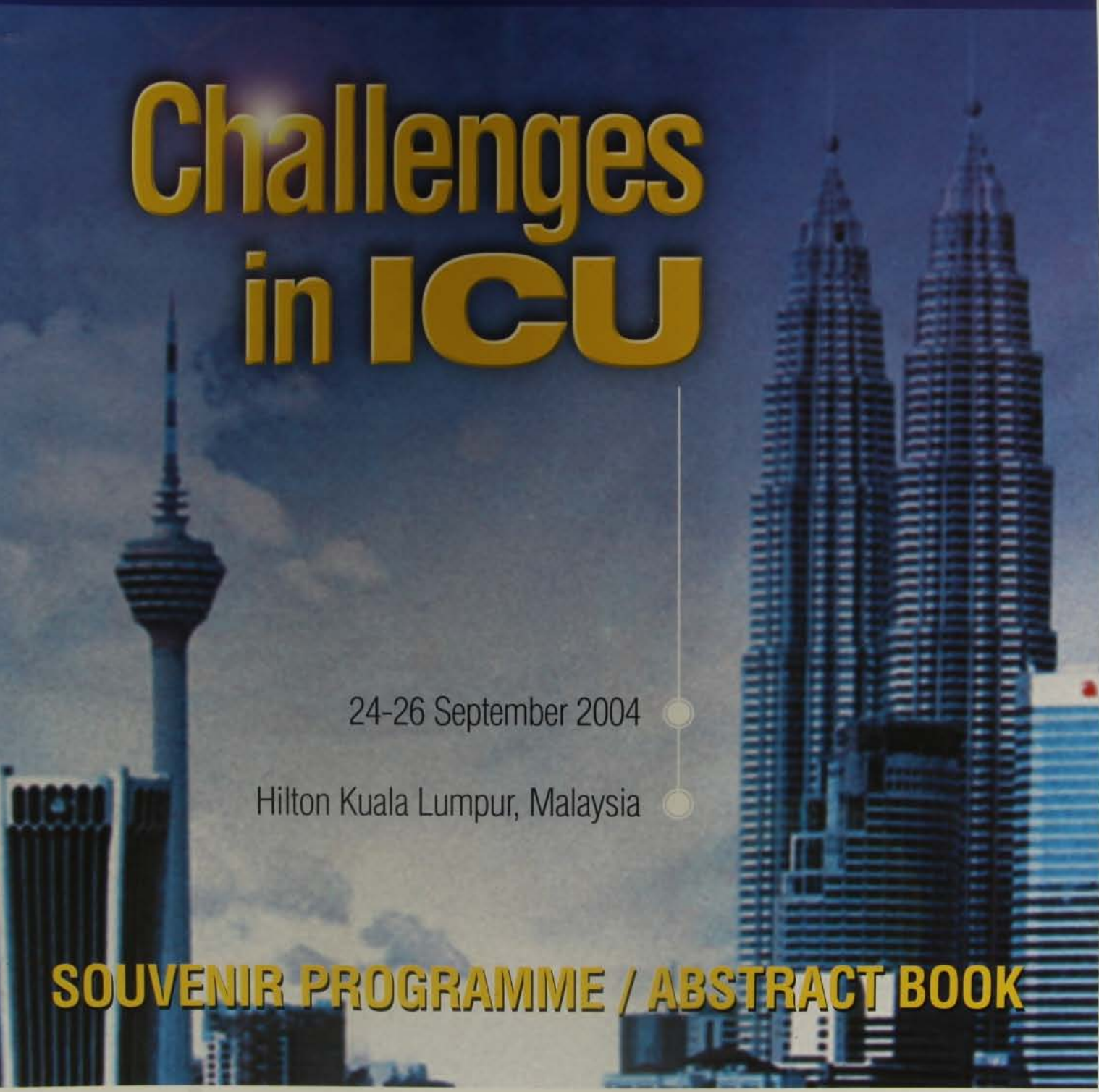
2ND NATIONAL CONFERENCE ON INTENSIVE CARE



Challenges in ICU

24-26 September 2004

Hilton Kuala Lumpur, Malaysia

SOUVENIR PROGRAMME / ABSTRACT BOOK

Organised by :

Critical Care Medicine Section,
Malaysian Society of Anaesthesiologists

In Collaboration with

Ministry of Health Malaysia

Challenges in ICU CONTENTS

Message

Following the hugely successful inaugural conference last year and the organization of this second national conference, the Critical Care Medicine Section of MSA has set the trend for its national conference to be held on a yearly basis. This yearly meeting dedicated to the science and art of caring for the critically ill in the intensive care unit setting is a big boost to intensive care which is a fast developing subspecialty in Malaysia.

The conference not only provides updates on intensive care, it also provides an opportunity for doctors and nurses to meet and to exchange views. I am pleased to note that a separate symposium on intensive care nursing has been planned to reflect the importance of nursing in the intensive care units. Paediatric intensive care is also included and this holistic approach to intensive care is commendable.

The Ministry of Health will continue to support and work closely with professional bodies in continuing medical education activities such as this. I thank the Organising Committee and the Critical Care Medicine Section of MSA for organising this conference and I hope you will have a great meeting.

Tan Sri Datu Dr Hj Mohamad Taha B Arif
Director General of Health
Ministry of Health, Malaysia

2nd NATIONAL CONFERENCE ON INTENSIVE CARE
24-26 September 2004 • Hilton Kuala Lumpur, Malaysia

Message

We are privileged to welcome you to the 2nd National Conference on Intensive Care organized by the Critical Care Medicine Section of the Malaysian Society of Anaesthesiologists. There is no doubt that the field of Intensive Care is challenging hence the appropriately chosen theme "Challenges in ICU".

To meet this challenge however the Organizing Committee has brought together a world class faculty consisting of both foreign as well as local speakers. The topics to be covered are diverse and very vast but the Committee has ensured that the theme is comprehensively covered and whether you are a specialist or a medical officer in training, you will definitely find lots of interesting topics that you can identify with.

There is no doubt that this is one of the rare opportunities for thoughts to be clarified as the Committee has gone to great lengths to gather all these experts under one roof. We are grateful to all our speakers who have travelled from afar to help us meet up with the challenges of providing knowledge-based care to our critically ill patients.

Professor Chan Yoo Kuen
President
Malaysian Society of Anaesthesiologists

Message

It is a pleasure organising the 2nd National Conference on Intensive Care as I am supported by a hardworking committee, an efficient secretariat and an enthusiastic crowd. The support we get goes beyond my expectation and it is no wonder that I now harbour an ambition to develop this meeting into a "must-attend yearly meeting" by health care providers in Malaysia.

As in last year, we have invited renowned speakers from overseas who are supported by our own local speakers in all the symposia sessions. Our aim of organising this conference is not only to provide an update on the topics in intensive care but also to nurture local clinicians to become world class speakers. Our theme this year is "Challenges in ICU" with the focus on sepsis and its related topics. The scientific programme is carefully planned to meet the clinicians' needs with the hope to influence local practices.

We were shocked and saddened by the sudden demise of our speaker and friend from Indonesia, Dr Iqbal Mustafa, founding council member and past president of the Western Pacific Association of Critical Care Medicine. Dr. Iqbal was an outstanding clinician who had contributed significantly to intensive care in this region. The organising committee extends its deepest condolences to Dr Iqbal's family and the Indonesian Society of Anaesthetists on their tragic loss.

I sincerely hope this conference meets your expectations and that you have a great time during the conference.

Thank you.

Dr Ng Siew Hian
Chairperson
Organising Committee
2nd National Conference on Intensive Care

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Programme Summary

Time	24 September 2004 (Friday)		25 September 2004 (Saturday)		26 September 2004 (Sunday)	
0800 - 1700	Registration		Plenary 2		Plenary 4	
0830 - 0900	Plenary 1					
0900 - 0930			Plenary 3		Plenary 5	
0930 - 1000	Opening Ceremony					
1000 - 1045	Trade Exhibition / Tea		Tea		Tea	
1045 - 1230	Symposium 1	Symposium 2	Symposium 5	Symposium 6	Symposium 9	Symposium 10
1230 - 1430	Lunch / Friday Prayers		Lunch		Lunch	
1430 - 1615	Symposium 3	Symposium 4	Symposium 7	Symposium 8		
1615 - 1630	Tea		Tea			
1630 - 1800	Free Papers		College of Anaesthesiologists Consensus Statement			
1830 - 2000	Evening Satellite Symposium Wyeth (M) Sdn Bhd		Evening Satellite Symposium Pall (M) Sdn Bhd			

Programme • 24 September 2004 (Friday)

0800 - 1700	**Registration**	
0830 - 0930	**Plenary 1** Ballroom B & C ***(K Inbasegaran)*** **Evolving concepts in haemodynamic support** *(CHARLES GOMERSALL)* - page 16	
0930 - 1000	**Opening Ceremony**	
1000 - 1045	**Trade Exhibition / Tea**	
1045 - 1230	**SYMPOSIUM 1** Ballroom B ***(Shanti Rudra Deva / Melor Mansor)***	**SYMPOSIUM 2** Ballroom C ***(V Sivasakthi / Jenny Tong)***
1045 - 1110	**1. Optimising antibiotic strategies** *(SURESH KUMAR)*	**1. The timing of interventions in the management of sepsis** *(JEAN-LOUIS VINCENT)* - page 18
1110 - 1135	**2. Severe Gram positive infections** *(CHARLES GOMERSALL)* - page 16	**2. Community-acquired pneumonia** *(LEE KANG HOE)* - page 19
1135 - 1200	**3. Nosocomial infection surveillance in ICU** *(TAN CHENG CHENG)* - page 17	**3. Multi-organ management in severe sepsis** *(JEAN-LOUIS VINCENT)* - page 19
1200 - 1225	**4. Severe fungal infection** *(CHARLES GOMERSALL)* - page 18	**4. Dengue haemorrhagic fever** *(TAI LI LING)* - page 20
1230 - 1430	**Lunch / Friday Prayers**	
1430 -1615	**SYMPOSIUM 3** Ballroom B ***(Irene Cheah)***	**SYMPOSIUM 4** Ballroom C ***(Mohamed Ali Salleh / Lela Mansor)***
1430 - 1505	**1. Septic shock in paediatric patients: Are there new treatments?** *(TANG SWEE FONG)* - page 21	**Neurosurgical intensive care interactive session** *(THOMAS LEW, KWEK TONG KIAT, ESTHER GEH)* - page 22
1505 - 1540	**2. Neonatal sepsis: Current perspectives** *(CHEAH FOOK CHOE)* - page 21	
1540 - 1615	**3. High frequency ventilation in neonates and children** *(CHEUNG KAM LAU)* - page 22	
1615 - 1630	**Tea**	
1630 - 1800	**Free papers**	
1830 - 2000	**Evening Satellite Symposium (Wyeth (M) Sdn Bhd)** Ballroom B The role of antibiotics in today's management of severe sepsis *(LEE KANG HOE)*	

