital decompression early when neurological deterioration occurs.

Conclusion

The management concepts of acute ischaemic stroke in the ICU and the options for early reperfusion in a timely fashion are evolving. The current focus of ICU management includes neuromonitoring, adequate perfusion (BP), normoglycemia, normothermia, and early recognition of neurological deterioration with initiation of the appropriate surgical or medical treatment of brain swelling. The recent investigations in the field of early reperfusion involve expansion of the time window for IV thrombolysis, safer thrombolytics, and combination of IV, IA thrombolysis and different ultrasound techniques.

Hillis AE, Ulatowski JA, Barker PB, Torbey M, Ziai W, Beauchamp NJ, Oh S, Wityk RJ (2003) A pilot randomised trial of induced blood pressure elevation: effects on function and focal perfusion in acute and subacute stroke. Cerebrovasc Dis, 16, 236-46.

Jensen MB, St Louis EK (2005) Management of acute cerebellar stroke. Arch Neurol, 62, 537-44.

Kirollos RW, Tyagi AK, Ross SA, Van Hille PT, Marks PV (2001) Management of spontaneous cerebellar hematomas: a prospective treatment protocol. Neurosurgery, 49, 1378-86; discussion 1386-7.

Molina CA, Ribo M, Rubiera M, Montaner J, Santamarina E, Delgado-Mederos R, Arenillas JF, Huertas R, Purroy F, Delgado P, Alvarez-Sabin J (2006) Microbubble administration accelerates clot lysis during continuous 2-MHz ultrasound monitoring in stroke patients treated with intravenous tissue plasminogen activator. Stroke, 37, 425-9.

Ng PP, Stevens EA, Skalabrin EJ (2008) Novel intra-arterial strategies in the treatment of acute ischaemic stroke. J Med Imaging Radiat Oncol, 52, 201-7.

Oliveira-Filho J, Silva SC, Trabuco CC, Pedreira BB, Sousa EU, Bacellar A (2003) Detrimental effect of blood pressure reduction in the first 24 hours of acute stroke onset. Neurology, 61, 1047-51.

Roquer J, Rodriguez-Campello A, Gomis M, Jimenez-Conde J, Cuadrado-Godia E, Vivanco R, Giralt E, Sepulveda M, Pont-Sunyer C, Cucurella G, Ois, A (2008) Acute stroke unit care and early neurological deterioration in ischaemic stroke. J Neurol, 255, 1012-7.

Rosamond W, Flegal K, Furie K, Go A, Greenlund K, Haase N, Hailpern SM, Ho M, Howard V, Kissela B, Kittner S,Lloyd-Jones D, McDermott M, Meigs J, Moy C, Nichol G, O'Donnell C, Roger V, Sorlie P, Steinberger J, Thom T, Wilson M, Hong Y (2008) Heart disease and stroke statistics--2008 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation, 117, e25-146.

Saka O, Serra V, Samyshkin Y, McGuire A, Wolfe CC (2008) Cost-Effectiveness of Stroke Unit Care Followed by Early Supported Discharge. Stroke.

Schwarz S, Georgiadis D, Aschoff A, Schwab S (2002) Effects of induced hypertension on intracranial pressure and flow velocities of the middle cerebral arteries in patients with large hemispheric stroke. Stroke, 33, 998-1004.

Smith WS, Sung G, Saver J, Budzik R, Duckwiler G, Liebeskind DS, Lutsep HL, Rymer MM, Higashida RT, Starkman S, Gobin YP, Frei D, Grobelny T, Hellinger F, Huddle D, Kidwell C, Koroshetz W, Marks M, Nesbit G, Silverman IE (2008) Mechanical thrombectomy for acute ischaemic stroke: final results of the Multi MERCI trial. Stroke, 39, 1205-12.

Vahedi K, Hofmeijer J, Juettler E, Vicaut E, George B, Algra A, Amelink GJ, Schmiedeck P, Schwab S, Rothwell PM, Bousser MG, Van Der Worp HB, Hacke W (2007) Early decompressive surgery in malignant infarction of the middle cerebral artery: a pooled analysis of three randomised controlled trials. Lancet Neurol, 6, 215-22.

Van Den Berghe G, Wilmer A, Hermans G, Meersseman W, Wouters PJ, Milants I, Van Wijngaerden E, Bobbaers H, Bouillon R (2006) Intensive insulin therapy in the medical ICU. N Engl J Med, 354, 449-61.

Williams LS, Rotich J, Qi R, Fineberg N, Espay A, Bruno A, Fineberg SE, Tierney WR (2002) Effects of admission hyperglycemia on mortality and costs in acute ischaemic stroke. Neurology, 59, 67-71.

STOP with Disposables & GO GREEN with our Reusable

GELLI-ROLL®

Why hurt the environment and your checkbook by purchasing disposable blankets? The Gelli-Roll® is better for the Caregiver, the Patient and the Earth.

The Gelli-Roll®:

- **Keeps your patient normothermic**
- **Reduces red bag waste**
- **Is cost-effective**
- **Ensures patient comfort**

The Gelli-Roll® is a water blanket encapsulated within Akton® polymer pads. It may be used before, during and after surgery to maintain constant patient temperature.

For more information on the Gelli-Roll® and other CSZ products, please visit:

www.gelli-roll.com

Phone: 513-772-8810 ~ Toll Free: 800-989-7373 ~ Fax: 513-772-9119

CSZ
Cincinnati Sub-Zero

Warming/ Cooling Units

ECRI Institute
The Discipline of Science. The Integrity of Independence.

ECRI Institute is a totally independent nonprofit research agency designated as a Collaborating Center of the World Health Organization (WHO). Such organizations are appointed to contribute to WHO's public health mission by providing specialized knowledge, expertise, and support in the health field to the WHO and its member nations. ECRI Institute is widely recognized as one of the world's leading independent organizations committed to advancing the quality of healthcare with over 240 employees globally.

ECRI Institute is pleased to provide readers of ICU Management with sample information on Warming/Cooling Units from its Healthcare Product Comparison System (HPCS), which contains over 280 reports. The HPCS reports contain extensive information about the technology, its purpose, its principles of operation, stage of development specifications and reported problems. The Warming/Cooling Units comparison charts include ECRI Institute's 'Recommended Specifications' (generic templates) which can be used for comparison and tendering purposes. The comparative tables overleaf are extracted from ECRI's 2005 database and have additionally been reviewed and updated by the respective manufacturers.

For more information, visit www.ecri.org

Contact

ECRI Institute Europe
Weltech Centre, Ridgeway Welwyn Garden City,
Herts AL7 2AA, United Kingdom
Tel. +44 (0)1707 871511
Fax. +44 (0)1707 393138
info@ecri.org.uk www.ecri.org.uk

[1]These recommendations are the opinions of ECRI Institute's technology experts. ECRI Institute assumes no liability for decisions made based on this data.

SUPPLIER	ECRI Institute's Recommended Specifications[1]	Cincinnati Sub-Zero
MODEL	Full-Body Warming/Cooling Units	Blanketrol II Model 222R
WHERE MARKETED		Worldwide
FDA CLEARANCE	Preferred	Yes
CE MARK (MDD)	Preferred	Yes
APPLICATIONS	Total-body heating/cooling	Hypo/hyperthermia, total-body warming/cooling
PADS		
Joint/limb		Yes
Full body, adult	Required	Yes
Full body, pediatric	Required	Yes
Size, cm (in)		Various sizes available
Blanket/pad material	Plastic preferred	Not specified
Reusable/disposable		Reusable and disposable available
MODES OF OPERATION		
Manual		Yes
Automatic		Yes
Monitor only		Yes
DISPLAY TYPE	Any type	Color-coded LED
FUNCTION INDICATORS		Manual, auto, monitor, alarm silence, test lights, status, outlet water temperature, patient temperature, set point, lighted on/off switch, paddle-wheel flow indicator
RESERVOIRS		
Number	≥1	2
Capacity, L (gal)		7.5 (2)
TYPE OF FLUID		Distilled water
FLOW, L/hr (gal/hr)		121.1 (36)
Flow indicator	Preferred	Visual, Audible
CONNECTORS		
Number	Varies	3
Integral connector	Preferred	Yes
Strain relief	Preferred	Yes
TEMPERATURE SCALE READOUT	Celsius and Fahrenheit preferred	Celsius, Fahrenheit (F - 115v only)
FLUID TEMPERATURE RANGE, °C (°F)	0-43 (32-109.4)	4-42 (39.2-107.6)
AUTO MODE PATIENT TEMPERATURE RANGE, °C (°F)	30-40 (86-104)	30-40 (86-104)
SAFETY THERMOSTATS		
High limit, °C (°F)	≤43 (≤109.4)	42 (107.6), 45 (113), 46 (114.8)
Low limit, °C (°F)	0 (32)	1 (33.8), 3 (37.4), 4 (39.2)
ALARMS		
High-temperature fluid limit	Required, audible	Visual, audible
Low-temperature fluid limit	Preferred, audible	Visual, audible
Patient temperature set	Optional	Visual
Low fluid	Required	Visual, audible
H_2O temperature sensor	Required	Visual, audible
Patient temperature probe	Required	Visual, audible
ALARM SILENCE	Not recommended	Yes, except during high-/low-temperature condition
H x W x D, cm (in)		91.4 x 43.2 x 43.2 (37 1/2 x 17 x 17)
WEIGHT, kg (lb)		59.4 (131)
LINE POWER, VAC		115; optional 100/230/240
HEATER POWER, W		800
PURCHASE INFORMATION		
Unit price		Not specified
Blanket/pad price		
Warranty	Required	2 years
Delivery time, ARO		1-3 weeks
Year first sold		1982
Fiscal Year		January to December
OTHER SPECIFICATIONS		Control-panel test button; shutdown alarm; male/female connectors; calibration tester; R-134a refrigerant; low dB; microprocessor control with board-exchange program; optional RS232 (115v only). Meets requirements of CSA, IEC 601-1, TUV, and UL 416.
LAST UPDATED		Nov-08