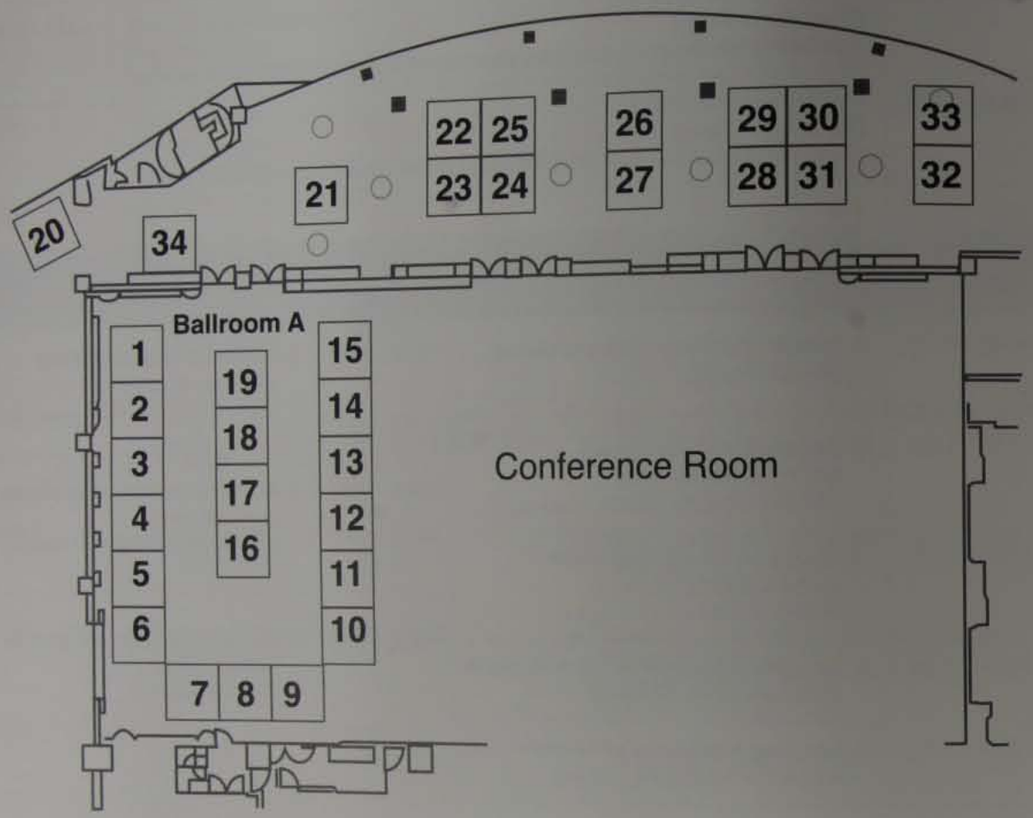
Programme • 25 September 2004 (Saturday)

0800 - 0900	**Plenary 2** Ballroom B & C ***(Ng Siew Hian)*** **Sepsis: What do we know, what do we need?** *(JEAN-LOUIS VINCENT)* ~ page 23	
0900 - 1000	**Plenary 3** Ballroom B & C ***(Ng Siew Hian)*** **Ethical issues in intensive care** *(DAVID TUXEN)*	
1000 - 1045	**Tea**	
1045 – 1250	**SYMPOSIUM 5** Ballroom B ***(V Kathiresan / Jaafar Mohd Zain)***	**SYMPOSIUM 6** Ballroom C ***(Aisai Abdul Rahman / R Raveenthiran)***
1045 - 1110	**1. "Open the Lungs"** ~ page 25 *(DAVID TUXEN)*	**1. The holistic approach to the care of the critically ill patient** *(S PATHMAWATHI)* ~ page 29
1110 - 1135	**2. The use of non-invasive mechanical ventilation in non-COPD, non-hypercapnic acute respiratory failure** *(SYED ROZAIDI WAFA)* ~ page 26	**2. Coping with dying patients and their relatives** *(S SATIAPOORANY)* ~ page 29
1135 - 1200	**3. Patient-ventilator interactions** *(ALAN WONG)* ~ page 27	**3. Clinical practice in neuroscience intensive care unit** *(ANG SEOK KHIM)* ~ page 30
1200 - 1225	**4. How to ventilate a patient with chest trauma** *(JAMSARI SUKRO)*	**4. Competency training in neuroscience intensive care unit** *(TAN GEK LEE)* ~ page 30
1225 - 1250	**5. When to tracheostomise** *(DAVID TUXEN)* ~ page 28	
1250 - 1400	**Lunch**	
1400 – 1605	**SYMPOSIUM 7** Ballroom B ***(Tan Cheng Cheng / Oloan E Tampubolon)***	**SYMPOSIUM 8 (Pro-con debate)** Ballroom C ***(Mohd Basri Mat Nor / Lim Wee Leong)***
1400 - 1425	**1. Acute cardiac decompensation** *(LEE KANG HOE)* ~ page 31	1400 - 1500 **1. Outcome from continuous renal replacement therapy is better than intermittent haemodialysis in the critically ill** *(RAVINDRAN V / AHMAD FAUZI ABDUL RAHMAN)* ~ page 36
1425 - 1450	**2. Acute hepatic failure** *(FELICITY HAWKER)* ~ page 32	
1450 - 1515	**3. Management of venous thrombo-embolism (VTE) in the ICU** *(THOMAS LEW WK)* ~ page 33	
1515 - 1540	**4. Disseminated intravascular coagulation in intensive care** *(NIK ABDULLAH NIK MOHAMAD)* ~ page 34	1500 - 1600 **2. Crystalloids are better than colloids for resuscitation in septic shock** *(JENNY TONG MG / V SIVASAKTHI)* ~ page 38
1540 - 1630	**Tea**	
1630 - 1745	**College of Anaesthesiologists Consensus Statement**	
1830 - 2000	**Evening Satellite Symposium (Pall (M) Sdn Bhd)** Ballroom B Breathing system filter as a measure of infection control in anaesthesia and intensive care *(ENVER VARKA)*	

Programme • 26 September 2004 (Sunday)

0800 - 0900	**Plenary 4** Ballroom B & C ***(Tang Swee Fong)*** **Assessing quality of care in intensive care** *(FELICITY HAWKER)* ~ page 39	
0900 - 1000	**Plenary 5** Ballroom B & C ***(Tang Swee Fong)*** **Evidence-based practice in paediatric critical care** *(CHEUNG KAM LAU)*	
1000 - 1030	**Tea**	
1045 - 1250	**SYMPOSIUM 9** Ballroom B ***(Jahizah Hassan / Khoo Teik Hooi)***	**SYMPOSIUM 10** Ballroom C ***(S Sushila)***
1045 - 1110	**1. Immunonutrition - Current status** *(GRACIE ONG)*	1045 – 1120 **1. Nutritional support in the critically ill child** *(LOH TSEE FOONG)* ~ page 42
1110 - 1135	**2. Sedation and analgesia - Are we doing it right?** *(SHANTI RUDRA DEVA)* ~ page 40	1120 – 1155 **2. Acute brain injuries in infants and children** *(CHEUNG KAM LAU)* ~ page 42
1135 - 1200	**3. Issues on blood transfusion in the critically ill** *(KWEK TONG KIAT)* ~ page 40	
1200 - 1225	**4. Imaging modalities in the critically ill** *(KAMARUDDIN JAALAM)*	1155 – 1230 **3. Utilising inotropic support in septic shock** *(ADRIAN GOH)*
1225 – 1250	**5. Long-term outcome of intensive care** *(FELICITY HAWKER)* ~ page 41	
1250 - 1400	**Lunch**	

Trade Exhibition



Ballroom A	
1, 2	Advance Medical System (M) Sdn Bhd
3	T-Medic Sdn Bhd
4	Hospitech Marketing Sdn Bhd
5	Laerdal Hospiline Sdn Bhd
6	Dynamed Sdn Bhd
7	Jebsen & Jessen Technology (M) Sdn Bhd
8, 9	Ideal Healthcare Sdn Bhd
10	Multidata Medic (M) Sdn Bhd
11	Anugerah Saintifik Sdn Bhd
12	Cook Asia (M) Sdn Bhd
13, 14	Hospimetrix Sdn Bhd
15	Insan Bakti Sdn Bhd
16, 17, 18, 19	Malaysian Healthcare Sdn Bhd

Ballroom Foyer	
20	KL Med Supplies (M) Sdn Bhd
21	JDH Logic-Med Sdn Bhd
22, 23, 24, 25	B Braun Medical Supplies Sdn Bhd
26, 27	Pfizer (Malaysia) Sdn Bhd
28, 31	Heal Marketing Sdn Bhd
29	Humedical (M) Sdn Bhd
30	Suria-Medik Sdn Bhd
32	3M Malaysia Sdn Bhd
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Acknowledgments

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Abstracts

EVOLVING CONCEPTS IN HAEMODYNAMIC SUPPORT

C D Gomersall
Department of Anaesthesia & Intensive Care, The Chinese University of Hong Kong, Hong Kong

Several concepts have developed in haemodynamic research over the past few years. These include new drugs such as levosimendan, new uses for old drugs such as vasopressin, the importance of the right ventricle, use of indicators of fluid responsiveness and the importance of the microcirculation.

Levosimendan is a new calcium sensitizing agent which has positive inotropic effects that are not mediated via adrenergic receptors.

Vasopressin is increasingly being advocated as a vasopressor for patients with septic shock although its exact role has yet to be clearly established.

The clinical importance of right ventricular function in critically ill patients is increasingly being recognized. Mechanically ventilated patients frequently have raised pulmonary artery pressures which predisposes to right ventricular dilatation which in turn impacts on left ventricular function as a result of ventricular interdependence.

The difficulties of measuring preload have long been recognized but it is only recently that a more pragmatic approach of assessing fluid responsiveness rather than preload has been adopted. Several different methods of assessing fluid responsiveness have been studied including pulse pressure variation and systolic pressure variation.

The microcirculation is receiving more attention with studies demonstrating microcirculatory shunting at a capillary level. These data, however, are difficult to reconcile with data suggesting supranormal tissue PO2 in septic patients.

Details of the topics discussed in this lecture will be available at http://www.aic.cuhk.edu.hk/web8/

SEVERE GRAM POSITIVE INFECTIONS

C D Gomersall
Department of Anaesthesia & Intensive Care, The Chinese University of Hong Kong, Hong Kong

Gram positive infections remain a significant problem in critically ill patients, causing a wide range of infections ranging from toxic shock syndromes to complicated soft tissue infections and pneumonia. The problem is exacerbated by the increasing prevalence of resistant organisms such as pneumococci with reduced penicillin susceptibility , methicillin resistant staphylococci and, to a lesser extent, vancomycin resistant enterococci. Luckily several drugs which are effective against these organisms have already been marketed (eg linezolid, quinupristin/dalfopristin and daptomycin) and others are due for release in the next couple of years. These drugs may prove to be more effective against deep tissue infection with these resistant organisms due to their better tissue penetration. In addition they have the advantage of a better adverse effect profile than the glycopeptides.

Further information about the topics discussed in this lecture will be available at http://aic.cuhk.edu.hk/web8

Potential conflict of interest: the Dept of Anaesthesia & Intensive Care, Chinese University of Hong Kong has received educational grants and payment for contract research from Pfizer Corporation. Dr Gomersall's travel and accommodation costs have also been paid by Pfizer Corporation.

35% resistant to unasyn and 48% resistant to imipenem. With regard to Klebseilla species, 100% of them are resistant to ampicillin, 41% resistant to gentamycin and 56% resistant to 3rd generation cephalosporin. For Pseudomonas aeroginosa, 17% of them are resistant to aminoglycoside while 13% of them are resistant to 3rd generation cephalosporin.

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Abstracts

NOSOCOMIAL INFECTION SURVEILLANCE IN ICU

Tan Cheng Cheng
Intensivist and Anaesthetist, Hospital Sultanah Aminah, Johor Bahru, Johor, Malaysia

Surveillance is a dynamic process of gathering, analyzing and interpreting data on events that occur in a specific population. It is closely integrated with the timely dissemination of these data to those who need to know. Surveillance is an essential component of effective clinical programs designed to reduce the frequency of adverse events such as infection or injury.

Steps in surveillance include:- (i) definition of the event(s), (ii) systematic collection of data, (iii) summarization of data, (iv) analysis and interpretation, (v) consuming the results for improvement.

In ICU, surveillance is now considered the "cornerstone" of an infection control program. The scientific basis for surveillance as a part of a hospital infection control program was established by the landmark Study on the Efficacy of Nosocomial Infection Control (SENIC).

The SENIC project was a study that was conducted by the Center of Disease Control (CDC) in 1974 to evaluate the efficacy of common nosocomial infection prevention programs in reducing the rate of infection in 4 important infections: surgical site infection, urinary tract infection, pneumonia and bacteremia. The SENIC investigators recognized (and wished to measure) how the surveillance activity itself could influence patient care through the Hawthorne effect (ie, how healthcare workers may alter their practice when they see that someone is watching and is interested in how they are caring for patients).

The SENIC project found that reduced rates of nosocomial infections were strongly associated with intensive surveillance activities. It showed that nosocomial infection rates decreased on average 32% in hospitals where surveillance programs were implemented, compared with an increase of 18% in other institutions over a 5–year period.

Surveillance methodologies are either concurrent or retrospective. Concurrent surveillance is flexible, informative, timely, capable of cluster detection and capable of changing behavior but expensive while retrospective surveillance depends on completeness, validity and accuracy of existing data and does not identify problems as promptly as concurrent does but isn't expensive. The approaches to surveillance may be hospital wide, periodic, targeted or outbreak response surveillance.

Total surveillance with the meticulous collection of clinical and microbiological data for each hospitalized patient is labor-intensive, time consuming and not always feasible on a practical basis. At the other end of the spectrum, the computerized surveillance of data from the microbiology laboratory alone gives limited information, which may be pertinent to a specific problem.

At present, the most established surveillance system is the CDC National Nosocomial Infection Surveillance System which publishes its report once a year and the report is easily available from the internet.

In Malaysia, we are yet to establish our surveillance system nationwide. So far data have been collected by the microbiology laboratory without much clinical input.

In the National Audit ICU, the incidence of ventilator-associated pneumonia (VAP) was 26.9 VAP per 1000 ventilator days. This incidence is above the 90th percentile of the NNIS benchmark (which is 17.5 VAP per 1000 ventilator days.) The top three common organisms are Acinetobacter species, Klebseilla species and Pseudomonas aeroginosa.

Data from Hospital Sultanah Aminah, Johor Bahru showed that 62% of the Acinetobacter species are resistant to gentamycin,

In conclusion, nosocomial infection surveillance is an integral part of infection control in ICU and should be given adequate emphasis in our infection control program.

Abstracts

SEVERE FUNGAL INFECTION

C D Gomersall
Department of Anaesthesia & Intensive Care, The Chinese University of Hong Kong, Hong Kong

Fungal infections are increasingly important in critically ill patients, representing the fourth most common cause of bloodstream infection. Data from around the world, including the Far East, demonstrate that not only is fungal infection becoming more common but the prevalence of non-albicans Candida infection is increasing. Diagnosis of fungal infection remains difficult although use of specialized fungal blood culture bottles increases the sensitivity of blood cultures. Treatment options have, however, increased with the introduction of new anti-fungal agents: caspafungin, micafungin and voriaconazole. These agents are less toxic than amphotericin B and should significantly reduce the risks of empirical therapy in situations where non-albicans Candida infection is suspected.

More information about the topic covered in the lecture are available at http://www.aic.cuhk.edu.hk/web8

Potential conflict of interest: the Dept of Anaesthesia & Intensive Care, Chinese University of Hong Kong has received educational grants and payment for contract research from Pfizer Corporation and educational grants from Merck Sharp & Dohme. Dr Gomersall's travel and accommodation costs for the conference have been paid by Pfizer Corporation.

THE TIMING OF INTERVENTIONS IN THE MANAGEMENT OF SEPSIS

Jean-Louis Vincent
Head of Department, Department of Intensive Care, Erasme University Hospital, Brussels, Belgium

Time is money is a well-known adage but in the patient with sepsis, we could say "time is tissue". Several studies have demonstrated the importance of early effective management in patients with sepsis. Early and appropriate antibiotic therapy improves outcomes in patients with sepsis, and early, intensive goal-directed resuscitation is associated with improved survival rates compared to standard therapy in patients with severe sepsis and septic shock. Another important recent finding has come from the ENHANCE study, an open label study that included 2378 patients treated with drotrecogin alfa (activated), a drug that has been shown to improve morbidity and mortality from sepsis in an earlier randomised controlled trial (PROWESS). The ENHANCE study showed similar survival benefits to those seen in PROWESS, but in addition, suggested that earlier treatment (within 24 hours of development of the first sepsis-induced organ dysfunction), was associated with greater lower mortality rates. An integrated database, INDEPTH, has also been developed, combining the results of ENHANCE and PROWESS and comparing them to groups of patients with severe sepsis who did not receive drotrecogin alfa. From this database, treatment by time interactions were noted with a relative risk of 0.67 if treatment was given immediately the first sepsis-induced organ dysfunction developed, 0.46 if it was given within 12 hours and 0.88 within 24 hours. The relative risk estimate was 1 at 35 hours. The challenge now is to find ways of enabling us to diagnose sepsis early so that patients can benefit from early intervention. Current markers or signs of sepsis, e.g., fever, white blood cell count, C-reactive protein, procalcitonin, etc., are all non-specific and diagnosis relies on the combined presence of multiple clinical, hemodynamic, and biochemical features. New, specific diagnostic aids are urgently needed as well as a keen awareness and alertness of physicians to the possible diagnosis of sepsis so that treatments can be started as early as possible in the course of the disease process.

But there is still much we do not know. For example, as other immunomodulating drugs are developed that also reduce mortality, which agent should be given to which patient? Or will combinations of drugs be needed, and if so which and at what doses? Improved markers of sepsis are needed to enable early identification and diagnosis of patients with sepsis. Genetic typing is also being developed and may have a place in helping to individualize treatments. The recently suggested PIRO (predisposition, infection, immune response, organ dysfunction) system of 'staging' sepsis is still in the early stages of development but will help to characterize patients, to target treatments, and to monitor response to therapy.

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Abstracts

COMMUNITY-ACQUIRED PNEUMONIA

Lee Kang Hoe
Department of Medicine, National University Hospital, Singapore

Community-acquired pneumonia (CAP) is a common problem leading to hospitalization and in severe cases, ICU admission for septic shock or respiratory failure requiring ventilatory support. There are certain criteria that predict severity: revised ATS criteria (this rule was met if at least two of three minor criteria assessed at admission (systolic blood pressure <90 mm Hg, multilobar (>2 lobes) involvement, PaO2/FiO2 <250) or one of two major criteria assessed at admission or during follow up (requirement for mechanical ventilation or septic shock) were present) and the British CURB65 criteria (any of the following; confusion, urea > 7 mol/L, RR ≥30/min, blood pressure (SBP <90 mm Hg or DBP ≤60 mm Hg), age ≥65 years). These may be used as criteria for ICU admission.

There are various guidelines from different societies and organizations that provide recommendations for antibiotic choices depending on likely organisms based on the clinical severity. Most antibiotic choices are empiric, and the correct choice does improve outcome, although more than 50% of patients may not have an identifiable pathogen. Administration of an antibiotic should be within 4 hours of hospitalization to improve outcome.

Some newer biomarkers should be considered for predicting the likelihood of bacterial infection as well as the presence of pneumonia (e.g. procalcitonin, and sTREM-1). Other new microbiological rapid testing may also be helpful, e.g. streptococcal urinary antigen and Legionella urinary antigen testing. Note that tuberculosis is still an important cause of CAP locally, and there may be some added value to PCR testing for smear negative cases. Another important pathogen to consider would be Burkholderia pseudomallei in the local setting, especially in a diabetic patient.

If the patient develops severe sepsis with multiple organ failure, they may require organ support. The interventions as discussed in the recent publication, "Surviving Sepsis Campaign Guidelines guidelines for management of severe sepsis and septic shock." Important points to consider include the ventilatory management of ARDS to minimize ventilator induced lung injury, and the reduction in mortality from replacement therapy with activated protein C.

MULTI-ORGAN MANAGEMENT IN SEVERE SEPSIS

Jean-Louis Vincent
Head of Department, Department of Intensive Care, Erasme University Hospital, Brussels, Belgium

Sepsis can range in severity from a minor reaction to a urinary tract infection, to full-blown multiple organ failure. To characterize the degree of organ dysfunction, we no longer use a dichotomous separation between the presence and absence of organ dysfunction, but prefer a grading system such as the sequential organ failure assessment (SOFA) score. This score uses very simple variables, which are routinely used in every institution, to characterize the degree of organ dysfunction (score of 1 or 2) or failure (score of 3 or 4) for each of six organ systems: cardiovascular, respiratory, renal, hepatic, neurological, and coagulation. The effects of treatments on organ dysfunction can thus be easily monitored over time, and increasingly are being included in trials of new therapeutic agents to complement mortality data. The PROWESS randomized controlled study of recombinant activated protein C, identified as drotrecogin-alfa (activated), in patients with severe sepsis or septic shock showed reduced mortality rates in treated patients. Organ function was also improved in treated patients with reduced vasopressor requirements and duration of mechanical ventilation resulting in shorter times to resolution of cardiovascular or respiratory dysfunction.

The management of patients with severe sepsis relies heavily on adequate basic resuscitation with fluids and vasopressors, eradication of the infectious organism and source, and support of failing organs. General approaches such as drotrecogin alfa activated can help improve overall organ function, and developments are continuously being made in the management of individual organ failures. For example, studies have indicated that mechanical ventilation with relatively large tidal volumes may result in increased mortality rates in patients with acute lung injury (ALI) or acute respiratory distress syndrome (ARDS), and it is advised to limit the tidal volume in patients with acute inflammatory response who require mechanical ventilation. Renal support systems are also developing and the introduction of more biocompatible membranes or use of continuous rather than intermittent extracorporeal support techniques may help improve outcomes. There is no one cure for the patient with severe sepsis or septic shock, rather their treatment needs to be considered as a "package".

Abstracts

DENGUE HAEMORRHAGIC FEVER

Tai Li Ling
Department of Anaesthesia and Intensive Care, Hospital Kuala Lumpur, Kuala Lumpur, Malaysia

Dengue fever was first described as "breakbone fever" in 1780 while the haemorrhagic form was first recognised in the Philippines in 1953. In Malaysia, classical dengue fever was first reported in 1901 and dengue haemorrhagic fever (DHF) in 1962, both in Penang.

Dengue virus is of the family Flaviviridae and transmitted by bites from the Aedes mosquito. There are 4 dengue serotypes which produce clinically identical disease, and all can produce DHF and dengue shock syndrome (DSS) in decreasing order of frequency: serotypes DEN -2, 3, 4, and 1. Individuals infected with one strain maintain lifelong homotypic immunity while remain susceptible to infections with other heterotypic strains. DHF/DSS is more likely to develop in secondary infections i.e. an individual previously infected with one serotype and later inoculated with a different serotype. This may be explained by the theory of antibody dependent enhancement, whereby cross reactive but non-neutralising antibodies from a previous infection bind to the new infecting serotype and facilitate virus entry into cells resulting in higher peak viral titres.

There is also higher risk of DHF in locations with two or more serotypes circulating simultaneously at high levels (hyperendemic transmission).

DHF is characterised by increased capillary permeability resulting in haemoconcentration and shock, usually at the time of defervescence of fever. Haemostatic changes in DHF involve vascular changes, thrombocytopenia, and coagulation disorders. Patients develop pleural effusions and ascites with a variable amount of bleeding. Warning signs that DSS is impending include sustained abdominal pain, persistent vomiting, change in level of consciousness or a sudden decrease in platelet count. Mortality can be as high as 10-20% (over 40% if shock occurs) but as low as 0.2% with early appropriate treatment.

The commonest method in diagnosis of dengue infection is serology tests in detecting specific antibody, IgM and IgG. More than 90% of patients develop detectable IgM antibody 6 to 10 days after onset of illness which persists for 1 to 3 months.

There is no specific therapeutic agent for dengue. Treatment is mainly supportive. Steroids have no proven role. No studies have found a difference in clinically significant outcomes between crystalloids or colloids used in volume replacement in DSS.