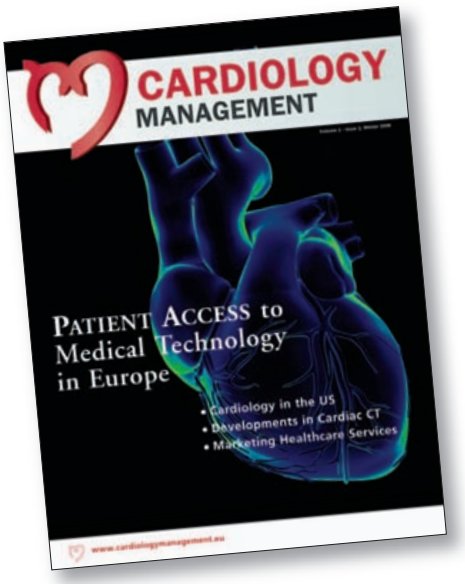
Blanketrol III Model 233	Electri-Cool II Model 767	Micro-Temp LT Model 749	Norm-O-Temp Model 111	Portable Cold Therapy Model 707
Worldwide	Worldwide	Worldwide	Worldwide	Worldwide
Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	No
Hypo/hyperthermia, total-body warming/cooling	Localized cooling	Localized cooling	Hyperthermia, total-body warming	Localized cooling
Yes	Yes	Yes	Yes	Yes
Yes	No	No	Yes	No
Yes	No	No	Yes	No
Various sizes available	Various sizes available	Various sizes available	Various sizes available	Various sizes available
Not specified	Not specified	Not specified	Not specified	Not specified
Reusable and disposable available	Reusable and disposable available	Reusable and disposable available	Reusable and disposable available	Reusable and disposable available
		Yes		
Yes	Yes	No	Yes	Yes
Yes	No	Yes	No	No
Yes	N/A	N/A	No	No
Color-coded LED	LED	LED	LED	Temperature strip
Manual, auto, gradient 10°C, gradient variable, smart mode, monitor, alarm silence, test lights, status, outlet water temperature, patient temperature, set point, lighted on/off switch, paddle-wheel flow indicator	Set point, outlet water temperature	Set point, outlet water temperature	Set point, outlet water temperature, lighted on/off switch, paddle-wheel flow indicator	Temperature, 4-position temperature selector
2	1	1	2	1
7.5 (2)	0.35 (0.1)	0.9 (0.24)	5.7 (1.5)	4.5 kg ice with 2.1 L water
Distilled water	Distilled water	Distilled water	Distilled water	Water
121.1 (36)	38 (10) - through pad	83 (22)	102.2 (27)	4-19 (1-5)
Visual, Audible	No	No	Visual	No
3	1	1	2	1
Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes
Celsius, Fahrenheit	Celsius, Fahrenheit	Celsius, Fahrenheit	Celsius, Fahrenheit	Celsius, Fahrenheit
4-42 (39.2-107.6)	5-13 (40-55)	20-42 (86-107)	20-42 (68-107.6) or 20-41 (68-105.8)	2-13 (35.6-55.4)
30-40 (86-104)	N/A	N/A	N/A	N/A
42 (107.6), 45 (113), 46 (114.8)	N/A	43-47 (109.4-116.6), 44-50 (111.2-122)	42 (107.6), 43.5 (110.3), 44.5 (112.1), 46 (114.8)	N/A
1 (33.8), 3 (37.4), 4 (39.2)	3 (37.4)	N/A	N/A	Not specified
Visual, audible	N/A	N/A	Visual, audible	N/A
Visual, audible	Visual, audible	No	No	N/A
Visual	N/A	N/A	N/A	N/A
Visual, audible	No	No	Visual	N/A
Visual, audible	Audible	Audible, Visual	Visual, audible	N/A
Visual, audible	N/A	N/A	N/A	N/A
Yes, except during high-/low-temperature condition	No	No	Yes	N/A
95.3 x 43.2 x 43.2 (37.2 x 17 x 17)	30.5 x 15.2 x 30.5 (12 x 6 x 12)	20.8 x 24.9 x 23.1 (9.1 x 9.8 x 8.2)	47 x 22.9 x 38.1 (18.5 x 9 x 15)	26.7 x 39.4 x 19.1 (10.5 x 15.5 x 7.5)
59.4 (131)	7 (13)	4.2 (9)	15.2 (33.5)	2.5 (5.5)
115; optional 100/230/240	115; optional 220/100	100/115, 220/240	115; optional 100/230	115
800	N/A	150	800	N/A
Not specified	Not specified	Not specified	Not specified	Not specified
2 years	1 year	1 year	1 year	N/A (one-patient use)
1-3 weeks	3-5 days	3-5 days	1-3 weeks	3-5 days
2006	2004	Not specified	1986	Not specified
January to December	January to December	January to December	January to December	January to December
Control-panel test button; shutdown alarm; male/female connectors; calibration tester; R-134a refrigerant; low dB; microprocessor control with board-exchange program. Meets requirements of CSA, IEC 601-1, TUV, and UL 416.	Thermoelectric cooling. UL approved.	Meets requirements of GS, UL, and TUV approved.	Male/female connectors; high flow rate; low dB level for silent operation; microprocessor control; optional stand with IV pole or low-profile stand available. Meets requirements of CSA, IEC 601-1, and UL 544.	CUL and UL approved.
Nov-08	Nov-08	Nov-08	Nov-08	Nov-08

SUPPLIER	ALSIUS	ALSIUS	Innercool Therapies, Inc.
MODEL	CoolGard 3000®	Thermogard XP™	CoolBlue Surface Pad System
WHERE MARKETED	38 countries in North America, South America, Europe, Asia Pacific	38 countries in North America, South America, Europe, Asia Pacific	United States, Austria, Germany, Italy
FDA CLEARANCE	Yes	Yes	Yes
CE MARK (MDD)	Yes	Yes	Yes
APPLICATIONS	Total-body heating/cooling	Total-body heating/cooling	Total-body heating/cooling
PADS	N/A: Intravascular Temperature Management	N/A: Intravascular Temperature Management	3 Types (S/M, L/XL, and Thigh Replacement)
Joint/limb	N/A: Intravascular Temperature Management	N/A: Intravascular Temperature Management	Leg Pads
Full body, adult	N/A: Intravascular Temperature Management	N/A: Intravascular Temperature Management	Torso and Leg Pads
Full body, pediatric	N/A: Intravascular Temperature Management	N/A: Intravascular Temperature Management	
Size, cm (in)	N/A: Intravascular Temperature Management	N/A: Intravascular Temperature Management	S/M (accommodates patients up to 100 kg) & L/XL (>100 kg)
Blanket/pad material	N/A: Intravascular Temperature Management	N/A: Intravascular Temperature Management	Blanket Material
Reusable/disposable	N/A: Intravascular Temperature Management	N/A: Intravascular Temperature Management	Disposable
MODES OF OPERATION			Three Types
Manual	Yes	Yes	10-50°C
Automatic	Yes	Yes	30-43.5°C
Monitor only	N/A	N/A	10-50°C
DISPLAY TYPE	6.4" LCD color display screen	6.4" LCD color display screen	Amber LED
FUNCTION INDICATORS	Patient temperature, target temperature, programmed rate of patient temperature change, patient temperature alarm settings, coolant bath temperature, operational mode (Run or Standby), current date and time.	Patient temperature, target temperature, programmed rate of patient temperature change, patient temperature alarm settings, coolant bath temperature, operational mode (Run or Standby), current date and time.	All Operation, Temperature, and Safety functions indicated
RESERVOIRS			Dual Compartment
Number	1	1	2
Capacity, L (gal)	2 L (0.5 gal)	2 L (0.5 gal)	7.5 L or 2 gallons
TYPE OF FLUID	Propylene glycol/Distilled water (50/50 mixture)	Propylene glycol/Distilled water (50/50 mixture)	Distilled Water
FLOW, L/hr (gal/hr)			36-42 gal/hour
Flow indicator	Yes	Yes	Audible and Visual
CONNECTORS			6 total
Number	2	2	6
Integral connector	Yes	Yes	
Strain relief	No	No	
TEMPERATURE SCALE READOUT	Celsius and Fahrenheit	Celsius and Fahrenheit	Celsius and Fahrenheit
FLUID TEMPERATURE RANGE, °C (°F)	0.5 - 42 (32.9 - 107.6)	0.5 - 42 (32.9 - 107.6)	4-42 (39.2-107.6)
AUTO MODE PATIENT TEMPERATURE RANGE, °C (°F)	31 - 38 (87.8 - 100.4)	31 - 38 (87.8 - 100.4)	30-43.5 (86-110.3)
SAFETY THERMOSTATS			
High limit, °C (°F)	44°C (111.2°F)	44°C (111.2°F)	44°C, 111.2°F
Low limit, °C (°F)	-1.5°C (29.3°F)	-1.5°C (29.3°F)	2°C, 35.6°F
ALARMS			
High-temperature fluid limit	Yes, audible and on-screen message	Yes, audible and on-screen message	Audible and Visual
Low-temperature fluid limit	Yes, audible and on-screen message	Yes, audible and on-screen message	Audible and Visual
Patient temperature set	Yes, audible and on-screen message	Yes, audible and on-screen message	Audible and Visual
Low fluid	Yes, audible and on-screen message	Yes, audible and on-screen message	Audible and Visual
H_2O temperature sensor	N/A	N/A	Audible and Visual
Patient temperature probe	Yes, audible and on-screen message	Yes, audible and on-screen message	YSI 400 compatible
ALARM SILENCE	Yes, silence limited to 2 minute duration, at which time audible alarm resumes	Yes, silence limited to 2 minute duration, at which time audible alarm resumes	Yes
H x W x D, cm (in)	114cm x 43cm x 76cm (45" x 17" x 30")	114cm x 43cm x 76cm (45" x 17" x 30")	95 x 43 x 43
WEIGHT, kg (lb)	52kg (115lb.)	52kg (115lb.)	55, 122lbs
LINE POWER, VAC	115VAC or 230VAC, user selectable	115VAC or 230VAC, user selectable	115 or 230
HEATER POWER, W	1,500 watts	1,500 watts	800
PURCHASE INFORMATION			
Unit price	$36,000	$36,000	Contact: info@innercool.com
Blanket/pad price			Contact: info@innercool.com
Warranty	Includes all parts, labor and travel expenses	Includes all parts, labor and travel expenses	2 years
Delivery time, ARO			7-14 days
Year first sold			2007
Fiscal Year			
OTHER SPECIFICATIONS	Screen articulation: 180° swivel, 45° tilt; Data interface: Serial RS-232C; Alarm displays: All alarms are audible and display an on-screen text message; Patient temperature output signal: Conforms to YSI 400 standard	Screen articulation: 180° swivel, 45° tilt; Data interface: Serial RS-232C; Alarm displays: All alarms are audible and display an on-screen text message; Patient temperature output signal: Conforms to YSI 400 standard	
LAST UPDATED	Nov-08	Nov-08	Nov-08

CARDIOLOGY MANAGEMENT

for Cardiology Management

Free Subscription Form



How to Subscribe?

- Send an email with name and address to office@cardiologymanagement.eu;
- Complete this form and post it to 28, rue de la Loi - B-1040 Brussels - Belgium;
- Complete this form and fax it to +32 2 286 8508.

Title & First Name:

Surname:

Job Title:

Institution:

Address:

Postcode & City:

Country:

Telephone:

Email:

Medical Doctors (respond below)

1. What is your occupation? (check only one)
   - Chief Cardiologist
   - Other Physician (please specify)

1a. What is your Cardiology sub-specialty? (check only one)
   - General Cardiology
   - Interventional Cardiology
   - Cardiac Radiology (Cardiac MRI, Echography, Cardiac CT)
   - Cardiac Surgery/ Cardiovascular Surgery
   - Paediatric Cardiology
   - Other (please specify)

1b. I am Chief of my Department
   - Yes
   - No

Non-physician professionals (respond below)

1c. What is your occupation? (check only one)

Administrator/Manager:
   - Cardiology Administrator
   - Cardiology Business Manager
   - Cardiology PACS Administrator

Executive
   - Chief Information Officer / IT Manager
   - Chairman / Managing Director
   - Director
   - Chief Financial Officer / other executive titles

Other
   - Medical Physicist
   - Academic
   - Chief Technologist
   - Manufacturer
   - Business Consultant
   - Distributor / Dealer

All respondents reply to the questions below

2. In what type of facility do you work? (check only one)
   - Private clinic
   - Hospital (check number of beds)
   - More than 500 beds
   - 400-499 beds
   - 300-399 beds

3. How many beds is your ward equipped with?
   - More than 30 beds
   - 15 - 30 beds
   - Less than 15 beds

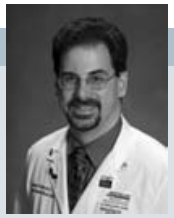
4. With what technologies or disciplines do you work? (check all that apply)
   - Echography
   - Interventional Cardiology
   - Angiography
   - Cardiac CT
   - Cardiac MRI
   - Cardiology PACS

5. What is your role in purchasing
   - Final say
   - Influence
   - No role

FAX BACK TO +32 2 286 8508

THE AGING OF OUR ICUs PART II

THE GERIATRIC TRAUMA TEAM: THE CUTTING EDGE OF ELDER TRAUMA CARE



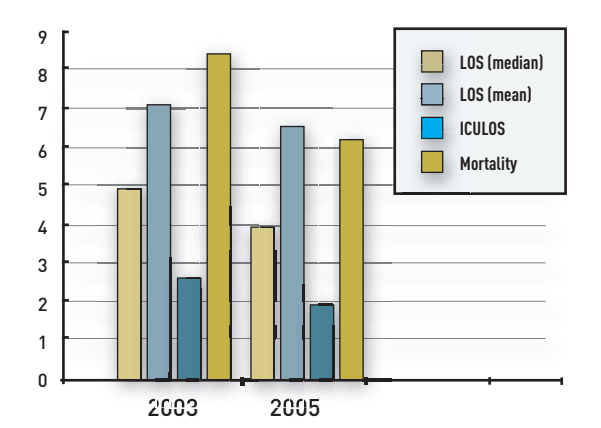
Robert D. Barraco, MD, MPH

Section Chief
Geriatric Trauma
Lehigh Valley Hospital
Allentown, Pennsylvania, USA
robert_d.barraco@lvh.com

In this, our second in a series of articles concerning the impact of the aging population in our ICUs, we address the care of the injured elderly. The elderly pose unique problems for trauma care providers. Elder trauma patients have significantly higher mortality than younger patients, and they have significantly longer ICU and hospital length of stay when stratifying by Injury Severity Score (ISS) (Taylor et al. 2002).