Until the Aedes mosquito can be effectively controlled or a cost effective vaccine developed, DHF can be expected to continue to escalate.

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Abstracts

SEPTIC SHOCK IN PAEDIATRIC PATIENTS: ARE THERE NEW TREATMENTS?

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Severe sepsis and septic shock are common causes of morbidity and mortality in critically ill patients. Septic shock evolves from a systemic inflammatory and coagulation response which is initiated as part of the body's response to an infection. However, simultaneous activation of the proinflammatory network and the coagulation system occurs with uncontrolled amplification of the coagulation cascade, excessive fibrin deposition and thrombosis of the microvasculature, ultimately leading to organ ischaemia, multiple organ dysfunction syndrome and death.

The search for a 'magic bullet' to disrupt this unregulated inflammatory and coagulation cascade has proved to be difficult. Several small clinical trials examining therapies such as steroids, immunoglobulins and anti-inflammatory agents in paediatric patients with sepsis have failed to show benefit. More recently, antithrombin III, bactericidal permeability-increasing protein, and activated protein C have been the focus of clinical research in this field.

How novel therapies affect children with severe sepsis remains unproven. There is, to date, no trial in the literature demonstrating a reduction in mortality from specific therapeutic intervention in children with severe sepsis. Furthermore, before new therapies are administered in children, the risks and benefits of the therapy much be weighed fully.

NEONATAL SEPSIS: CURRENT PERSPECTIVES

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Neonatal sepsis occurs as a result of bacterial infections acquired through two major modes of transmission - ascending infection from the maternal genital tract (early onset sepsis; EOS) and systemic invasion by organisms that colonise the infant (late onset sepsis; LOS). Neonatal sepsis is associated with high mortality, up to 50% of cases from EOS and 10% for LOS. While group B streptococcus remains to be a leading cause of EOS, the etiology of LOS in many countries now changes over to organisms that are predominantly commensals; coagulase negative staphylococcus (Staph. epidermidis) being a major pathogen, indirectly reflecting the increasing numbers of very low birth weight infants cared for in neonatal intensive care units. Recently, EOS has been shown to commence even in utero when the fetus is exposed to chorioamnionitis. Termed the fetal inflammatory response syndrome (FIRS), up to 45% of premature infants may show such evidence of intrauterine inflammation. Amniotic fluid and umbilical cord blood show elevated markers such as IL-6 and TNF-a, and fetal exposure to these pro-inflammatory cytokines has been associated with significant morbidity - white matter brain injury and bronchopulmonary dysplasia (BPD) with postnatal sepsis (LOS) regarded as an additional risk factor for the development of BPD. The diagnosis of sepsis in neonates demands high clinical acumen as the presenting signs and symptoms may be subtle or vague. Antibiotics should be started immediately when infection is suspected until cultures and other confirmatory laboratory results are available. Useful and early laboratory markers such as the immature to total neutrophil (I:T) ratio and c-reactive protein are the two most important and established rapid diagnostic assays for neonatal sepsis, while procalcitonin, IL-6 and lipopolysaccharide-binding protein have recently been introduced. The cornerstone in the management of neonatal sepsis lies in its prevention, such as the enforcement of strict hand hygiene practices, proper hub-care and "normalisation" of the care of the infant. Clinical manifestations of SIRS and MODS may be present in the neonate with sepsis; whether immuno-modulatory agents impact on the rate and prognosis of sepsis will depend on results of multi-centre studies on the use of intravenous immunoglobulin and prophylactic GM-CSF currently on trial.

Abstracts

HIGH FREQUENCY VENTILATION IN NEONATES AND CHILDREN

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After four decades of mechanical ventilation, high frequency ventilation appears to be gentle to the delicate lungs of premature babies. The key difference from conventional mechanical ventilation (CMV) is the usage of unusually high rates and low tidal volumes. The cyclic changes in lung volume during large tidal volume ventilation are believed to be an important factor in causing ventilator-induced lung injury. Many randomized controlled trials have been conducted to test the efficacy of HFV in the reduction of chronic lung diseases in premature infants. Outcomes of the early trials, including the HIFI study, were disappointing. Subsequent studies, in which a strategy to promote lung recruitment and maintenance of lung volume was used, showed favourable outcomes. HFV used with a high lung volume strategy, applied by experienced neonatologists under vigorously controlled conditions, do offer some protection from lung injury in preterm infants. However it is not without complications. Meta-analysis of randomized controlled trials suggested that the benefits of HFV in reducing chronic lung diseases appeared to be outweighed by concerns about the increased rates of pulmonary air leak and severe intraventricular haemorrhage. Experience is an important element in the safe and effective use of HFV particularly in premature infants. Many uncertainties about the use of HFV, such as the long term risk-benefit ratio, still remain and await further research.

Acute respiratory disease syndrome in children is often associated with multi-organ failure with heterogeneous causes. The clinical use of HFV in children with ARDS was reported with success in different case series. A randomized controlled trial of HFV in children with ARDS showed a trend in reduction of mortality and length on ventilation, but nor reaching statistical significance. There was a statistically significant lower need for supplementary oxygen among survivors at 30 days in the group randomized to HFOV versus conventional ventilation, suggesting that there might be some quality of life benefit using HFOV. Larger clinical trials that incorporate current standard practice for conventional ventilation, and that are powered to detect clinically significant differences in outcome, are still needed before any conclusions can be drawn regarding its relative merits as a treatment option.

NEUROSURGICAL INTENSIVE CARE INTERACTIVE SESSION

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Case Presentations and discussion illustrating the following treatment concepts and decisions
- Severe Head Injury – Tier 1, and 2 therapies
- Initiation and management of barbiturate coma
- Decompressive Craniectomy
- Hypothermia therapy
- Coagulopathy in brain parenchymal injury
- Insertion of jugular venous bulb catheter
- Use and interpretation of jugular oxygen saturation
- Management of diabetes insipidus
- Post-op complications of Subarachnoid Haemorrhage
- Management of cerebral vasospasm
- Myocardial Stunning & Neurogenic Pulmonary Edema

Abstracts

SEPSIS: WHAT DO WE KNOW, WHAT DO WE NEED?

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The last few years have seen exciting developments in our understanding of the pathophysiology and intricacies of severe sepsis and septic shock, and in our approach to treatment. We know that early resuscitation can improve outcomes, and that time is of the essence in treating patients with severe sepsis and septic shock. We also know that there is an important link between the coagulation system and the inflammatory network responsible for the septic response, and that treatment with recombinant activated protein C (drotrecogin alfa [activated]) improves outcomes, having been shown to cause a 19.4% relative reduction in mortality risk, i.e., to save one life for every 16 patients treated. We know too that moderate doses of steroids (hydrocortisone [50 mg IV every 6 hours]) to patients with septic shock who have an abnormal adrenal response to an ACTH test improve survival.

But there is still much we do not know. For example, as other immunomodulating drugs are developed that also reduce mortality, which agent should be given to which patient? Or will combinations of drugs be needed, and if so which and at what doses? Improved markers of sepsis are needed to enable early identification and diagnosis of patients with sepsis. Genetic typing is also being developed and may have a place in helping to individualize treatments. The recently suggested PIRO (predisposition, infection, immune response, organ dysfunction) system of 'staging' sepsis is still in the early stages of development but will help to characterize patients, to target treatments, and to monitor response to therapy.

Abstracts

DEATH AND DYING IN INTENSIVE CARE

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Intensive care units (ICUs) commonly admit critically ill patients with a significant risk of dying. Although the initial intent in all patients is to preserve life, 10-20% of admitted emergency patients will die. In the majority of these patients a decision to withdraw therapy is made at some stage prior to death. Many intensive care systems have limited intensive care bed availability. Although this should not influence individual life support decisions, it does necessitate actively addressing futile care. As these decisions are faced almost on a daily basis, critical care practitioners are forced into developing policies and patterns of practice which provide a rational basis for such decisions.

Patients support may be limited or withdrawn in a number of ways – a decision not to initiate support, treatment limitations, withdrawal of support, and occasionally a "one way wean" of life supports.

Pre-admission or early admission assessment of prior health and functional status is very important, especially in patients who are elderly, debilitated, have terminal illnesses or who are in dependent living circumstance.
Extent of support decisions may be based on this information. The decision takes into account age, previous medical conditions, prior functional status and quality of life, and quality of outcome from the current illness. We commonly place patients in one of 4 categories

1. Full ICU support
2. Limited ICU support (commonly no CPR, no hemofiltration and an inotrope limit)
3. Active conservative care (active care without life support systems)
4. Palliative care (may or may not be in ICU)

The decision to limit or withdraw support is made between medical, nursing and the family and has many pitfalls. Considerations for family involvement are the family's right, the importance of their opinion, their capacity to make a decision, the burden of the decision on the family and the stress of making a decision. When death has become inevitable, we believe a family should be presented with a decision which alleviates them of the burden of making that decision but allows the opportunity to object. Under some other circumstances, families must be involved in the decision making process. Patient involvement in decisions is theoretically sound but often impractical as patients are frequently incapable of making valid decisions and may change their mind.

A number of important considerations need to be remembered in the decision making process. We have a duty to the patient to do everything reasonable to allow survival as long as that survival has some quality to the patient. Once survival is no longer possible or survival will have no quality (eg persisting vegetative state) it becomes our duty to stop futile care. Secondly, we commonly try to comply with family wished however we must remember that our primary duty of care is to the patient and we must be careful that we do not comply with a family request that, no matter how well intentioned, is not in the best interest of the patient.

Unfortunately, intensivists become experts in death. There are many pitfalls in making judgments about support restriction and withdrawal. Patterns of practice and guidelines that are both humane and practical have to be established and used.

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Abstracts

"OPEN THE LUNGS"

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Acute Lung Injury (ALI) and adult respiratory distress symptom (ARDS) are terms used to describe different levels of severity of a response pattern of the lungs to a variety of direct and indirect injury processes. Both are characterised by the acute onset bilateral pulmonary infiltrates, not due to a high left atrial pressure. At a consensus conference in 1994, severity was differentiated by PaO2/FIO2 ratio: ALI <300, ARDS <200.

Early 1980's ARDS studies suggested a community incidence of 30-40 cases per 105 population PA, a mortality of 50-80%, the majority of deaths being due to multiple organ failure rather than primary disease or primary respiratory failure and lung function returning to within 90% of pre morbid lung function within 12 months. More recent studies have confirmed this community incident but with mortality rates being reduced to as little as 30-40%.

For many years it was believed that the multiple organ failure associated with ARDS was due to the primary injury or illness that caused the lung injury or due to an independent process. It is now recognised that the primary lung injury can be aggravated by mechanical ventilation and that the injured lung itself can produce inflammatory mediators that contribute to multiple organ failure. Ventilatory practices that minimise the secondary lung injury are believed to reduce this mediator production and consequently reduce multiple organ failure and death.

Although the lung may appear uniformly injured on plain chest x-ray, CT studies have shown that the wet, injured lung collapses under its own weight and can be considered to have three zones. The most dependent zone remains completely collapsed throughout the ventilatory cycle. The least dependent zone remains completely inflated throughout the ventilatory cycle and the intermediate zone (between these two) collapses and reexpands with tidal respiration. Each of these zones has a risk of secondary injury by different mechanisms and each has an injury minimising strategy to that forms part of current recommended ventilatory practice.

The least dependent region is at risk of overexpansion injury. In animal model studies, overexpansion can cause an injury similar to ARDS in normal lungs. This is minimised by maintaining Pplat <30cm H2O (at worst 35cm H2O) and the use of sufficiently small tidal volumes to achieve this goal has become an important part of the current ventilatory strategy for ALI. In an injured lung animal model, collapse re-expansion injury has been shown to occur and to be reduced by using sufficient PEEP to prevent collapse from occurring at the end of expiration. Sufficient PEEP to prevent end-expiratory collapse in the intermediate zone (above) has become the second important part of the current ventilatory strategy for ALI.