It makes sense that they be treated in a trauma centre. The Eastern Association for the Surgery of Trauma (EAST), in its practice management guideline on geriatric trauma, recommended that advanced patient age should lower the threshold for field triage directly to a trauma centre (www.east.org, 2002, Level II). A 2001 paper by Demetriades et al. even recommended that all patients age 70 and over should be full trauma activations. This is consistent with the level III recommendation from EAST that, with the exception of patients who are moribund on arrival, an initial aggressive treatment approach should be pursued with the elderly trauma patient.

Figure 1. Consultation protocol.



How do we go about making an accurate prognosis in the elder trauma patient? The existing scoring systems do not perform well in the elderly. Both pre-existing medical conditions and complications contribute to the increased mortality. The 2002 EAST guideline states that the presence of pre-existing medical conditions in elderly trauma patients adversely affects outcome. Post-injury complications in the elderly trauma patient also negatively impact survival and contribute to longer lengths of stay in survivors and non-survivors compared to younger trauma patients. The Gubler-Charlson Comorbidity Index seemed to have good correlation with outcome in the elderly (Gubler et al. 1997), but attempts at prognostic scores for the geriatric trauma patient have not been successful to date. One score incorporated complications, but this did not have usefulness for early prognostication as one would have to wait till those complications occurred to calculate the score (DeMaria et al. 1987). An aid in estimating prognosis, the EAST guideline contained several level III recommendations. In patients 65 years of age and older a GCS < 8 is associated with a dismal prognosis; therefore, consideration should be given to limiting further aggressive therapeutic interventions if substantial improvement in GCS is not realised within 72 hours of injury. Patients ≥65 years of age with a trauma score < 7 or an admission respiratory rate <10 have a 100% mortality rate. Consideration should be given to limiting aggressive therapeutic interventions in these groups as well. In a large National Trauma Data Bank study, patients with severe chest and/or abdominal

injury, moderate to severe head injury, admission SBP less than 90 mm Hg, and significant base deficit had mortalities approaching 100% (Nirula et al. 2004). Even older patients with modest shock and mild to moderate head injury admitted with severe chest and/or abdominal injury had a less than 5% chance of survival.

Considering the poorer prognosis in the elderly, The American Trauma Society Leadership Forum called for the integration of palliative care and critical care. They also petitioned the American College of Surgeons Committee on Trauma to require palliative care services at all trauma centres. Recommendations were made for the development of curricula for present and future practitioners as well as the public about palliative care.

So what can we do to improve these poorer outcomes in the elder trauma patient? As mentioned in our previous instalment, the American Geriatrics Society supports the concept of interdisciplinary management. Their position statement clearly establishes the utility of interdisciplinary care in the treatment of the elderly patient. Expanding on this concept, the John A. Hartford Foundation has supported the Geriatric Interdisciplinary Team Training program. Their concept is simple: "Patients with multiple conditions rely on healthcare professionals from a variety of disciplines. This is often the case with elderly patients. Studies show that complex patients manage better when their doctors, nurses, gerontologists, pharmacists--every health professional involved in their care (including the patient!)-**work together** as a team to develop a smart plan of care." In addition, the use of Geriatric Resource Nurses and Acute Care of the Elderly (ACE) units are recommended (www.gittprogram.org).

This support for interdisciplinary management has led to studies of a new paradigm of care for the elder trauma patient. Several studies from the orthopaedic literature examined the use of interdisciplinary management to improve outcomes. Khasraghi et al. (2005) utilised the team approach in their article and found that patients treated as part of a multidisciplinary hip fracture service had fewer medical complications (36% vs. 51%), more often had surgery within 24 hours (63% vs. 35%), and had shorter hospital stays (mean, 5.7 days vs. 8.1 days) than patients treated before the hip fracture service. Consistent with these findings, a comprehensive orthogeriatric approach was found to improve functional outcomes following hip fracture as compared with the common two-step model of orthopaedic surgery followed by transfer to a geriatric rehabilitation facility (Adunsky et al. 2003). Collaborative care or orthopaedic-geriatric co-care for older patients with hip fracture was found to be associated with significant reductions in morbidity and

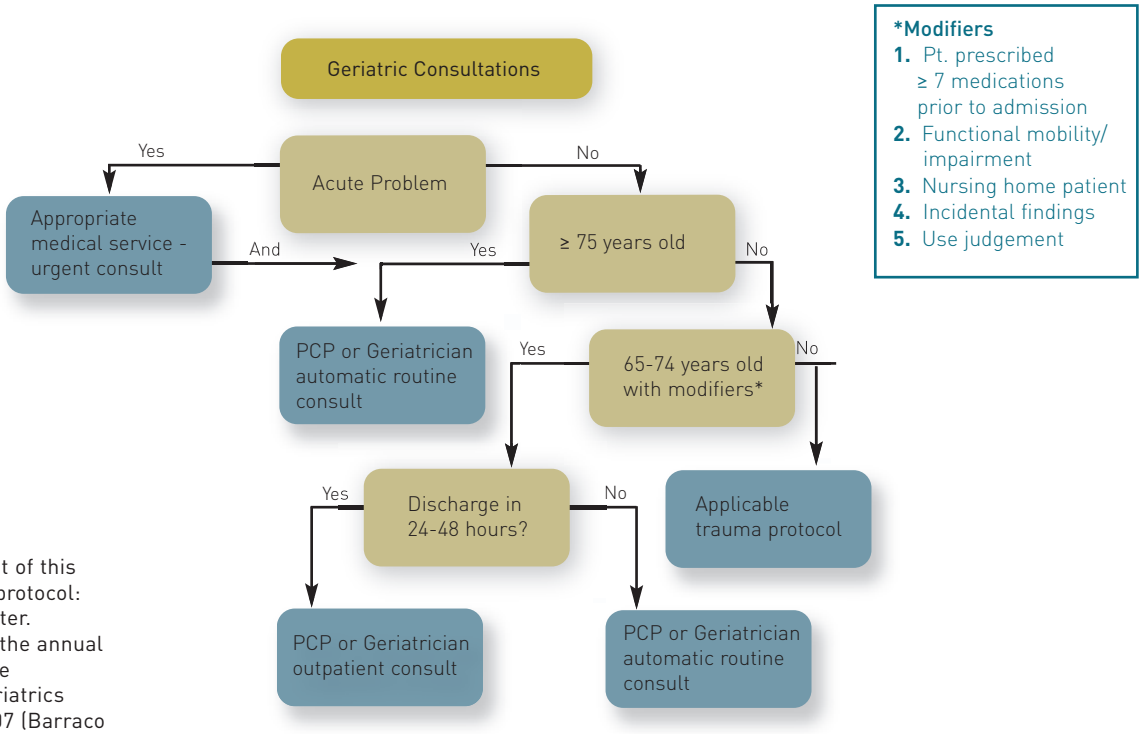


Figure 2.

Establishment of this consultation protocol: Before and after. Presented at the annual meeting of the American Geriatrics Society in 2007 (Barraco et al. 2007).

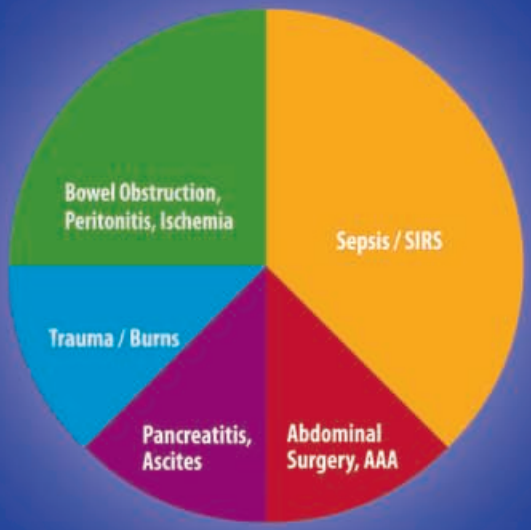
mortality and increases in optimal postoperative care (Fisher et al. 2006). The use of orthopaedic-geriatric units has gained worldwide acceptance per a recent article from Australia (Chong et al. 2008). This multidisciplinary approach has reduced mortality rates below the stated average for hip fractures at that facility.

The trauma literature is beginning to catch up to that of its orthopaedic colleagues. A recent paper examined utilisation of a geriatric consultation in the care of the injured elderly (Fallon et al. 2006). Though less than half of the eligible patients were seen in consult, geriatricians assisted with advanced care planning, disposition decisions to promote function, made medication changes, decreased inappropriate medications, and assisted with pain management. Trauma surgeons followed 91% of geriatrician recommendations.

At our level I trauma centre in eastern Pennsylvania, we acknowledged these findings and established a Section of Geriatric Trauma. Our Geriatric Interdisciplinary Trauma Team (GITr) meets weekly to discuss patients on the trauma service age 65 and over. Participants include geriatrics, trauma, nursing, pharmacy, physical and occupational therapy, and case management, with pastoral care, nutrition, and other services attending as needed. We also conduct monthly educational conferences on geriatric topics encountered by our practitioners. The curriculum consists of a mixture of lectures, case studies, and journal clubs. Common problems such as dementia, delirium, and constipation are discussed as well as more complex issues relating to cardiac and pulmonary dysfunction and palliative care. Lecturers span the disciplines, with speakers from trauma, geriatrics, orthopaedics, cardiology, respiratory and other subspecialties. Web pages were established with general information on elder trauma and, in the near future, educational content for the community and emergency medical services staff. Routine consultation via protocol with geriatricians or the patient's primary care physician ensures continuity of care (Fig. 1). A look at our outcomes before and after the establishment of this service has been favourable as presented at the annual meeting of the American Geriatrics Society in 2007 (Barraco et al. 2007) (Fig. 2), all differences being statistically significant, $p<0.05$. Reductions were exhibited in hospital and ICU length of stay as well as mortality. In order to improve upon these results, we are moving forward with the development of elder trauma care protocols for problems such as syncope.

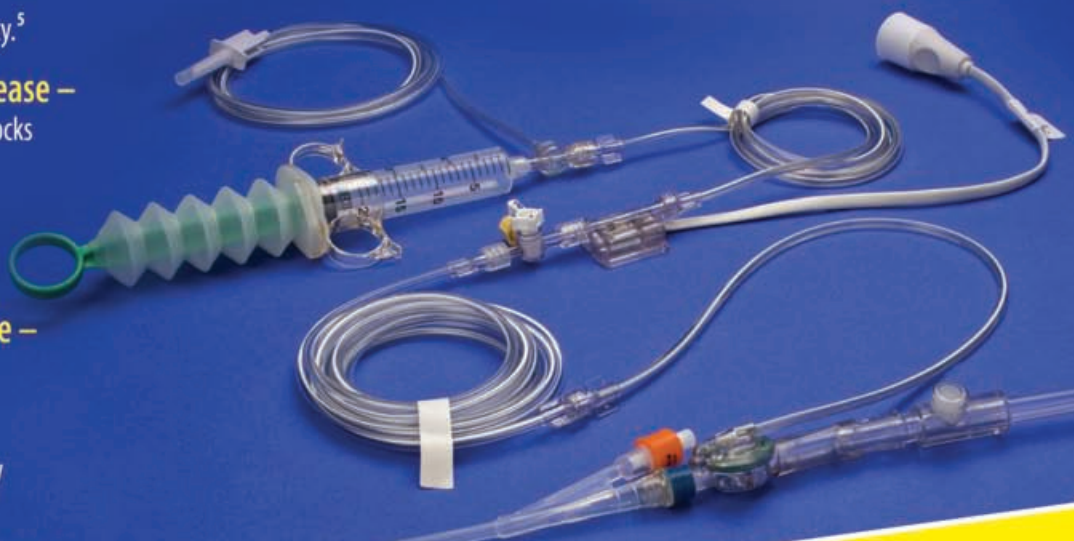
In summary, elder trauma patients are best treated at trauma centres. There are many factors to take into consideration in addition to age, including pre-existing conditions, complications, severity of injury, and physiologic insult. Early aggressive care is indicated with an interdisciplinary approach unless prognostic factors or patient and/or family wishes indicate otherwise. At that point, a skillful palliative care service can compassionately guide appropriate end-of-life care.

Who is at risk for Intra-Abdominal Hypertension?[1-4]



AbViser® AutoValve® – IAP Monitoring Device is the first and only closed IAP monitoring system with proven accuracy, reproducibility and safety.[5]

- **Simplifies ICU Nursing Tasks –** Easy set-up and use[5]
- **Standardized Data –** Proven accuracy, reproducibility and safety.[5]
- **Automatic Valve with Time Release –** Eliminates clamping and turning of stopcocks
- **White Stripe Tubing (designates IAP) –** Reduces misconnection errors
- **Closed System w/Syringe Sleeve –** Helps reduce nosocomial infection risk[6]
- **OR Compatible –** Data assists surgeon in closing laporatomy
- **Early IAH Recognition –** Consistent monitoring improves outcomes[2, 7-9]



Protocol driven intra-abdominal pressure monitoring and intervention reduce resource utilization while improving patient outcomes.[7-9]

WOLFE TORY MEDICAL, INC.
Elegant solutions for complex issues.

For more information contact:
Wolfe Tory Medical, Inc.
79 West 4500 South, Suite 18 Salt Lake City, Utah 84107 USA
U.S.A. Phone Number: 801-281-3000 Fax: 801-281-0708
www.wolfetory.com

REFERENCES:
1. Malbrain MLG, Chiumello D, Pelosi P, et al. Incidence and prognosis of intraabdominal hypertension in a mixed population of critically ill patients: a multiple-center epidemiological study. Critical care medicine 2005;33(2):315-22.
2. Cheatham ML, Malbrain ML, Kirkpatrick A, et al. Results from the International Conference of Experts on Intra-abdominal Hypertension and Abdominal Compartment Syndrome. II. Recommendations. Intensive care medicine 2007;33(6):951-62.
3. Daugherty EL, Hongyan L, Taichman D, et al. Abdominal compartment syndrome is common in medical intensive care unit patients receiving large-volume resuscitation. Journal of intensive care medicine 2007;22(5):294-9.
4. Regueira T, Hasbun P, Rebolledo R, et al. Intraabdominal hypertension in patients with septic shock. The American surgeon 2007;73(9):865-70.
5. Kimball EJ, Mone MC, et al. Reproducibility of bladder pressure measurements in critically ill patients. Intensive care medicine 2007;33(7):1195-8.
6. Huey WY, Newton DW, Augustine SC, et al. Microbial contamination potential of sterile disposable plastic syringes. American journal of hospital pharmacy 1985;42(1):102-5.
7. Oda S, Hirasawa H, Shiga H, et al. Management of Intra-abdominal Hypertension in Patients With Severe Acute Pancreatitis With Continuous Hemodiafiltration Using a Polymethyl Methacrylate Membrane Hemofilter. Ther Apher Dial 2005;9(4):355-61.
8. Sun ZX, Huang HR, Zhou H. Indwelling catheter and conservative measures in the treatment of abdominal compartment syndrome in fulminant acute pancreatitis. World J Gastroenterol 2006;12(31):5068-70.
9. Cheatham ML, Safcsak K. Is the evolving management of IAH/ACS improving survival? Acta Clinica Belgica 2007;62, supplement 1:Abstract O61.

AbViser® AutoValve®
Intra-Abdominal Pressure Monitoring Device

STRATEGIES TO SHORTEN ANTIBIOTIC THERAPY DURATION IN THE ICU

Jérôme Pugin, MD

Professor, Head Physician
Intensive Care Department
University Hospitals of Geneva
Switzerland

jerome.pugin@medecine.unige.ch

Vandack Nobre, MD

Research Fellow
Intensive Care Department
University Hospitals of Geneva
Switzerland

There is little controversy as to whether patients with severe sepsis and septic shock should receive a prompt, broad-spectrum antibiotic treatment. The Surviving Sepsis Campaign care bundles popularised this concept, and a recent Canadian study based on a large registry of septic shock patients further supports it (Kumar et al. 2006). These investigators showed that mortality rates correlated with the time delay between the onset of shock and the administration of the first dose of antibiotics. De-escalation therapy, i.e. narrowing the antibiotic spectrum and/or changing the route of administration, is also becoming popular among critical care physicians. This strategy is certainly associated with a lower risk of developing multi-resistant bacteria, and also decreases drug-related costs. Decreasing antibiotic treatment duration should carry the same beneficial effects.

In our ICUs and elsewhere, the duration of antibiotic therapy is not governed by clear and unequivocal rules. It is mainly based on empirical recommendations, derived from expert advice. Recently we have become concerned that critically ill patients may be receiving unnecessary prolonged antibiotic treatment based on such rules. Several approaches can be taken in order to possibly decrease the duration of antibiotic therapy. One possibility is to modify the empirical rule and to test whether a shorter duration changes any aspect of patients' outcomes. This was the approach taken by Chastre et al. when they compared 8 vs. 15 days in the treatment of ventilator-associated pneumonia (Chastre et al. 2003). In this study, mortality rates were the same for patients regardless of whether they were treated for 8 or 15 days. The authors however reported an increased recurrence of pneumonia in patients treated only 8 days infected with non-fermenting Gram-negative bacteria. This may show the limit of changing an empirical rule by another one, highlighting the fact that patients and the causative microorganisms are non-homogenous, and thus may require differential treatment durations. Another strategy to shorten antibiotic therapy duration utilised by Singh and colleagues is to use a clinical score to help the clinician to stop unnecessary antibiotic treatments (Singh et al. 2000). In Pittsburgh, mechanically ventilated patients with a new infiltrate on the chest radiography or with a new fever tended to receive an indiscriminate 10 to 21-day course of ciprofloxacin. They were able to stop unnecessary antibiotics in many patients with low probability of VAP based on low clinical pulmonary infection scores measured at day 1 and day 3. The outcome was similar in patients receiving the full course and in those in whom antibiotics were stopped on day 3.

A third approach is to use a marker of the infectious process resolution as a tool to decide when to stop the antibiotic therapy. Procalcitonin (PCT) is a biomarker that has been shown to decrease rapidly in plasma from septic patients with favorable outcome, and to remain high in those patients who will eventually die (Harbarth et al. 2001). It was therefore natural to test the concept that the duration of antibiotic therapy could be customised based on the evolution of plasma PCT levels. This concept had previously been proposed and tested in patients with community-acquired pneumonia (Christ-Crain et al. 2006). The duration of antibiotic therapy was cut in half in this trial (6 vs. 12 days) without negatively impacting on patients' outcome. Based on this concept, we designed a randomised-controlled trial in patients with severe sepsis and septic shock (Nobre et al. 2008). In the test arm, when plasma PCT levels had reached < 10% of the initial value and the patient was stable, clinicians were asked to stop antibiotics (see figure). Controls were treated according to empirical rules. The group of patients in whom antibiotics were

stopped based on PCT levels had a median duration of antibiotic treatment of 6 days, compared with 10 days in the empirical group. The reduction of antibiotic treatment duration was neither associated with increased recurrence of the infection nor with increased mortality, but rather with a significant shorter ICU length of stay. Importantly, only a selection of patients with uncomplicated infections was studied, and results may therefore not be generalised to the whole population of patients with septic shock. These results on a relatively small number of patients also need to be confirmed in larger multi-centre clinical trials.

In conclusion, it is our impression that critical care physicians are moving towards shorter durations of antibiotic treatment for their patients. There is no reason why the antibiotic treatment should not be adapted to the infectious response when this is possible. The evolution of plasma PCT levels brings objectivity to the clinical decision and allows customization of therapy, with no apparent harm. In any case, the clinician should not rely only on a marker to make a decision, but rather thoroughly examine his patient together with laboratory and radiologic tests, and integrate the marker in his decision. Given the relatively high price of PCT measurements, further medico-economic studies are needed to determine whether this approach is cost-efficient.

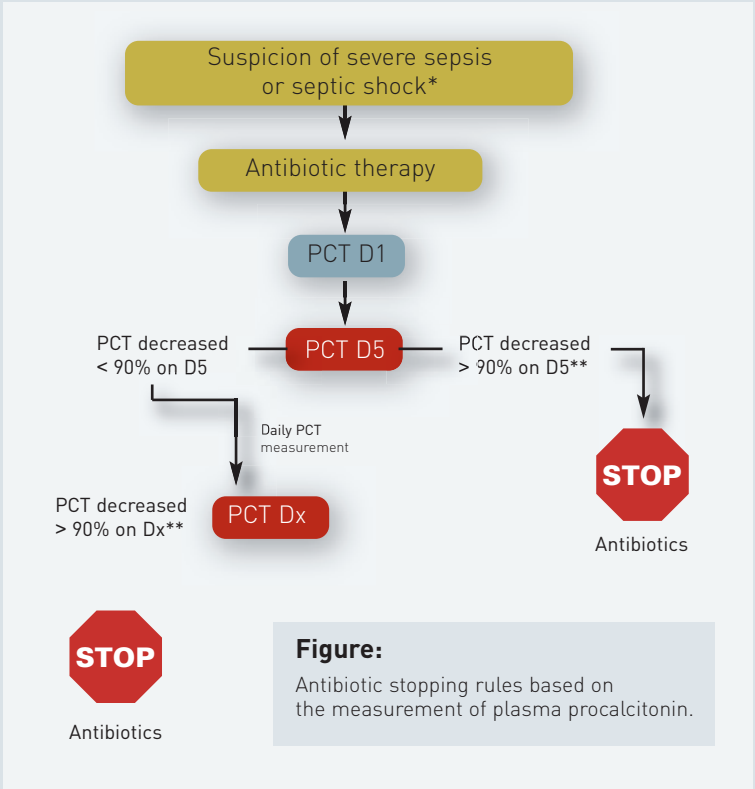


Figure:
Antibiotic stopping rules based on the measurement of plasma procalcitonin.

References

Chastre J, Wolff M, Fagon JY, Chevret S, Thomas F, Wermert D, Clementi E, Gonzalez J, Jusserand D, Asfar P, Perrin D, Fieux F, Aubas S; PneumA Trial Group. Comparison of 8 vs 15 days of antibiotic therapy for ventilator-associated pneumonia in adults: a randomized trial. JAMA. 2003;290:2588-98

Christ-Crain M, Stolz D, Bingisser R, Müller C, Miedinger D, Huber PR, Zimmerli W, Harbarth S, Tamm M, Müller B. Procalcitonin guidance of antibiotic therapy in community-acquired pneumonia: a randomized trial. Am J Respir Crit Care Med. 2006;174:84-93

Harbarth S, Holeckova K, Froidevaux C, Pittet D, Ricou B, Grau GE, Vadas L, Pugin J. Diagnostic value of procalcitonin, interleukin-6, and interleukin-8 in critically ill patients admitted with suspected sepsis. Am J Respir Crit Care Med. 2001;164:396-402

Kumar A, Roberts D, Wood KE, Light B, Parrillo JE, Sharma S, Suppes R, Feinstein D, Zanotti S, Taiberg L, Gurka D, Kumar A, Cheang M. Duration of hypotension before initiation of effective antimicrobial therapy is the critical determinant of survival in human septic shock. Crit Care Med. 2006;34:1589-96

Nobre V, Harbarth S, Graf JD, Rohner P, Pugin J. Use of procalcitonin to shorten antibiotic treatment duration in septic patients: a ran domized trial. Am J Respir Crit Care Med. 2008;177:498-505

Singh N, Rogers P, Atwood CW, Wagener MM, Yu VL. Short-course empiric antibiotic therapy for patients with pulmonary infiltrates in the intensive care unit. A proposed solution for indiscriminate antibiotic prescription. Am J Respir Crit Care Med. 2000;162:505-11

COPING WITH STRESS IN THE ICU

Charlie Granger FRCA

Consultant in Anaesthesia and Intensive Care
Royal Lancaster Infirmary
Lancaster, UK

charlie.granger@mbht.nhs.uk

The Intensive Care Unit (ICU) can be a highly stressful environment - not just for our patients and their relatives but also for us, the staff who care for them. This stress comes at a price – even if we have chosen to work in such a highly charged environment (Lederer et al. 2008). This article will discuss how ICU staff can reduce the price they pay for the career they have selected.