The most dependent zone that does not inflate at any stage during the ventilatory cycle can be "opened" at least in part by recruitment manoeuvres, sighs, prone ventilation and partial liquid ventilation. The most promising of these is the recruitment manoeuvre, which has been shown in CT studies to open most or all of this collapsed region and that this region can be maintained open by returning to a level of PEEP that is significantly lower than the pressure required to open the region.

Recruitment manoeuvres may be static or dynamic. Static recruitment consists of elevating PEEP to 40-60 cm H2O without any significant ventilation for a period of 40-60 seconds. This can be well tolerated in some patients and poorly tolerated in others with the occurrence of hypotension and desaturation. Dynamic recruitment consists of elevating the PEEP to level 25-35 with preservation of tidal ventilation (pressure or volume regulated breaths) such that plateau airway pressures reach the same end inspiratory goal (40-60 cm H2O). The latter manoeuvre appears to achieve the same result, is better tolerated and is particularly important in patients where hypercapnia may be dangerous (eg head injury).

Evidence for components of these strategies include randomised controlled studies by Amato (NEJM 1998) where a combination of recruitment manoeuvre, high PEEP, low tidal volumes and hypoventilation improved patient outcome, and the ARDS Network study (NEJM 2000) where the use of only a lower tidal volume achieved a 25% relative reduction in mortality. Prone ventilation has not been shown to improve outcome in large randomised trials, but may have improved outcome in the most severely ill patients and is believed to be an important adjunct to recruiting collapse zones in some patients.

Two key components of "opening" the lung are lung recruitment and higher levels of PEEP. There are no randomised trials clearly supporting the use of these either of these components. The recent randomised controlled ARDS Network study (NEJM 2004) comparing high with low levels showed no significant difference in outcome but has been criticised for insufficient difference in PEEP level between treatment and control groups and lack of recruitment. The impact of this study on clinical practice is yet to be seen but studies to examine if there is benefit from recruitment followed by sufficient PEEP to maintain recruitment have not been completed.

Abstracts

THE USE OF NON-INVASIVE MECHANICAL VENTILATION IN NON COPD, NON-HYPERCAPNIC ACUTE RESPIRATORY FAILURE

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Non-invasive ventilation has been shown to be an effective treatment for acute hypercapnic respiratory failure, particularly in chronic obstructive pulmonary disease.

British Thoracic Society Standards of Care Committee (BTSSCC)
BTS Guidelines: Non-invasive ventilation in acute respiratory failure
Thorax 2002

From the above statement issued by the BTSSCC it is obvious that the role of NIV is well established in cases of COPD and hypercapnic respiratory failure. The issue that comes to mind is what role NIV has in other forms of acute respiratory failure such as cardiogenic pulmonary oedema, acute exacerbation of asthma, severe pneumonia and traumatic chest injury. Numerous studies, clinical trials and case series have looked into such roles of NIPPV and at most, the question remains unanswered satisfactory and with confidence.

In the pooled data from 3 randomised control trials (Bersten AD. N Engl J Med 1991, Lin M. Chest 1995, and Rasanen J. Am J Cardiol 1985) looking at the use of NIV in cardiogenic pulmonary oedema (CPO), concluded NIV showed a trend towards decreased mortality. Masip J et al. Lancet 356 (9248):2126-2132, 2000 showed a more rapid clinical improvement in patients on NIV, a reduced intubation rate but no difference in mortality or hospital length of stay. Sharon A et al. J Am College Cardiology, 36 (3); 832-837, 2000, in their study showed high dose nitrates to be safer and better than BiPAP ventilation and that BiPAP was less effective and was potentially harmful when compared to iv nitrates. However, this inference was considered unjustified by the accompanying editorial as the groups were not comparable. It was also noted that the high intubation rate in the NIV group (80%) were not explained. The study was prematurely terminated by the safety committee. Metha S et al. in their randomized, prospective trial of BiPAP versus CPAP in acute pulmonary edema Crit Care Med, 25(4); 620-628, 2000 showed that BiPAP improves ventilation and vital signs more rapidly than CPAP but BiPAP has a trend towards a higher rate of AMI. So in conclusion, the use of NIPPV in APO shows the evidence is stronger for the use of CPAP than for BiPAP. CPAP has been shown to be effective in patients who remain hypoxic despite maximal medical treatment. BiPAP should be reserved for patients in whom CPAP is unsuccessful and/or the patient is found to have substantial hypercapnia or unrelenting dyspnea. The outcome in CPO pts is likely to be related not to effective ventilation but to cardiovascular performance (e.g. cardiac failure, acute MI etc.).

There are several studies looking at the use of NIV in acute pneumonia. Confalonieri M et al. Am J Respir Crit Care Med. 2000 showed no difference in hospital mortality but a subgroup analysis of patients with co-existing COPD randomized to receive BiPAP had an improved 2 month survival (88.9% vs 37.5%, $p = 0.05$) thus the COPD subgroup was the only one to benefit. In conclusion CPAP improves oxygenation in patients with diffuse pneumonia who remain hypoxic despite maximum medical treatment. BiPAP can be used as an alternative to tracheal intubation if the patient becomes hypercapnic. NIV therapy is warranted in appropriate COPD patients with pneumonia.

In acute exacerbation of asthma, the success of NIV in COPD patients raises the possibility that it would be beneficial in acute asthma but till today there have been no randomized controlled trials. Meduri (noninvasive Positive Pressure Ventilation in Status asthmaticus. , Chest 1996, 110: 767-774) showed there is still insufficient evidence to recommend NIV in acute asthma. However a trial of NIV in carefully selected and monitored patients is justifiable based on the anecdotal evidence. Reasonable approach is to use NIV in pts who fail to respond promptly to standard initial medical therapy but who have not developed contraindications to NIV. Because the condition of the asthmatic pts may deteriorate abruptly, NIV in asthmatics should be used in an ICU setting.

In chest trauma, CPAP should be used in patients with chest wall trauma who remain hypoxic despite adequate regional anaesthesia and high flow oxygen. NIV should not be used routinely. In view of the risk of pneumothorax, patients with chest wall trauma who are treated with CPAP or NIV should be monitored on the ICU. NIV has been used in a variety of other conditions (such as acute respiratory distress syndrome, postoperative or post-transplantation respiratory failure) with reduced intubation rates, ICU stay, and mortality. In this context, patients who would be considered for intubation if NIV fails should only receive NIV in an ICU.

As it can be seen, there are still conflicted results seen from various studies and case series reported in the literature. One must understand that majority of the studies done were uncontrolled trials and were performed on COPD patients. None of these controlled trials has used "sham" NIV as control therapy. Double blind, placebo controlled trials of NIV in acute respiratory failure are unlikely ever to performed. Results have been inconsistent between studies and there is a wide variety of patients that fall under this category thus making it difficult to apply results to individual patients.

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Abstracts

PATIENT-VENTILATOR INTERACTIONS

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Mechanical ventilation is a life-supporting process employed in the management of respiratory failure. One of the main objectives of instituting mechanical ventilation is to allow for respiratory muscle unloading in an attempt to decrease the patient's work of breathing. In the past, neuromuscular blockade or deep sedation was frequently used to facilitate this objective. With the acceptance that the use of neuromuscular blocking agents and intense sedation predisposes the patient to numerous hazards, some means of assisted ventilation is now usually employed. In assisted ventilation, the patient and the ventilator share the work of breathing. Therefore, of primary concern in assisted ventilation is the interaction between the patient and the mechanical ventilator. Ideally, to unload the work of breathing, the ventilator should be able to adapt to the constant changes of the patient's ventilatory demands and respiratory system mechanics. Unfortunately such a ventilator is not yet commercially available despite the introduction of numerous new modes, and as such, patient-ventilator dysynchrony may develop. Dysynchrony between the patient and ventilator can lead to increased morbidity and a longer course of mechanical ventilation. The recognition that the respiratory system is not passive but is dynamic and reactive would assist in the understanding of the complex interplay between the ventilator and patient.

Abstracts

WHEN TO TRACHEOSTOMIZE

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The use of percutaneous tracheostomy techniques has greatly increased the availability and use of tracheostomies in critically ill patients. The timing of tracheostomy depends on the indication and the local threshold for performing this procedure.

Most tracheostomies are performed in critically ill patients for one or more of 4 indications. These are: long term mechanical ventilation (eg. > 2 weeks), upper airway insufficiency, medium or long term coma, or inability to clear lower respiratory tract secretions.

Tracheostomies may be performed within the first 24 hours of critical illness where there has been major laryngeal or facial trauma requiring repair. Early tracheostomy (within 7 days) may be undertaken in the presence of severe head or lung injury where it is expected that mechanical ventilation will be required for more than 2 weeks. The basis for this decision is increased patient comfort with less sedation, less laryngeal injury, less airway resistance and a more stable airway.

The direct benefits of a more awake interactive and co-operative patient includes less myopathy and pressure complications, more spontaneous ventilation and coughing hopefully leading to healthier lungs and earlier recovery.

The most common timing for tracheostomy is between 7 and 14 days where it has become clear that there will be an intubation requirement exceeding two weeks. This is most commonly due to severe lung injury, muscle weakness, difficulty in managing secretions or for airway protection when conscious state is reduced.

Tracheostomy may be delayed beyond three weeks when earlier tracheostomy is indicated. This may occur where there are severe neck burns, severe head injury with unstable intracranial pressure, very severe lung injury with risk of hypoxemia during the procedure, or a high degree of anticoagulation present which cannot be safely ceased (eg. ECMO).

The threshold for tracheostomy is also an influential factor. This depends on the bed pressure and intensive care staff experience in performing percutaneous tracheostomy.

In patients who are marginal for extubation or marginal for intensive care discharge because of difficulty in clearing secretions, a tracheostomy can enable removal of an endotracheal tube and intensive care discharge earlier than would otherwise have been possible. In intensive care units with inadequate bed availability, tracheostomies may enable earlier discharge and allow more admissions. The Alfred intensive care unit performs approximately 200 tracheostomies per annum (12%) and it has been estimated that 100 of these save 3-4 ICU bed days. This is the equivalent of having an extra intensive care bed and enables admission of additional 80 patients per annum.

The threshold for performing tracheostomy is also affected by the tracheostomy technique available. Tracheostomies can be surgical, percutaneous dilatational or trans-laryngeal. Surgical tracheostomies usually require the risk of patient transport and can be subject to delays due to either surgeons or operating room availability. Percutaneous tracheostomies are commonly performed by an intensivist, do not require transport, use a smaller incision and with a skilled proceduralist appears to have less bleeding. For these reasons, percutaneous tracheostomies have become more popular and are performed more often.

Wire guided cricothyroidotomy is also an important alternative to emergency tracheostomy in the case of a failed intubation. When intubation has failed and ventilation can't be established, emergency tracheostomy is often performed late, when the patient is deeply cyanosed and brain injury is occurring. The procedure is often traumatic and undertaken by a person who has never done one before. Many intensivists are now comfortable with wire guided airway access and can commence cricothyroid airway access early in the process of failed intubation allowing rapid atraumatic lower airway access if ventilation also fails.

Modern tracheostomy techniques have led to increased availability and use of tracheostomies and to significant changes in tracheostomy practice.

Abstracts

THE HOLISTIC APPROACH TO THE CARE OF THE CRITICALLY ILL PATIENT

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The very essence of good nursing is to help a person attain or maintain wholeness in every dimension of their being. 'Holism' has become the buzz word of the nineties, and nurses are frequently exhorted to care for the whole person. Holistic care embraces all nursing as its goal enhancement of healing the whole person from birth to death. The nursing profession has traditionally viewed persons holistically, even though the terms itself was not introduced into the nursing literature. This presentation will explore the definition, role and method of holistic approach to the care of the critically ill patient in critical area such as imagery, meditation, focusing, active listening and humor. Beside that the relationship between holistic nursing practice and complementary and alternatives modalities will also be reviewed. The implication for critical care nursing also will be discussed since approaching health holistically among ill patient will not only free them from disease, but will create deeper healing on all aspects.