Stress arises when an individual feels obliged to respond to a situation but unable to cope with the situation's demands. This emphasises the most important aspect of stress: Stress is subjective. The source of the stress – professional, organisational, clinical, domestic or internal – might influence the effect the stress has or how it might best be dealt with, but this central truth remains: Stress is in the eye of the beholder. This is not a new observation – Marcus Aurelius (Roman Emperor 161 – 180 AD) said much the same thing: "If you are distressed by anything external, the pain is not due to the thing itself but to your own estimate of it; and this you have the power to revoke at any moment."

Because stress is essentially subjective it is logical that coping with stress should also fundamentally be a subjective process. Coping with stress means solving problems that can be solved and converting those that can't be solved into positive challenges. It means handling a situation that cannot be mastered.

Locus of Control

The impact stress has on an individual therefore depends not only on the nature and severity of the stress but also on the psychological makeup of the individual. Learning to cope with stress involves learning techniques that bolster our resistance to stress. Foremost amongst these is the 'Locus of Control'. This refers to the individual's belief concerning 'who or what influences things', the polarities by one account being 'Internal', 'Chance' and 'Powerful Others' (Levenson 1973). Of these options, it is an Internal locus of control that is the most effective in supporting sound coping skills – that is, the individual believes that control of future outcomes resides primarily in themself, in contrast to believing that control lies in the hands of 'Powerful Others' or, more fatalistically 'Chance'. Though our ability to control events is inescapably linked to personal power – the higher I am in a hierarchy the more likely I am to be able to influence events – the concept is more fundamental that that.

Although control over events will inevitably be shared between different loci in different circumstances, the individual with an internal locus of control believes, generally speaking, that they are in charge of their own lives. With this belief come a number of other beneficial effects: a greater likelihood to make long-term plans, to work for success, resist coercion and, most importantly from the point of view of this article, tolerate stress (Krause and Stryker 1984). The late media mogul Sam Goldwyn, who started life as a refugee, liked to say "The harder I work, the luckier I get" - his career and aphorism both epitomise not only a strong internal locus of control but also, quite possibly, some of the benefits from having one. Fortunately, for those of us born with a less well-developed sense of self-belief, an internal locus of control is also an attribute that can be developed (Hattie 1997).

Forms of Stress

The psychological impact of a stress is also inevitably influenced by the nature of the stress itself – the polarities in this case being 'challenge-related' and 'hindrance-related'. The former describe stresses, which are linked to some sort of potential positive outcome or individual personal growth – for example studying for exams or applying for promotion – whereas the latter are stresses that

are without associated gains and which only constrain or interfere with our activities – examples might be limitations in resources or obstructive bureaucracy. The link between possible personal advancement and a challenge-related stress does not remove the stressful aspect completely, but it does make the stress more manageable. It is, therefore, easier to cope with a stress if it can be viewed as setting a challenge rather than imposing a hindrance.

Stress Management Techniques

A number of studies have demonstrated that stress management techniques can be taught. One of these involves learning 'Mindfulness Meditation', a formal discipline by which subjects are taught to 'pay attention on purpose' – with specific attention to encouraging compassion, impartiality and acceptance of self and others. This increases the subjects' sense of control over stress as well as their ability to accept and let go of events that are not controllable. In a short study involving medical students, mindfulness meditation reduced anxiety levels, reduced psychological distress and increased empathy – benefits which were maintained during a time of increased stress as exams approached (Shapiro 1998).

A study of cognitive behavioural training in GPs demonstrates a second technique in developing skills at coping with stress – in this case the emphasis lies on distinguishing between positive and negative thoughts and analysing stresses logically, as opposed to emotionally. These coping skills were then used during stressful periods, in distinction to the meditative approach which is more a continuous 'way of being'. This training improved the quality of the GP's work life and reduced their work-related and general psychological distress – results which were maintained or improved at follow-up 12 weeks later (Gardiner 2004).

In this study, the best results came from subjects who had developed a 'Problem-Focussed' coping style. Problem Focussed coping is made up of two strands: 'Problem-Solving' and 'Stress Reducing Appraisal'. The former uses deliberate policies of Simplification (start with the most obvious steps when faced with a problem), Prioritisation (deal with the most important things first) and Delegation (delegate when possible) to reduce the number of stressful events the individual is exposed to. The latter aims to reduce the emotional load of the stresses that remain – in this case by: (1) Accepting that difficulties are an inherent part of the working environment, (2) Accepting that there are personal and medical limits to what can be done – and that these limits do not necessarily imply failure, (3) Accepting that periods of high demand are an inevitable component of our career and finally, (4) Retaining the right to say 'No'. These simple steps help the stressed individual to accept the stress they are exposed to, divorce them from a sense of failure and encourage a more constructive coping response (Gardiner 2004).

A third approach to managing stress focusses on assertiveness training. Our personal levels of assertiveness influence our perception of stress – more assertive people tend to perceive a specified stress (giving a talk in public, for example) as a challenge whilst less assertive individuals perceive the same stress as a threat. As outlined above, challenge-based stresses are associated with lower levels of personal stress than hindrance-based stresses, so the more assertive we are the greater the chance that we will perceive a stress as a personally enhancing challenge rather that a stressful hindrance. Once again, this process can be taught (Lee and Crockett 1994).

The final contributions to coping with stress, methods that might be more practical than some of the others mentioned above, involve promoting physical fitness and learning to relax (Bellarosa and Chen 1997). One image that helps here is the 'stress jug', which expresses our capacity to absorb stress – the bigger the jug, the greater our ability to deal with stress. The importance, however, is that no matter how large the jug, sooner or later it will fill, at which point additional stresses – even if they are, in themselves, trivial – might lead to a seemingly disproportionate response. In this case, though the response has been triggered by the final stress, the underlying cause is the addition of one stress too many to a person who has already absorbed all the stress they can. The implication is that, if we are to fill the role expected of us, both at home and at work, we have to make sure we take the time to empty our stress jug through adequate relaxation. A supportive family is obviously of central importance in this process.

If we fail to take these simple steps in self-preservation we risk being slowly and relentlessly ground down by the stresses that are inherent in one of the most demanding, absorbing and rewarding jobs in the field of health – a career in intensive care.

References

Gardiner M, Lovell G, Williamson P. (2004) Physician you can heal yourself! Cognitive behavioural training reduces stress in GPs. Family Practice 21 (5) 545-551

Hattie J, Marsh HW, Neill JT, & Richards GE. (1997). Adventure education and Outward Bound: Out-of-class experiences that make a lasting difference. Review of Educational Research, 67 (1) 43-87

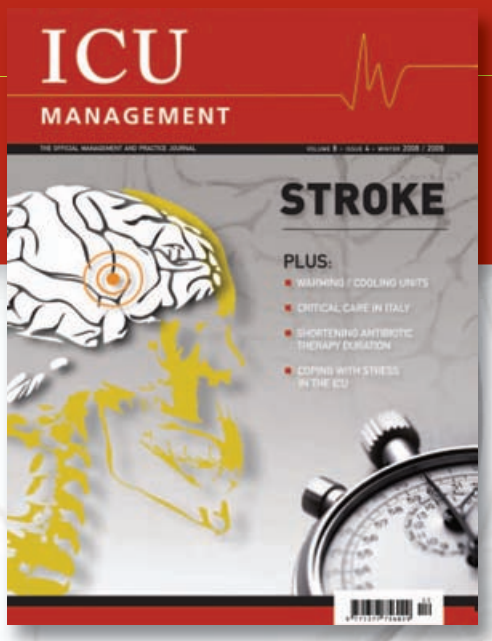
Krause N, Stryker S. (1984) Stress and well-being: the buffering role of locus of control beliefs. Social Science & Medicine. 18 (9) 783-90

Lederer W, Kinzl JF, Traweger C, Dosch J, Sumann G. (2008) Fully developed burnout and burnout risk in intensive care personnel at a university hospital. Anaesthesia & Intensive Care. 36 (2) 208-13

Levenson H. (1973). Multidimensional locus of control in psychiatric patients. Journal of Consulting and Clinical Psychology 41 (3) 397-404

Shapiro SL, Schwartz GE, Bonner G. (1998) Effect of Mindfulness-based stress reduction on medical and premedical students. Journal of Behavioural Medicine 21 (6) 581-599

ICU MANAGEMENT



HOW TO SUBSCRIBE:

- Complete the form below and **fax it** to +32 2 286 8508 or **post it** to:
  ICU Management, 28 rue de la Loi, B-1040 Brussels.

Name:

Institution:

Address:

Postcode & Town:

Country:

Telephone:

E-mail:

☐ Two years subscription ☐ One year subscription

Subscription Rates

One year:	Europe **now only** 53 €	Overseas **now only** 68 €
Two years:	Europe **now only** 89 €	Overseas **now only** 105 €

- **Transfer** the correct amount to the following bank account:

ICU Management, 28 rue de la Loi, B-1040 Brussels
IBAN BE29 7350 1603 2064 Swift: KREDBEBB
(in Belgium: 735-01603 20-64) Note: Charges to the principa l;

Subscription online:
WWW.ICU-MANAGEMENT.ORG/INDEX.PHP?ID=SUBSCRIBE

* If you attend ISICEM, a one year subscription is included in the congress free

Subscribe now!

FAX BACK: +32 2 286 8508
TRANSFER TO: BE2973501603 2064 KREDBEBB

EXPERIENCED NURSES

SOME TIPS FOR CRITICAL CARE UNITS

Clémence Dallaire, PhD

Nurse, Professor
at the Faculty of Nursing Sciences
Université Laval
Quebec, Canada

clemence.dallaire@fsi.ulaval.ca

Paul-André Lapointe, PhD

Director of the Department
of Industrial Relations
Faculty of Social Sciences
Université Laval
Quebec, Canada

This article was inspired by a study carried out in the critical care units of a hospital in Quebec, with the help of 42 semi-conducted interviews among nurses and union representatives. This group played a major role in the establishment of priorities in the numerous solutions, which emerged from the interviews and in the accepted choice of solutions.

The results highlight the real-life experiences of the longest serving or most experienced nurses, and a certain inter-generational conflict between the experts and novices. The main remark is that there is a very large instability of working teams, due to the modes of administration of the employment statutes, whether it be the excessive recourse to precarious statutes, high absenteeism, or a significant level of voluntary departures including departures of those taking retirement.

Besides an inferior quality of care given, the instability creates a deficit of individual and joint competences, which translates into work overload for the experts and additional stress for those who are not so experienced. Individual competences are partly acquired thanks to work experience and exposure to specific problems. They are sometimes transmittable only through personal interaction.

Within a working team, individual competences are really effective when they are combined and articulated together, in a synergistic way. For a working team, it is the capacity of effectively cooperating, coordinating and communicating on the basis of a common language, verbal or non-verbal, with a view to achieving complex interventions. This collective way of knowing how to react is particularly sought after in critical care units, where complex problems call for teamwork and the coordinated intervention of nurses, at the same time or sequentially. This teamwork is a must and is based on the quality of joint competences.

Teamwork

Such cooperation may be more difficult when a particularly ruthless conflict arises between stable/expert staff and provisional/novice staff, which could in part be associated with an inter-generational conflict. New generations of nurses would look for flexible hours, greater career mobility and a better balance between personal/family requirements and professional requirements. As a result, the younger ones would be less involved in work and would take fewer initiatives. This behaviour is also attributable to a strategy of protection: Less experienced nurses who are occasionally introduced to critical care teams and units avoid having to take initiatives for fear of making mistakes.

Without denying the existence of differences between the generations, the strength lies in noting that by granting stability and the best working hours (of the day and week) to some and by confining others to precarious and unpleasant working hours (evening, night and weekend), the administration

modes of the employment statutes aggravate the differences between the generations, even transforming them into an inter-generational conflict, and induce particular behaviour.