COPING WITH DYING PATIENTS AND THEIR RELATIVES

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Death the ultimate outcome of life is a fact and a profound mystery. Death is a subject that most people do not like to hear about, talk about or even think about. Why is this? Death is a reality, a fact of life, so wouldn't it be better to approach.

Nurses witness firsthand the plight of patients throughout the dying process and are able to recognize and appreciate their complex needs. When cure is no longer possible, dying people primarily need good nursing care.

Our relationships with patient are very close because we have unique insights about what patients' value and desire for care, at the end of life. Patients often trust their nurses to guide them through the dying process and look to them to be their advocates when they cannot do so for themselves.

The unique insights of nurses who provide hands-on care to dying people are therefore invaluable in defining the issues and developing workable solutions to cope with dying patients and their relatives and improve care of the dying.

Nurses have been, and will continue to be, leaders in end-of-life care. As the largest group of health professionals and those most connected with the comprehensive needs of the terminally ill and their families, nurses have long advocated for humane and dignified care at the end of life.

Everyday critical care nurses, provide optimal care to dying ICU patients in various difficult situations and also deal with issues of death and dying. The care of patients dying in the ICU often requires a dramatic shift from the 'rescue' mode to approaches that recognize death's inevitability and focus on patient and family comfort.

Such a shift requires a reaching consensus with the patient or family about the goals of ICU care. In addition, nurse must have a well-developed plan and the nursing skills and knowledge to meet the physical, emotional and spiritual needs of dying patients and their families.

Lack of clarity about the prognosis, chaotic timetables of caregivers/families to look after their loved one, the transition from curatives care to comfort care and the multiple people involved in the decision making and the provision of care compound the stress of the situations. Improved communication among all of these groups, clearer prognostic indicators, advance planning, earlier discussions and better education for nurses/caregivers/families are necessary for change to occur.

As nurses we are always faced with caring for dying patients and their relatives/families. This requires a holistic approach looking after the physical, psychological and spiritual care of each individual. Therefore without competent and caring nurses, end-of-life care will be reduced to a mechanical exchange devoid of human presence and holistic care.

Abstracts

CLINICAL PRACTICE IN NEUROSCIENCE INTENSIVE CARE UNIT

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Nurses are always striving to deliver the best and up to date care to patients in the Intensive Care Unit (ICU). This can be achieved through critical thinking and motivated nurses that will change practices base on research and evidence.

This paper will discuss about the responsibilities of the nurses in searching for ways to maintain high-quality clinical practice. Various approaches including standard of practices, management of resources, nurses' performance and development are used to safe guide the interests of clinical practice and patients' outcomes.

COMPETENCY TRAINING IN NEUROSCIENCE INTENSIVE CARE UNIT

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Competency training in the Neuroscience Intensive Care Unit is managed as a process that integrates learning activities into daily work of the nurses. It is dedicated to developing the skills of nurses, clarifying the clinical standards and expectations, to ensure that nurses' learning lead to value-added services.

In this paper, an overview ideas and practices concerning competency training will be presented. Educators need sound initiatives, systems view of clinical performance, and effort of nursing officers in training process. The emphasis will be placed on concepts, methods, benefits of competence-based techniques, measurement of training effectiveness and actual performance of nurses.

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Abstracts

ACUTE CARDIAC DECOMPENSATION

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This can be defined as acute heart failure, where there is a sudden pathophysiologic state due to an abnormality of cardiac function leading to the failure of the heart to pump blood at a rate commensurate wit h the requirements of the metabolizing tissues. This should be distinguished from circulatory congestion due to abnormal salt and water retention as in acute renal failure, and noncardiac causes of inadequate cardiac output.

There are many causes of heart failure, and one needs to consider underlying causes versus precipitating causes, e.g. severe anemia in a patient with previously compensated heart failure. Some of the common underlying causes would include ischemic heart disease, valvular heart disease, hypertension, and arrythmias.

Heart failures can be considered as systolic and diastolic. Systolic heart failures are more common than diastolic heart failures which are usually seen in elderly over-weight females with severe hypertension. In systolic heart failure, there may be a problem with preload, myocardial contractility or afterload. Another consideration would also be between right-sided and left-sided heart failure. In right-sided heart failure, there would obviously be the absence of pulmonary oedema.

Most patients would present with acute tachypnoea, tachycardia, and have rales & increased jugular venous pressure on examination. They may or may not have hypotension as well. Chest radiograph would show a dilated heart shadow and features of pulmonary oedema for left-sided failure (Kerley B lines, pleural effusions, alveolar filling, hilar congestion).

Treatment is directed to treat the precipitating cause and alleviate the underlying problem. Supportive care to improve oxygenation and ventilation may be required. This may take the form of non-invasive ventilation besides the traditional intubation & mechanical ventilation. Pharmacological interventions are started to improve myocardial contractility, decreased afterload, and also decrease preload. Occasionally, mechanical devices may be needed, e.g. intra-aortic balloon pump. Most of these patients would need closed monitoring in the ICU.

Abstracts

ACUTE HEPATIC FAILURE

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Acute Hepatic Failure (AHF) is an uncommon condition in which necrosis of hepatocytes leads to impaired liver function, coagulopathy and jaundice. It is usually the consequence of viral infection, hepatotoxic drugs, other toxins such as paracetamol, amanita phalloides or herbal remedies, or other rarer causes. In some cases, AHF develops in the context of pre-existing chronic liver disease and is then termed acute on chronic liver disease (AoCLD).

Patients may present with a history suggestive of a cause. However, in many cases no likely precipitating contact or incident can be identified. The disease typically evolves over several days, but deep coma with cerebral oedema can occur in hours in hyperacute liver failure, or may develop over months with the subacute variant. Most patients become deeply jaundiced.
Patients with grade III and IV encephalopathy should be managed in an ICU. Because liver transplantation is indicated in many
patients with ALF, early transfer to a liver transplant unit should be considered.

Patients with advanced encephalopathy may develop cerebral oedema. They should be nursed with the head elevated to 20 degrees. Mannitol is the most effective treatment. Barbiturate therapy and moderate hypothermia are unproven, and corticosteroids have been shown not to influence the incidence and severity of cerebral oedema. Hyperventilation may be effective during an acute increase in intracranial pressure (ICP) but is of no benefit in the longer term. Despite the coagulopathy, ICP monitoring is used in most liver units, although the risk:benefit ratio should be considered for each patient individually.
Infusions of clotting factors are indicated before invasive procedures or if there is overt bleeding. However, because the INR is a major factor in decisions to transplant, FFP should not be given routinely.

Other aspects of medical management include mechanical ventilation to normocarbia in grade III and IV encephalopathy, maintenance of normovolaemia and early use of continuous renal replacement therapy if renal failure develops. Infusion of 10% dextrose, early enteral feeding, H2-antagonists, early empiric antibiotics for signs of sepsis and lactulose but not neomycin are also used.

No drugs reverse the effects of hepatic failure. Cytoprotective drugs such as prostaglandin E1 and corticosteroids do not have beneficial effects.

Artificial liver support is being investigated to salvage those patients who have the capacity for hepatic regeneration but die from cerebral oedema before the liver recovers or as a "bridge" to transplantation. Although some systems show promise, none has been shown definitively to improve outcome.

Liver transplantation should be considered early in all patients. The King's College Liver Unit criteria are widely used to select transplant candidates. Survival with transplantation is approximately 70% but is only 20-25% with medical therapy alone.

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MANAGEMENT OF VENOUS THROMBO-EMBOLISM (VTE) IN THE ICU

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Anti-thrombotic therapy is important in a few key clinical settings: prevention and treatment of VTE; primary prevention of ischaemic conorary events; acute myocardial infarction; prosthetic heart valves; atrial fibrillation; and secondary prevention of ischaemic cerebrovascular disease. This presentation focuses on the prevention and management of VTE in the ICU.

Deep vein thrombosis (DVT) and pulmonary embolism (PE) contribute significantly to mortality and morbidity associated with critical illness. 13% of deaths reported in ICU have been attributed to PE. VTE has been reported to have caused or contributed to death in 3% of ICU patients. Yet only 30% of patients with post-mortem diagnosed PE had clinical suspicion present before death. Although VTE is associated with a large number of predisposing risk factors, including increased age, previous VTE, malignancy, and major trauma, no multi-variant independent risk factor analysis exists. Moreover, 6% of patients come into ICU with pre-existing DVT. The clinical significance of asymptomatic DVT detected by routine screening in the ICU is uncertain. Greater frequency of PE occurs later in the hospitalization (11.5%) and even small PE may be poorly tolerated by critically ill patients

Randomized controlled trials of DVT prophylaxis show a significant reduction in proximal DVT and PE versus placebo without significant increase in major bleeding. Compliance with thrombo-prophylaxis guidelines is most effective in ICUs with a standardized guidelines combined with mandatory computerized order entry. Geerts has proposed review of VTE risk and thromboprophylaxis requirements in all patients admitted to the ICU, particularly for the following high-risk groups following major trauma, spinal cord injury, major hip or knee surgery, and major surgery for cancer.

Both pharmacological and mechanical methods prophylaxis have been shown to be effective in different subsets of at-risk patients. These include use of compression stockings, sequential lower limb compression devices, unfractionated heparin (low-dose or PTT-adjusted), low molecular weight heparin, and warfarin (low-dose or INR adjusted). In the peri-operative patient, the benefit and risk of VTE prophylaxis must be weighed against the potential complications .

An understanding of its pathophysiology suggest not only different mechanisms contributing to VTE in trauma as opposed to medical critically ill patients but a significant role for inherited defects acting in combination with other risk factors for VTE in populations studied. For example heterozygous factor V Leiden mutation, present in 5% of Caucasian population confers an estimated 5-10 fold increase risk of VTE.

The often held belief that the Asian population is less susceptible to VTE may be related to differences in the prevalence of this and other inherited defects, of which few studies are available. The use of traditional / complementary medicine and their anti-thrombotic effects on VTE risk is also largely unstudied but highly relevant. Conversely, the true prevalence of VTE and fatal PE in any hospital population has been found to be generally under-estimated and this may reinforce bias against aggressive thromboprophylaxis in our practice. It is necessary timely to review and study local experiences in order to calibrate North American or European VTE prophylaxis guidelines to Asian populations.

Recommended Further Reading:

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Abstracts

DISSEMINATED INTRAVASCULAR COAGULATION IN INTENSIVE CARE

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Introduction

Disseminated intravascular coagulation (DIVC) is an acquired syndrome arising from various different causes. It involves exposure of blood to the procoagulants such as tissue factor producing both thrombosis and hemorrhage following imbalance of haemostasis and fibrinolytic systems in the body. It is characterized by the consumption of clotting factors and platelets, formation of fibrin within the circulation resulting in varying degrees of microvascular obstruction leading to end-organ damage. When platelet and coagulation factor were significantly consumed, bleeding becomes a major clinical manifestation.

Main Text

In ICU, DIVC commonly occur acutely when blood is exposed to large amounts of tissue factor over a brief period of time, with massive generation of thrombin. The acute triggering of coagulation overwhelms control mechanisms, and compensatory mechanisms do not have sufficient time to recover. The clinical consequence is a profound systemic bleeding diathesis and, due to widespread intravascular fibrin deposition, tissue ischaemic injury, and a microangiopathic haemolytic anaemia.

In addition to bleeding, the common manifestations of DIVC in ICU include thromboembolism and dysfunction of the kidney, liver, lungs, and central nervous system. Siegel and colleagues studied the medical record of 118 patients with DIVC and found that the main clinical manifestations were bleeding (64 percent), renal dysfunction (25 percent), hepatic dysfunction (19 percent), respiratory dysfunction (16 percent), shock (14 percent), thromboemboli (7 percent), and central nervous system involvement (2 percent) [1].

Patients in surgical ICU with DIVC commonly presented with bleeding around indwelling lines, catheters, drains, and tracheostomies, and blood may accumulate in serous cavities. Petechiae and ecchymoses are common in conjunction with blood oozing from wound sites and it can be life-threatening if it involves the central nervous system, lungs and the gastrointestinal tract.

Acute renal failure may occur following microthrombosis of afferent arterioles producing cortical ischaemia/ necrosis or hypotension and/or sepsis leading to acute tubular necrosis. Endotoxin-induced endothelial injury may predispose to intrarenal thrombus formation by directly promoting platelet aggregation, by diminishing the release of nitric oxide (endothelium-derived relaxing factor), which normally inhibits platelet aggregation [2], and by increasing the synthesis of plasminogen activator inhibitor type 1, leading to a reduction in fibrinolytic activity [3].

Jaundice is common in ICU patients with DIVC and this may be due both to hepatic dysfunction and increased bilirubin production secondary to hemolysis. In addition, sepsis and hypotension may lead to hepatocellular injury.

In ICU, sepsis and trauma are strongly associated with DIVC and diffuse pulmonary microthrombosis due to DIVC can aggravate the lung injury associated with ARDS. Pulmonary haemorrhage with haemoptysis and dyspnoea may result from damage to the vascular endothelium

Microthrombi, haemorrhage, and hypoperfusion may contribute to neurologic abnormalities in patients with DIVC and the patients can present with coma, delirium, and transient focal neurologic symptoms which might be masked in ICU patients who are receiving sedation and neuromuscular blockade.

The diagnosis of DIVC in ICU setting is suggested by the history, clinical presentation, moderate to severe thrombocytopenia and the presence of microangiopathic changes on the peripheral blood smear. The diagnosis is confirmed by a variety of laboratory studies which demonstrate evidence of both increased thrombin generation and fibrinolysis. Elevated D-dimer levels, reflecting cross-linked fibrin degradation, are the most common abnormal

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parameter in patients with DIC [4,5]. Measurement of D-dimer is more specific although somewhat less sensitive than a latex agglutination test for fibrin degradation products [4]. The method of choice is the enzyme-linked immunosorbent assay (ELISA).

Prolongation of the prothrombin time (PT) reflects reduced activity of the components of the extrinsic and common pathways and these is due to clotting factors that are frequently decreased in DIVC [5]. Prothrombin levels may be normal in some patients, particularly those with abruptio placentae [10]. The activated partial thromboplastin time (aPTT) is sensitive to deficiencies of factors XII, XI, IX and VIII, and less sensitive than the PT to deficiencies of components of the common pathway. The plasma fibrinogen concentration is usually low in acute decompensated DIVC, but may be elevated as an acute phase reactant in certain conditions, including pregnancy. Other studies, which may be useful, include the thrombin time and reptilase time, which are usually prolonged due to hypofibrinogenemia and the presence of fibrin degradation products. Specific assays can also be used to monitor various coagulation factors. Factors V and VIII, in addition to fibrinogen, are usually significantly depressed.

Treatment of ICU patient with DIVC includes treating the underlying disease and initiating factors. Hemodynamic support is essential, but many patients do not require specific therapy for the coagulopathy, either because it is of short duration or because it is not severe enough to present a major risk of bleeding or thrombosis. In selected instances, the use of blood component replacement therapy or heparin may be of value. Restoration of physiologic levels of antithrombin may be another therapeutic option. In contrast, the administration of antifibrinolytic agents, such as epsilon-aminocaproic acid (EACA) or aprotinin, is generally contraindicated, since blockade of the fibrinolytic system may increase the risk of thrombotic complications [6].

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Abstracts

ACUTE RENAL FAILURE IN ICU: CRRT VS IHD

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Acute renal failure (ARF) complicates 5–23% of intensive care unit (ICU) admissions, and approximately 50% require renal replacement therapy. The overall mortality rate in the patients requiring renal replacement therapy (RRT) improved tremendously to around 50% when acute hemodialysis was introduced into clinical practice. However these figures has remained static since then, even after introduction of many innovations including continuous renal replacement therapy (CRRT) in the late 1970's. A few factors had been looked at to improve the situation ie the timing of initiation of dialysis, modality choice, frequency, duration, and intensity of therapy.

Intermittent hemodialysis (IHD) has been the conventional method used in acute renal failure, and extrapolating data from chronic maintenance dialysis patients' adequacy, it is usually prescribed as 3-4 times per week. Hemodialysis mainly uses diffusive principle with high dialysate flow (500ml/min) and hence it is a very efficient for small solutes removal. The efficiency of the dialysis process allows a shorter treatment time (3-4 hours). The shorter treatment time means the patients are free to undergo certain procedure at other time such as imaging, surgery and procedures as they are more mobile. It also allows administration of drugs such as antibiotics, which levels may be affected by a continuous dialysis/removal. Since the dialysate are produced online, there is significant cost-saving as manufactured dialysate are expensive. In certain group of patients lactate dialysate could be avoided (lactate replacement fluid for CRRT are cheaper than bicarbonate replacement fluid).

The shorter dialysis time also reduce the chances of dialyser clotting. The prescribed dose of dialysis can be achieved. The lower incidence of clotting allows heparin free dialysis, which may be necessary for some patients (ie bleeding tendencies and immediate post surgery. As the dialyser rarely clot during therapy, a precise volumetric control is usually achieved.

CRRT have evolved since the inception, varying options available depending on necessity and availability. Veno-venous approach is the preferred approach currently, though it means adding another blood pump as compared to arteriovenous approach, adding to complexity of the machines.

Hemodynamic stability is considered to be one of the main assets of CRRT. Even if CRRT offers a hemodynamic advantage, this protection is relative, not absolute. Hypotension can still occur if too much fluid is removed, if fluid is removed too quickly, or if substitution lags behind removal. Data looking at mean arterial pressure (MAP) between CRRT and IHD also revealed conflicting results.

Hemodynamic stability is related to the recovery of renal function. Hence, a reduction of hypotensive episodes should have a positive effect on the recovery of renal function. In a retrospective study by van Bommel et al, however, the same percentages of patients exhibited recovery of renal function, whether they were treated with IHD or CRRT though the time until recovery was shorter with CRRT (11 ± 2 d versus 18 ± 3 d with IHD, $P < 0.05$)

As CRRT is a continuous process, it is expected to offer better solute removal. Unfortunately, as the dialysate flow is relatively low (30L/hour in IHD compared to average 2L/hour in CRRT) the efficiency is markedly reduced. In a mathematical analysis, Clark et al. demonstrated that it was impossible to maintain blood urea nitrogen levels of 60 mg/dl (15mmol/L) with daily IHD (maximum of 4-h dialysis) in patients with body weights of >80 kg. Such low levels could be obtained with CRRT, but with daily volume exchanges (ultrafiltration versus substitution) of >40 litres. This goal is difficult to reach, for practical and economic reasons. Moreover, these values were calculated for full 24 h/d applications of CRRT, which are virtually impossible in the daily intensive care setting.

One of the most frequently mentioned advantages of CRRT is the presumed capacity of filters to remove and adsorb cytokines and other agents that play a role in the inflammatory status of septic patients with ARF. The adsorption has been demonstrated to occur most during the 1st hour. However the use of CRRT especially high volume hemofiltration (>4L/hour) to remove cytokines in patients with sepsis has not been transformed as successful from animal to human studies.

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The continuous need for anticoagulation therapy is a potential source of problems for patients with bleeding tendencies. Some authors have proposed regional anticoagulation to counter this problem. However, use of heparin/protamine is no more popular due to protamine side use of sodium citrate/calcium is labour and laboratory intensive that can only be performed by well-trained and experienced personnel.

The immobilization of the patient is a potential source of problems. It might be necessary to uncouple the patient for nursing procedures or complex investigations that cannot be performed in the intensive care unit. Every time this uncoupling is performed, the dialysis process is interrupted. With IHD, such procedures can be performed in the dialysis-free periods.
Finally, CRRT is more expensive than IHD, because of the need for specific dialysate solutions, substitution fluids, and filters and because of its labour-intensiveness.

The final argument for the superiority of CRRT could be made if controlled studies could demonstrate significantly better patient survival rates, compared with IHD. Until now, such proof has not been provided. In the recently published multivariate analysis by Swartz et al, the odds of death for CRRT, compared with IHD, exceeded 2 if no corrections were made for co morbid conditions. After correction, the odds of death decreased to 1.09, but these data do not indicate a significant difference between CRRT and IHD.

In our local setting, hemodialysis is easily available in almost all the general and district hospitals. Technical know-how in the management of these patients on HD is mainly gathered from experience with patients on maintenance dialysis, as such quite a number of local physicians are familiar with the use.

Up to current time there is no real evidence of superiority of CRRT over IHD. Furthermore, most of the data comparing IHD with CRRT had been with HD 3-4 times/week rather than the common sense approach of daily HD for acute renal failure. Some of the hybrid technique such as SLED (slow low efficiency dialysis) may possibly end as the answer to the solution.

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CRYSTALLOIDS ARE BETTER THAN COLLOIDS FOR RESUSCITATION IN SEPTIC SHOCK

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Septic shock results when infectious agents or infection-induced mediators in the bloodstream produce haemodynamic decompensation. The hypotension of septic shock (generally refers to a mean arterial pressure below 60-70mmHg in adults) results from hypovolemia, impaired myocardial contractility and decreased systemic vascular resistance. Septic shock requires early, vigorous resuscitation.

Large fluid deficits exist in patients with septic shock. Volume repletion produces significant improvement in cardiac function and systemic oxygen delivery and thereby tissue perfusion and reverse anaerobic metabolism. In approximately 50% of septic patients, fluids will reverse hypotension and restore haemodynamic stability.

Patients with septic shock can be successfully resuscitated with either crystalloid or colloids. Fluid infusion is initiated with boluses of 250-500 mls every 15 minutes titrated to clinical end points of heart rate, urine output, blood pressure and cardiac filling pressures. When titrated to the same level of filling pressures, both are equally effective in restoring tissue perfusion.

Crystalloid solutions used commonly for resuscitation are 0.9% sodium chloride and lactated Ringer's solution. The volume of distribution of these solutions is in the extracellular compartment. Approximately 25% of infused amount will remain intravascular while the rest is distributed to the extravascular space. Clinically, 100-200mls of intravascular volume expansion can be expected after infusion of 1L of isotonic crystalloids. Crystalloids are easily available, cheap, safe and carries no risk of allergic reaction and infection. Although resuscitation with crystalloids will require 2-4 times more volume than colloids and slightly longer period to achieve desired haemodynamic end points, it does not justify the added expense of using colloids alone.

Despite universal agreement on aggressive fluid resuscitation as the initial intervention in septic shock patients, the choice of optimal fluid resuscitation has not been clear. There have been many meta-analyses of clinical studies comparing crystalloids with colloids with the effect of resuscitation on mortality. However, these results have been conflicting, with some of the reports favouring crystalloids and some showing no difference.

To date, it remains uncertain whether the choice of fluid for resuscitation in septic shock affects survival. Factors that may influence the choice of resuscitation fluid include tolerability of the treatment, safety, cost and clinician preference. Both crystalloids and colloids should be considered for intravascular volume resuscitation. What is more important than the choice of fluid is the early initiation and aggressiveness of fluid resuscitation.

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ASSESSING QUALITY OF CARE IN INTENSIVE CARE

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Quality care has been defined as care that is safe, effective, efficient, timely, patient centred and equitable.