Accepted Solutions

The inventory of solutions was built by compiling the totality of the solutions proposed by the nurses interviewed. The solutions proposed converge towards a central objective, that is, the stabilisation of the teams, and mainly favour interventions with regard to competences. They simultaneously aim to adapt resources to the acuteness of the patient's condition and to raise competences while acting on the internal and external aspects of work organisation.

The adaptation of resources to the acuteness of the patient's condition can assume different forms:

- The redistribution of work between existing resources. In fact, it has been noted that some people work too much, while others do not work enough. It is thus a question of increasing the number of full-time positions and reducing their precariousness.
- The reduction of working time for units in order to dedicate the time thus freed-up to training and involvement in special projects.
- The raising of competences, which reduces the stress and psychological demands of work, linked to uncertainty and the loss of control, often generated by a lack of competences.
- The revision of the professional and nonprofessional composition of care teams: for example, the addition of assistants and clerks in order to lighten the workload of nurses and enable them to dedicate themselves to the real aspects of their profession.

The raising of competences can also assume different forms:

- Increased exposure time to complex problems in the units. In more concrete terms, it is a question of making the more "precarious" nurses work harder and more regularly, so that they acquire the experience and competences necessary to better carry out their work.
- The overlapping of schedules ensuring the sharing of competences between experts, who are older, and who generally work during the day, and novices, who are younger, and generally work in the evenings and during the night.
- Mentoring: Assigning an experienced nurse with teaching qualities who may serve as a point of reference to a specific group of novices.
- Involvement in special projects: Problem resolution leads nurses to analyse a specific situation, to review the relevant literature and to discuss within a group diagnosis and possible solutions.

Mentoring: Assigning an experienced nurse with teaching qualities who may serve as a point of reference to a specific group of novices.

Conclusion

These possible solutions are currently being put to the test in a pilot project and could enable the expectations of older nurses to be met in terms of joint competences while helping the young to develop their individual competences. They are all based on a fundamental fact to the effect that the more experienced and older nurses are of greater importance in the context of the complexification of care.

These nurses, who could be tempted to abandon critical care due to the heaviness of care and the workload, nevertheless have individual expertise allowing them to quickly react and manage acute cases in an efficient manner. They are, in short, absolutely essential in the practical training of young nurses and in the building of joint competences.

ICU MANAGEMENT

Content

Articles may focus on any management or practice issue in intensive care related to economics, quality of care or patient outcome. We only accept scientific papers with a clear connection to management and practise issues. We also invite viewpoints for publication in our Forum section, which can be personal opinions of the author and/or reactions to articles published in prior issues. These are published at the discretion of the Editors. Submissions may not have been published previously or be currently submitted for publication elsewhere. Articles must be written by independent authorities and any sponsors for research must be named. If manufacturers are named in an article, the text must present an unbiased view, not in support of any particular company.

Submission Guidelines

Authors are responsible for all statements made in their work, including changes made by the editor and authorised by the submitting author. The text should be provided as a word document via e-mail to editorial@icu-management.org. Please provide a contact e-mail address for correspondence. Following review, a revised version, which includes the editors' comments and recommendations, is returned to the author (at the contact e-mail address) for authorisation.

Length

- Articles: maximum 1000 words (less if figures or tables are included)
- Viewpoints: maximum 700 words
- News/research/product updates: maximum 200 words

Please note that contributions longer than the specified number of words may not be accepted.

Structure

Article texts must contain:

- Title
- Names of authors with abbreviations for the highest academic degree
- Affiliation: Department and institution, city and country
- Main authors are requested to supply a portrait photo (see specifications below)
- Summary of one or two sentences (no more than 30 words) describing the content
- Contact name for correspondence and an e-mail address which may be published with the article
- Website, if appropriate
- Acknowledgements of any connections with a company or financial sponsor
- Introduction, main text and summary/conclusion, with subheadings as appropriate
- Authors are encouraged to include checklists and/or guidelines, which summarise findings or recommendations
- References or sources, if appropriate, as specified below

Writing Style

Articles must be written in UK/British English (e.g. organisation, not organization), with short sentences, a clear structure (see above) and no bias. Full stops in numbers may only be used to indicate a decimal place; otherwise use commas as separators.

Images

Main authors are invited to supply a portrait photo for publication with their article. This and any other relevant images for publication with an article should be sent by e-mail as separate files (only high resolution images with 300dpi) and their order of placement in the article must be clearly indicated. Only the electronic formats ".tif" or ".jpg" can be used for images, i.e. not Microsoft Word or PowerPoint. Images must be no smaller than 9cm x 9cm at 100% scale. Only images meeting these specifications can be published. If an image has been published before, permission to reproduce the material must be obtained by the author from the copyright holder and the original source acknowledged in the text, e.g. © 2009 Sherry Scharff.

Format for References

Any references that are deemed important to understanding of the article should be cited in concise form within the article. Please use the Harvard reference system. Citations within the text for a single author reference should include the author surname and year of publication; for a citation with two authors include both author surnames and year of publication; for more than two authors, include the first author surname followed by "et al." and the year of publication. Multiple citations should be separated by a semicolon, and listed in alphabetical order.

Example of within text citation: (Edwards 2004; Edwards and Miller 2002; Miller et al. 2003).

Reference lists should be alphabetise by lead author and included at the conclusion of the submission.

Example of standard journal reference: Sydow Campbell, K. (1999) "Collecting information; qualitative research methods for solving workplace problems", Technical communication, 46 (4) 532-544.

Authors are responsible for the accuracy of the references they cite.

Acceptance

It is always at the discretion of our editorial board to accept or refuse submissions. We will respond to submissions within 8 weeks of receipt. We reserve the right to revise the article or request the author to edit the contents, and to publish all texts in any EMC Consulting Group journal, on the Internet and to list them in online literature databases.

Thank you,
The ICU Management Editorial Team
editorial@icu-management.org

AN OVERVIEW OF HEALTHCARE IN ITALY

Maurizia Capuzzo, MD
Department of Surgical, Anaesthetic and Radiological Sciences
Section of Anaesthesiology and Intensive Care
University Hospital of Ferrara, Italy
Italian Representative in the Council of European Society of Intensive Care Medicine
Chair of the Section on Health Services Research and Outcome of European Society of Intensive Care Medicine
cpm@unife.it

Davide Resi, MD
Specialist in Public Health
Agenzia Sanitaria e Sociale regionale - Regione Emilia-Romagna
Italy

Organisation of the Healthcare System

The Italian National Health Service (INHS), named "Servizio Sanitario Nazionale", was instituted in 1978 by law N. 833. The founding principles were universality, equality and equity. Accordingly, the aims were to promote, maintain and recover the physical and mental health of the whole population, and to guarantee that all residents and citizens receive healthcare and treatment without any discrimination based on gender, age, residence, income or job.

In the early nineties, the INHS was reformed (laws by decree N. 502 of 1992 – N. 517 of 1993 – N. 512 of 1994) and a new managerial style was introduced, in accordance with the cultural changes and the economic constraints, which had intervened since its' inception. The principle of universality became "to assure health services necessary and appropriate for those needing them". The new criteria included clinical appropriateness (i.e. provision of the most effective services to those requiring them) and economic appropriateness (i.e. provision of the most efficacious and least expensive services). At the same time, the concept of equality evolved from "people with the same health needs have to be treated in the same way" to the following so-called 'vertical equity': "people with poorer health, or higher health needs have to be treated in a more favourable way".

At the end of nineties, the third reform of INHS (laws by decree N. 229 of 1999) was based on the dignity of the human being, the need of health and well being, equity of health services, appropriateness and suitability of health services, and budget concerns. At the same time, legislative and administrative functions were given to the 20 regions and autonomous provinces of the country, which enjoyed considerable autonomy in organising healthcare delivery and became responsible for their health strategies. The process was gradual and concluded with the changes of the Italian Constitution 2001 (article 117, comma 2, letter m and Titolo V of part II) toward federalism.

Moreover, to guarantee that all citizens of the different regions and autonomous provinces receive the same basic level of health services, a decree of the Italian Prime Minister defines the "essential levels of care" (Livelli Essenziali di Assistenza sanitaria or LEA), that are the minimum standards of healthcare which must be given free of charge to all citizens in all regions and autonomous provinces. Those LEA include the following: i) prevention activities such as controls of food, vaccinations, screening tests for early diagnosis of cancer; ii) health services such as access to General Practitioners (GPs), diagnostic tests and imaging techniques, and drugs; iii) hospital services such as access to emergency departments, general hospital admissions, surgery and rehabilitation. On the other hand, each region has to assure the LEA but can give additional services to residents using its own funds
.

Financing of the Healthcare System

The INHS is financed in each region by the taxes (direct, such as income tax, and indirect, like part of Value Added Tax) paid by residents, even if there are equalizing funds to help less rich regions. Moreover, as a general rule, patients pay a small charge given as contribution for the services received. Hospital admission and services are free of charge for the following categories of citizens: Those aged less than 6 years or more than 65 years, those with income lower than a determined value, and those having one of 51 chronic illnesses, such as cancer, chronic obstructive pulmonary disease, heart failure, etc.

Hospitals are reimbursed by the administration of the regions or autonomous provinces where they are. The reimbursement is given according to the Diagnosis Related Group (DRG) system of the country, with a higher reimbursement for cases concerning patients of regions or autonomous provinces different from that where the hos-

pital is located. The aim is to press the hospital to be attractive for patients of other parts of the country.

The reimbursement for patients admitted to the intensive care units is included in the DRG given to each hospital admission. Moreover, the reimbursement for each hospital admission is assigned to the ward discharging the patient from the hospital, and it is subsequently divided among wards where the patient was treated according to the days spent in each of them.

Each of the regions and autonomous provinces has a plan to create an integrated system of social and healthcare services that can provide unitary and global responses to the needs of the society. Accordingly, there are health districts where GPs work is integrated with territorial healthcare services, including social support for non-autonomous people.

Responsibility for healthcare delivery is on Local Health Trusts; public enterprises funded by the regions through a per capita budget for a wide range of hospital and community services. Most public hospitals are directly managed by the Local Health Trusts, except those providing tertiary care (IRCCS), and/or with a teaching status (University Hospital Trusts). Private hospitals are mostly for profit and account nationally for 14% of total hospitalisations, with a wide regional variation. Private hospitals respecting the quality requirements defined by the regions and autonomous provinces can be accredited and can take care of citizens being reimbursed according to the DRG system.

All patients in Italy are registered with a GP or a paediatrician who is responsible for providing most primary care, referrals to specialists, and prescribing diagnostic interventions and drugs. To be treated, citizens are free to choose their GP as well as the hospitals and doctors in public and private accredited structures. The 118 Emergency System (118 is the phone number) is active throughout Italy. The system is composed of operation centres, a network of stations for ambulances, equipped cars with physicians and nurses, and some helicopter ambulances. The operational centres are active 24 hours a day, and nurses triage patients on the basis of information collected during phone calls, sending the rescue vehicle suitable for each case. Once the location of the intervention is reached, the rescue team decides the best referral hospital on the basis of the care needed, facilitated by radio communication systems. Voluntary associations such as the Italian Red Cross manage the network of vehicles and each region and autonomous province may define the lead time allowed for the rescue. For instance, in the region Emilia Romagna, according to the agreed standard, the 118 system has to guarantee that rescue vehicles arrive within 8 minutes in urban areas and within 20 minutes in rural areas. In the same region, major traumas are managed by a hub and spoke network.

As far as ICUs are concerned, the only census available was made by the Associazione Anestesisti Rianimatori Ospedalieri Italiani (AAROI) in 2005. According to that, there were 3774 ICU beds in the country with wide variability among regions, due to the number of inhabitants.

Total expenditures for Region and Autonomous Provinces Health Services in 2006 was 98,682,688 billion euros, with an increase of 9.55% in comparison with 2004 expenditures.

Moreover, there are contracts and agreement protocols with universities for research, education and training.

Residents of the Specialisation School in Anaesthesia and Intensive Care (in Italy both disciplines are in the same Specialisation School) regularly attend the Intensive Care Units of the hospitals of the regions and autonomous provinces.

References

World Health Statistics 2008. Publications of the World Health Organisation can be obtained from WHO Press, World Health Organisation, 20 Avenue Appia, 1211 Geneva 27, Switzerland

Istituto Nazionale di Statistica (ISTAT): www.istat.it

Facts and figures of the Regional Health Service of Emilia-Romagna (2006) Edited by: Marta Fin, Nicola Quadrelli, Nicola Santolini. Nuovagrafi ca - Carpi (Modena), Italy November 2007

Associazione Anestesisti Rianimatori Ospedalieri Italiani (AAROI). Censimento Nazionale dei posti letto di rianimazione attivi al 30 giugno 2005 Bollettino dell'Associazione Anestesisti Rianimatori Ospedalieri Italiani 2005;8:7-11

Italy: Facts and Figures

Population	59,131,287 (1st January 2007)
Capital	Rome
Area	301,263 square kilometres
Administrative divisions	19 Regions and 2 Autonomous Provinces
Language	Italian
Life expectancy at birth	Males: 78 years / Females: 84 (2006)
Probability of dying under five	4 per 1000 live births (2006)
Probability of dying between 15 and 60 years	Males: 83 per 1000 population Females: 44 per 1000 population
% of population over 60 years	26
Gross Domestic Income (GDI)	1,535,540 euros (2007)
Health expenditure (% of GDI)	8.9 (2005)
Hospital beds /10,000 population	40
Nursing and midwifery personnel density (per 10,000 population)	72.00 (2006)
Pharmaceutical personnel density (per 10,000 population)	8.00 (2006)
Physicians density (per 10,000 population)	37.00 (2006)

Data for 2006 unless indicated. Sources: Word Health Organisation statistics 2008 and Istituto Nazionale di Statistica (ISTAT)

THE PROJECT MARGHERITA FOR ASSESSING ITALIAN ICU PERFORMANCE

Guido Bertolini, MD
Laboratorio di Epidemiologia Clinica Istituto di Ricerche "Mario Negri" Ranica (Bergamo), Italy
bertolini@marionegri.it

Martin Langer
Università degli Studi di Milano Fondazione IRCCS-Istituto Nazionale Tumori Milano, Italy

Daniele Poole
Servizio Anestesia e Rianimazione Ospedale Civile San Martino Belluno, Italy

On behalf of the GiViTI group[e] Gruppo Italiano per la Valutazione degli Interventi in Terapia Intensiva (Italian Group for the Evaluation of Interventions in Intensive Care Medicine)

Early in 1991 an increasing number of Italian intensive care units (ICUs) agreed to collect and share data on organisation, case-mix and patients outcome as a basis for quality assessment and continuous education. To this end we established a nationwide network (GiViTI – Italian Group for the Evaluation of Interventions in Intensive Care Medicine; www.giviti.marionegri.it).

In 2002 GiViTI launched the Project Margherita (meaning daisy in Italian), for the continuous evaluation and improvement of the quality of care (Boffelli et al. 2006). The Project objectives are:

- To standardise data collection on admitted patients;
- To analyse and evaluate clinical outcomes and resource consumption in participating ICUs;
- To allow each ICU to monitor its own performance over time and to compare this with the average;
- To provide ICUs with an effective system for promptly identifying own critical states with a view to assuring good clinical care.

The Project Margherita adds to the general purpose of continuous quality of care assessment the opportunity to have a flexible tool for easily implementing new prospective data collections. The Project uses an ad hoc electronic platform with a modular structure that allows the basic data collection (the Margherita's Core) to be enlarged to meet the requirements of specific research projects (the Margherita's Petals).

The Core data collection includes demographics, admission diagnoses (including major infections), co-morbidities, surgical status, source and reasons for admission, the Simplified Acute Physiology Score (SAPS II) variables (Le Gall et al. 1993), failures and diseases occurring during ICU stay, major procedures/interventions performed during ICU stay, ICU and hospital outcomes. The Petals consist of specific data collections, which are not mandatory or permanent components of the system; rather, they correspond to specific areas of investigation. Examples are: the infections surveillance Petal (Malacarne et al. 2008), the COMPACT randomised clinical trial form, the surveillance on Xigris use (Bertolini et al. 2007). The Margherita software is distributed free of charge to all ICUs adhering to the GiViTI group.

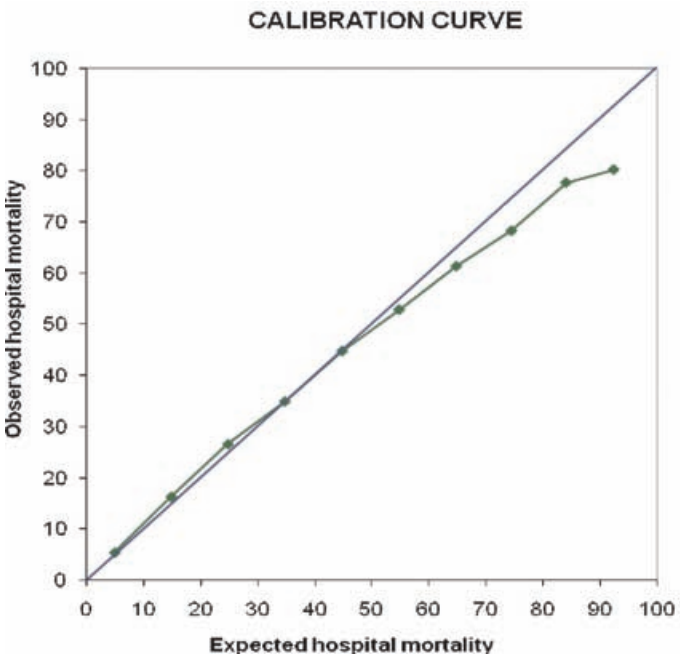
In each ICU, a trained physician is responsible for the data collection. A call-centre is active for any question during the study. The software provides investigators with an online definition of each item to collect, and numerous validity checks are done concurrently with the data entry. To avoid selection bias, patients admitted in months with more than 10% of incomplete or inconsistent records were excluded.

The participation to the project increased over time from 2002 to 2007 with the following progression:

Year	Number of ICUs	Recruited patients
2002	95	23,285
2003	122	31,863
2004	136	43,426
2005	180	55,246
2006	192	60,151
2007	200	62,849

The GiViTI Coordinating Centre produces an annual report, where a prediction model of hospital mortality is calculated by logistic regression analysis. A personalised report for each participating ICU is also provided each year. Here the ICUs may find specific analyses by which to compare their own data with those of all other participating centres and with their own centre over time.

Specifically the yearly reports contain:
- Description of collected data
- Description of data quality checks and data validation procedures
- Description of statistical analysis performed on the collected data
- Statistics results grouped by the following sections:
  - Characteristics of ICU patients on admission
  - Failures and diseases occurred during the stay
  - Procedures/interventions performed during the stay
  - ICU and hospital outcomes



Overall calibration curve (patients of 2007, prediction model of 2006).

Variable life-adjusted plot (VLAD) of a single ICU.

Figure 1 shows the overall calibration curve of the 2007 data based on the 2006 prediction model (top) (Boffelli et al. 2008), and an example of the variable life-adjusted (VLAD) plot of a single random chosen ICU (bottom) (Lovegrove et al. 1997). The overall calibration curve demonstrates a relative improvement in 2007 over 2006 in terms of observed versus expected adjusted mortality in sicker patients (with the highest expected mortality). The curve was computed on 25,958 patients who stayed at least 24 hours in the ICU. The VLAD for the individual ICU shows that there were more deaths than expected from the case-mix of this particular ICU in 2007. Two "crisis" periods can be detected: from February to the end of May and from September to the end of November. The curve was computed on 303 patients.

In the end, the GiViTI philosophy is based on three key concepts:

1) Only extensive data collection allows adequate insight and analysis of ICU data.
2) Only powerful analysis of outcome data, adjusted for as many confounders as possible, allows acceptable benchmarking.
3) The comparison with comparable units is a very good approach since it enables each unit to identify directions in which to improve performance.

The Project Margherita is successful and participating ICUs have significantly improved their performance levels and consequently reduced mortality rates during the years in which the scheme has been in operation.

Acknowledgments

GiViTI is the recipient of unconditioned grants from AstraZeneca Italy and Draeger Italia.

GiViTI Steering Committee (with location in brackets):
Guido Bertolini – (Ranica, BG); Daniela Boccalatte (Lucca); Paola Cogo (Padova); Maria Giovanna De Cristofaro (Napoli); Emiliano Gamberini (Cesena); Adonella Gorietti (Perugia); Martin Langer – (Milano); Nicola Latronico – (Brescia); Paolo Malacarne – (Pisa); Daniele Poole (Belluno); Danilo Radrizzani – (Legnano, MI); Mario Tavola – (Lecco); Franco Zuccaro (Matera).

A full list of participants is available on the project website: www.giviti.marionegri.it/MargheritaDue.asp

References

Bertolini, G., Rossi, C., et al. (2007) Use of Drotrecogin alfa (activated) in Italian intensive care units: the results of a nationwide survey. Intensive Care Med, 33, 426-34.

Boffelli, S., Rossi, C., et al. (2006) Continuous Quality Improvement in Intensive Care Medicine. The GiViTI Margherita Project - Report 2005. Minerva Anestesiol, 72, 419-32.

Boffelli, S., Rossi, C., et al. (2008) Progetto Margherita, Promuovere la ricerca e la valutazione in Terapia Intensiva. Rapporto 2007., Bergamo, Ed. Sestante.

Le Gall, J. R., Lemeshow, S., et al. (1993) A new Simplified Acute Physiology Score (SAPS II) based on a European/North American multicentre study. JAMA, 270, 2957-63.

Lovegrove, J., Valencia, O., et al. (1997) Monitoring the results of cardiac surgery by variable life-adjusted display. Lancet, 350, 1128-30.

Malacarne, P., Langer, M., et al. (2008) Building a continuous multicentre infection surveillance system in the intensive care unit: findings from the initial data set of 9,493 patients from 71 Italian intensive care units. Crit Care Med, 36, 1105-13.

Jean-Louis Vincent
Dept of Intensive Care
Erasme Hospital
Université Libre de Bruxelles
Brussels, Belgium
jlvincent@ulb.ac.be

CLINICAL TRIALS IN INTENSIVE CARE MEDICINE

Intensive care medicine is one area of medical practice where the conduct of clinical trials is often difficult, largely because of the very heterogeneous nature of our patient population. As a result, a large part of our standard-of-care practice has never actually been demonstrated to be effective in randomised controlled trials! But with financial constraints biting and demands from all quarters for us to justify our actions, intensive care is now playing catch up. The formation of national and international consortiums of critical care physicians has helped in this process and the initial trickle of results from large, high quality, multi-centre randomised trials that are (re) assessing established and new interventions in many aspects of critical care therapeutics is now developing into a steady stream.

The 29th Symposium of Intensive Care and Emergency Medicine, to be held in Brussels from March 24-27, 2009, will provide participants with the opportunity to discover the results from some of these studies, a number of which will be presented for the very first time. Here's a summary of just a few:

■ The NICE-sugar study

Results from this large Australasian and Canadian study are eagerly awaited-previous studies, by Van den Berghe and colleagues have been positive, but the VISEP and Glucontrol studies have shown negative results. We will also hear about a new study on tight blood sugar control in children.

■ rFVIIa in polytrauma

This study, targeting a reduction in mortality, was discontinued at an interim analysis for futility. Indeed, the mortality rate overall was much lower than anticipated so that it was hardly possible to reduce it further. However, the study did reveal some interesting facts, including that rFVIIa significantly decreased the number of transfusions.

■ Tissue factor pathway inhibitor (TFPI) in patients with community-acquired pneumonia (CAP)

Following a trial of TFPI in severe sepsis, which failed to show a consistent benefit on outcomes, but yielded some quite surprising findings, it is hoped that TFPI may prove to be effective in patients with CAP.

■ Extracorporeal support with the Molecular Adsorbent Recirculating System (MARS) in acute liver failure

The results of a recently completed multi-centre study will help determine whether this albumin dialysis system, available since 1993, can improve outcomes in this group of patients for whom there are few specific therapeutic options.

■ Early versus late tracheostomy in patients with prolonged mechanical ventilation

It has been proposed that early tracheostomy in patients receiving prolonged mechanical ventilation could be associated with improved outcomes. However, clinical studies so far have given conflicting results. This study may help provide some definitive answers.

■ Prone ventilation in ARDS

Prone positioning during mechanical ventilation in patients with acute respiratory failure has been widely shown to be associated with improved oxygenation, but studies so far have not been able to demonstrate that the improved oxygenation translates into improved survival. Results from a recent multi-centre Italian study will be presented.

This is just a small personal selection of the many clinical trial results that will be presented and discussed during the 29th ISICEM. Other new results include:

- Monitoring of immune status with HLA-DR receptors
- Guiding antibiotic therapy with repeated blood procalcitonin levels
- The effects of intravenous fluids on renal function
- Studies investigating the microcirculation using SDF or NIRS techniques
- Alternative modes of ventilation including NAVA and high frequency oscillation
- Monitoring of lung mechanics in ARDS, including pleural pressures, electrical impe dance tomography and SPECT techniques
- Automated weaning techniques
- Special formulas for nutrition

There will also be new data and/or sub-study results from older trials including:

- The MENDS trial comparing dexmedetomidine to benzodiazepines
- The VASST study on vasopressin in septic shock
- The Corticus study on hydrocortisone in septic shock

Finally, for this symposium appetizer, results will be presented from the Round Table conference on ICU-acquired weakness, which will be held immediately prior to the ISICEM and will gather a faculty of 24 experts in this field. With improved intensive care, patients are surviving longer, and syndromes of neuro/myopathy are increasingly being seen. ICU-acquired weakness can affect multiple aspects of ICU patient care, including weaning from mechanical ventilation and general mobilization, and can be a cause of delayed recovery and prolonged post-discharge disability. The Round Table will explore all aspects of this important complication of ICU care.

Delivering the very latest results from clinical trials around the world, the 29th ISICEM helps you keep right at the cutting edge of intensive care medicine.

Visit our website **www.intensive.org** for the latest program and join us in Brussels in March!

European Society of Anaesthesiology

ESA

Milan, Italy

Euroanaesthesia 2009

The European Anaesthesiology Congress

June 6-9

Symposia
Refresher Courses
Workshops
Industrial Symposia & Exhibition
Abstract Presentations

CME Accreditation
EACCME - UEM

Deadline abstracts:
December 15th 2008
Online submission:
www.euroanesthesia.org

ESA Secretariat
Phone +32 (0)2 743 32 90
Fax +32 (0)2 743 32 98
E-mail: registration@euroanesthesia.org

Jeannie Wurz
Medical Writer/Editor
Bern University Hospital
and University of Bern,
Bern, Switzerland
jeannie.wurz@insel.ch

STAFF REQUIREMENTS IN THE ICU

At the 21st Annual Congress of the European Society of Intensive Care Medicine, held September 21 to 24 in Lisbon, Portugal, six speakers gave presentations addressing the number and type of personnel needed in an intensive care unit (ICU) and how the organisation of work affects employees' mental health. Philipp Metnitz of Vienna began the session by pointing out that in 1996, all 15 members of the European Community spent less than 5% of their gross domestic product on healthcare, whereas now they spend somewhere in the range of 8–12%. "Staff is a very important resource in the intensive care unit, and it's a very expensive—if not the most expensive—resource," he said.

How Many Doctors Do We Need?
(Philipp Metnitz, Vienna, Austria)

Metnitz focused on the impact of physician staffing on patient outcome. All but one of the studies he presented found that intensive care physicians "are necessary. We are of utility. The patients benefit." These studies found that high-intensity ICU physician staffing decreases the odds of dying in the hospital. However, in a new study published in the Annals of Internal Medicine, Levy and coauthors say "exactly the contrary. The odds of hospital mortality were higher for patients managed by critical care physicians than for those who were not." This result will have to be discussed, he said.

How Many Nurses Do We Need?
(Rui Moreno, Lisbon, Portugal)

ESICM's new President Rui Moreno spoke about nursing workload scores, which were created in the 1970's to calculate patients' severity of illness. Today, these scores are used to quantify the nursing workload in an ICU. There are differences in the amount of nursing workload in different European countries, said Moreno, as well as differences within countries. "How many nurses you need depends on the complexity of care provided, but mainly on the amount of care provided," he said. "You have to make an effort to optimise this ratio."

How To Match Supply and Demand
(Bertrand Guidet, Paris, France)

If the workload per nurse is too high, said Bertrand Guidet, you will have more nosocomial infections, less successful weaning, more burnout, more nurse turnover, and more interpersonal conflicts. Because there is wide variation in workload and occupancy rate during the year, there is a need to adapt the supply of nurses to meet the demands. Nurses can handle a range of tasks, he said, including paperwork, documentation, computer work, quality assessment, and communication with patients and families.

Do We Need Additional Specialists in the ICU?
(Christian Putensen, Bonn, Germany)

Non-medical academic specialists have been shown to reduce errors and improve outcome, said Christian Putensen. The potential advantages of a specialist are concentration on a single skill, experience in solving particular problems, and performance of the same interventions very often. However, the more professions there are working in the ICU, the more rules you have for how to interact, the more that delegation and re-delegation is necessary, and the more information problems may occur in the ICU. As a result, "You have to talk to each other," he said.

What is the Best Shift Pattern?
(Julian Bion, Birmingham, United Kingdom)

The European Working Time Directive, passed in 1993, set maximum hours for workers in countries belonging to the European Union. The implementation date limiting hours of work to 48 per week is August 2009. Eleven countries are compliant with the ruling, said Julian Bion, and 17 are not. Limiting hours of work requires more handovers, and "the more handovers you have, the more opportunities you have for error." According to Bion, a system based on 9-hour shifts seems to provide the best balance between work, duration of duty, and opportunities for education. People who work shifts of longer than 9 hours are involved in more accidents. "We know that fatigue increases those error rates. And we know that error is linked to burnout," he said. However, the reduction in fatigue may be offset by errors from loss of continuity of care.

The Impact of ICU Organisation on Burnout
(Laurent Papazian, Marseille, France)

Burnout was described more than 30 years ago in the United States, said Laurent Papazian. It is a syndrome in response to stressors on the job, and is associated with a variety of symptoms, among them reduced energy and job enthusiasm, emotional distancing from patients, feelings of incompetence, and lack of productivity.

Workload and burnout are linked, said Papazian. In a study in surgical wards, each additional patient per nurse was associated with a 7% increase in 30-day mortality, a 23% increase in burnout, and a 15% increase in job dissatisfaction. Consequences of burnout include absenteeism, intention to leave the job, turnover, lower productivity and effectiveness at work, negative impact on other colleagues, and interpersonal conflicts, he said.

There is good news for well-organised ICU's, however. "Improved organisation contributes to improved well-being of physicians and nursing staff, which could reduce burnout, promote patient safety, enhance recruitment and retention of staff, and finally, improve patient and family satisfaction," said Papazian.

Note: Jeannie Wurz's travel, accommodations and registration for the ESICM congress were paid by ESICM.

EUROPEAN SOCIETY OF INTENSIVE CARE MEDICINE

22nd annual congress

European Society of Intensive Care Medicine

Vienna, Austria
11-14 October 2009

ESICM VIENNA 2009

For physicians, nurses and other allied healthcare professionals

Abstract submission deadline
15 April 2009

For more information, contact
European Society of Intensive Care Medicine (ESICM)
Annual Congress secretariat Mrs Estelle Flament
Avenue Joseph Wybran, 40
B-1070 Brussels
Tel +32 2 559 03 55
Fax +32 2 527 00 62
public@esicm.org
www.esicm.org

AGENDA

MARCH 2009

24-27 29th International Symposium on Intensive Care and Emergency Medicine (ISICEM)
Brussels, Belgium
www.intensive.org

MAY 2009

29-30 7th Critical Care and Emergency Medicine Greek Army Medical Corps meeting
Athens, Greece
www.armyicu.gr

JUNE 2009

6-9 Euroanaesthesia 2009
Milan, Italy
www.euroanesthesia.org

10-13 30th Congress Scandinavian Society of Anaesthesiology and Intensive Care Medicine
Odense, Denmark
www.ssai.info

25-27 4th World Congress Abdominal Compartment Syndrome
Dublin, Ireland
www.wsacs.org

AUGUST/SEPTEMBER 2009

28-1 10th Congress of the World Federation of Societies of Intensive and Critical Care Medicine and 63° Italian National Congress of SIAARTI
Florence, Italy
www.wfsiccm-florence2009.it

2-5 3rd International Hypothermia Symposium
Lund, Sweden
www.hypo2009.com

OCTOBER 2009

11-14 22nd annual congress European Society of Intensive Care Medicine
Vienna, Austria
www.esicm.org

NOVEMBER 2009

11-13 The Critical Care Canada Forum 2009
Toronto, Canada
www.criticalcarecanda.com

In our Next Issue

COVER STORY
-Elderly Care

PRODUCT COMPARISON CHART
-Multiple Medical Gas Monitors

HYPOTHERMIA SERIES
- Pre-hospital Hypothermia for Cardiac arrest

COUNTRY FOCUS
-France

CONGRESS PREVIEW
-ESA

Letters to the Editor & Requests for References Cited in ICU Management
editorial@icu-management.org

ICU Management is the Official Management and Practice Journal of the International Symposium on Intensive Care and Emergency Medicine.

GUEST AUTHORS
R. Armonda, R. Barraco, G. Bertolini, M. Capuzzo, C. Dallaire, C. Granger , H. Hand, M. Langer, P.-A. Lapointe, V. Nobre, D. Poole, J. Pugin, D. Resi, M. Searcy , K. Wartenberg, J. Wurz

ICU MANAGEMENT IS PUBLISHED BY
EMC Consulting Group
28, rue de la Loi, B-1040 Bruxelles, Belgium
E-mail: office@icu-management.org
Website: www.icu-management.org

PUBLISHER AND CEO
Christian Marolt c.m@icu-management.org

MEDIA CONTACT, MARKETING, ADVERTISING
Katya Mitreva k.m@icu-management.org

SUBSCRIPTION RATES

One year	Europe	53 Euros
	Overseas 68	Euros
Two years	Europe	89 Euros
	Overseas	105 Euros

Note: Participants of the International Symposium on Intensive Care and Emergency Medicine receive a one year subscription as part of their symposium fee.

ARTWORK
Aleksander Bugge a.b@emcconsulting.eu

PRODUCTION AND PRINTING
Total circulation: 7,085
ISSN = 1377-7564

REFERENCES
References cited in this journal are provided to EMC Consulting Group by the authors and are available on request at editorial@icu-management.org.

Verified Circulation
according to the standards of International Business Press Audits

ICU Management is independently audited by Accountskantoor Closset on behalf of International Symposium on Intensive Care and Emergency Medicine

EMC Consulting - Your Gateway to European Healthcare Management Consulting

- Strategic healthcare management consulting
- E-Health and education
- Media, public relations and communications
- Event Cocooning
- Congress and conference participation
- Association representation and lobbying
- EU project communications

EMC Consulting Group

EMC Consulting Group - 28, rue de la Loi - 1040 Brussels - Belgium
Tel: +32 2 286 8500 -Fax: +32 2 286 8508 -Email: office@emcconsulting.eu - www.emcconsulting.eu

Oxepa

Not just another fish in the bowl

Oxepa® uses EPA + GLA, rather than just EPA from fish oil, to improve treatment results in critically ill patients. In preclinical studies, this combination shows improved cardiopulmonary hemodynamics and respiratory gas exchange over EPA alone.

Oxepa offers therapeutic nutrition for modulating inflammation in ALI, ARDS and sepsis patients. Oxepa is not fortified with arginine because it may not be beneficial to sepsis patients whose overactive immune systems do not need more stimulation.

Studies show that Oxepa is not just nutrition; it's nutritional therapy.

Oxepa use reduces:*

- Risk of mortality.
- Development of new organ failure.
- Number of days a patient is on a ventilator.
- Length of patient stay in the ICU.

And we have the science to prove it!

Can you afford not to feed Oxepa to your patients?

For more information, contact your Abbott representative.

*Pontes-Arruda A, et al. *JPEN J Parenter Enteral Nutr.* 2008;32:596-605.

Abbott
A Promise for Life