Quality of care in intensive care can be assessed in a number of different ways. Outcome measures include survival, quality of life of survivors, length of ICU stay, and patient and/or family satisfaction. Survival is usually adjusted for severity of illness and diagnostic group using one of the validated scoring systems. Of these, the APACHE II system is the most commonly used, and it allows calculation of the Standardised Mortality Ratio (SMR) that in turn allows benchmarking with other ICUs. Differences in survival may reflect differences in practice and in turn facilitate implementation of best practice, so that overall outcome is improved. Quality of life in ICU survivors is assessed using one of a number of scales. Although data are few, it seems that impaired quality of life after ICU discharge is not unusual and long-term outcomes should be considered when assessing the "value" of new therapies and procedures.

Access measures include delayed admission, delayed discharge and cancelled operating theatre cases because of insufficient ICU beds. These are resource issues and may be beyond the control of ICU staff, but they negatively impact on efficient, patient centred, timely and equitable ICU care.

Complication measures include rates of unplanned readmissions to ICU, catheter related bloodstream infections and resistant infections (MRSA and VRE). In general complications have adverse effects on outcome measures.

Process measures include appropriate use of blood transfusions, sedation, peptic ulcer disease prophylaxis and deep venous thrombosis prophylaxis based on evidence based guidelines. However they can also address complex issues such as the quality of processes involved in end of life care. Process measures are generally easier to measure than outcome measures.

Clinical indicators can be developed from these measures and used by institutions or organisations to benchmark quality care. For example, the Australian Council on Health Care Standards (ACHS) uses three clinical indicators for Intensive Care: participation in the National Patient Database, inability to admit into an ICU and unplanned readmission to an ICU. Despite the value of this approach, there are important areas not covered such as adverse drug events, nosocomial infection, wrong diagnosis delayed therapy etc that are more suited to adverse event monitoring or specific quality assurance projects based on the plan, implement, review and set standards approach.

Such an approach has been used by the Leapfrog group in the USA, who have identified full-time intensivist staffing in ICUs as a key quality indicator.

Assessment of the quality of ICU care using these or similar measures has become integral to the practice of intensive care medicine.

Abstracts

SEDATION AND ANALGESIA – ARE WE DOING IT RIGHT?

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Anxiety, a universal feature of patients admitted to the ICU is not just confined to ventilated patients. Sedatives and analgesics are administered to patients in ICU to allay fear and anxiety, enhance comfort, promote sleep and facilitate mechanical ventilation.

Inadequate sedation is associated with an increase in sympathetic activity and thereby oxygen demand, unintentional extubation and even self-injury. It also makes medical and nursing care difficult if not impossible. On the other hand, oversedation has inherent risks too. Weaning mechanically ventilated patients can be delayed. Assessing neurological status of these patients will also be a problem and may result in unnecessary radiological imaging.

Ideally, the choice of drugs used for sedation and analgesia should be based on the pharmacokinetic and pharmacodynamic properties to allow safe and efficacious use. This is especially important in critically ill patients with multi-organ failure.

Sedation scoring systems should be routinely used to assess the adequacy of sedatives and analgesics administered thereby preventing the consequences of under or over-sedation. The scoring system must be simple, easy to apply, accurately describing the state of the patient.

Getting the right amount of sedation and analgesia is crucial in the management of patients admitted to the ICU. Are we doing it right?

ISSUES ON BLOOD TRANSFUSIONS IN THE ICU

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Anemia is a common problem among ICU patients. It tends to appear early and persist throughout the ICU stay with or without blood transfusion (BT). It has been reported that hemoglobin (Hb) concentrations fall by at least 0.5 g/dL during the first 3 days of ICU stay in non-bleeding patients.

Excessive phlebotomy for diagnostic investigations and an inappropriately low red blood cell production in critically ill patients have been cited as the main causes of anemia in the ICU.

On any given day in the US, 16% of medical ICU and 27% of surgical ICU patients receive BT. The majority of physicians give blood when the Hb falls below 10 g/dL, based on findings in animal and retrospective studies, that anemia increases cardiac related morbidity and mortality, especially in those with pre-existing CVS diseases.

In a recent large multi-centred controlled trial comparing patients randomized to a restrictive (Hb 7-9g/dL) vs liberal (Hb 10-12g/dL) transfusion strategy, there was a trend towards lower 30-day mortality in the restrictive strategy group. For patients with APACHE II <20 or age <55 yrs, mortality was significantly lower.

Why does BT lead to increased mortality? BT has been found to increase the ICU length of stay, and the risks of developing multi-organ failure and bacterial sepsis. These effects are mediated by changes to red blood cells and release of bioactive substances from apoptosis of white blood cells during storage.

Leukoreduction is the pre-storage removal of WBC by filtration. Universal leukoreduction of stored blood for routine BT is very costly and has not been shown conclusively to be beneficial.

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LONG-TERM OUTCOME OF INTENSIVE CARE

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Most usually we refer to outcomes from intensive care as survival and/or mortality rates. In the widely used APACHE II system, in-hospital mortality rates for patients admitted to the intensive unit are adjusted for severity of illness and diagnostic group. Comparisons can be made between ICUs by comparing the standardised mortality rate (SMR) which is the ratio of the number of patients observed to die in hospital to the number predicted to die by the APACHE II algorithm. In other settings other definitions of "mortality" are used. These range form mortality at 28 days (used in large randomised controlled trials) to mortality up to 5 years after the ICU admission (long term follow up studies).

Overall, survival to hospital discharge after ICU has improved over time despite the admission of older sicker patients. However the mortality rate after hospital discharge is around 20-50% and is higher than the general population matched for age and gender. Interestingly, among the factors shown to improve outcomes from intensive care are closed ICUs and full time intensivists.

Less well studied is the concept of quality of life after discharge from an ICU. This is a subjective measure that equates to "handicap" or "well-being". It can be measured by a number of different scales or scoring systems of which the Short-Form-36 is one of the most commonly used. Although the few studies are difficult to compare, there is general agreement that quality of life is often considerably impaired after discharge from ICU and that the dimensions with the poorest quality of life are work, home life, recreation, sleep and rest.

There are a number of neuropsychological consequences of admission to Intensive Care. Anxiety and depression are common and often coexist. Post Traumatic Stress Disorder is characterised by the triad of intrusive, unpleasant and unsettling flashbacks, avoidance of situations that tend to trigger the flashbacks, and increased levels of alertness. It has been diagnosed in as many as 27% of a group of patients with ARDS and may be related to sedation levels, as memories of factual events may be protective.

In circumstances where impaired quality of life and/or functional limitation occur, caregivers, usually family members, also suffer. There is deterioration in their own health status, psychological symptoms and restriction of social activity. The long term economic costs are also considerable, particularly when the costs of functional limitation are factored into the equation.
Now that the number of elderly people admitted to Australian and United States' ICUs has increased markedly, it is particularly important to consider the quality and longevity of the lives saved.

Late mortality and decreased functional state and quality of life represent morbidity not usually captured by usual outcome analysis. Further study of longer term outcomes of ICU survivors is required.

Abstracts

NUTRITIONAL SUPPORT IN THE CRITICALLY ILL CHILD

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Nutrition support is an often-neglected part of intensive care. However, available literature does show that proper nutrition provides better outcome. Nutritional support required for critically ill child must take into account their pre-morbid state, current disease patho-physiology and any organ dysfunction. Enteral feeding should be started as soon as possible through many routes available. In house protocols and procedures on enteral feeding can help in early establishment of enteral feeds. Parenteral nutrition maybe total or adjunctive, when enteral feeding is not possible or well tolerated. Monitoring is an integral part of nutrition support to gauge its efficacy and detect possible complications. More research to help formulate guidelines and guide therapy in the paediatric arena is needed.

ACUTE BRAIN INJURIES IN INFANTS AND CHILDREN

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Traumatic head injury is the leading cause of acquired disability and even mortality in children. Children are injured in motor vehicles accidents, falls, bicycles, sports, assaults and child abuse which often is preventable. Acute medical management is directed at preventing or minimizing secondary injury due to hypoxia, cerebral oedema, ischaemia or hyperaemia, and herniation syndrome. Early resuscitation and aggressive treatment of head trauma patients in a specialized ICU are associated with improved functional outcomes. Controlled ventilation should be provided for children with GCS less than or equal to 8, unstable airway, respiratory failure or deteriorating conscious state. After initial neurological assessment, sedation and analgesia should be given. An urgent CT scan should be performed and the neurosurgeon should decide on evacuation of haematoma and placement of an ICP catheter. Patients with increased ICP should be nursed in prop up position with head up 30 degree, fully sedated and paralyzed. External ventricular drainage device allows monitoring and drainage of cerebro-spinal fluid to maintain ICP at target range. Meticulous care should exercise to maintain adequate cerebral perfusion pressure and cardiac output. Secondary survey should be conducted to look for external and internal injuries that might compromise cardio-pulmonary status. Hypovolaemia should be corrected with normal saline and maintenance fluid should be started to keep urine output more than 1 ml/kg/hr. Dopamine or noradrenaline may be required to maintain blood pressure. For patient with persistent elevated ICP, mannitol or hyperosmolar therapy with 3% saline may help to alleviate intra-cranial hypertension. Short period of mild hyperventilation to keep PaCO2 at the range of 30-35mmHg may help in refractory high ICP. The primary objective is to maintain an adequate cerebral perfusion pressure for age of patient. If sustained intra-cranial hypertension persists, a repeat CT scan should be performed to look for surgically treatable lesion. Second tier therapies have not been subjected to scientific appraisal in randomized controlled trials and hence should be used with cautions. High dose barbiturate therapy should be used with caution in hypotension. Bilateral decompressive craniectomy with durapiasty could be considered in refractory cases. The role of induced moderate hypothermia (32-34 degree) in children with traumatic brain injury still needs to be elucidated in clinical trials.

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NOSOCOMIAL OUTBREAK OF ENTEROBACTER CLOACAE BACTERAEMIA IN AN INTENSIVE CARE UNIT DUE TO THE USE OF CONTAMINATED GELATIN SOLUTION

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From October to November 2003, a nosocomial outbreak of Enterobacter cloacae occurred in the intensive care unit of Hospital Pulau Pinang, Malaysia. Nine patients were infected by Enterobacter cloacae with similar antibiotic susceptibility pattern. Infection control precautions such as hand disinfection or washing which was initially reinforced could not control the outbreak. Further investigations were done including culturing of various intravenous solutions and disinfection solutions. The Enterobacter cloacae with the same antibiotic susceptibility was cultured from the opened bottle of gelofusine. Gelofusine has been used for dilution of insulin for intravenous infusion and was actually kept for more than 24 hours and shared among the patients. Measures such as discarding the used gelofusine after 24 hours and eliminating the sharing of gelofusine among the patients were strictly and promptly initiated. This nosocomial outbreak of Enterobacter cloacae was subsequently controlled. We concluded that the 500 ml bottle of gelofusine became contaminated during needle puncture for insulin dilution and its subsequent use for multiple patients may have been responsible for this outbreak. In conclusion, if we need to use gelofusine for insulin dilution, strict aseptic technique must be practiced and the used bottle of gelofusine should not be kept for more than 24 hours and should also not to be shared among the patients.

AN ANALYSIS OF BLOOD CULTURES IN INTENSIVE CARE UNIT

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Objective: To evaluate the frequency, yield and contamination rate of blood cultures taken in ICU

Design: Prospective observational study

Methods: All the blood culture results of every patient in ICU were recorded on a culture and sensitivity form in year 2003 and analysed. Culture results of those patients discharged within 48 hours or with repeated admission were excluded. Blood culture would be considered contaminated if only one sample grew Coagulase Negative Staphylococci (CoNS), Bacillus species or mixed growth.

Results: The total number of patients admitted to ICU was 1060, of which 365 patients were excluded. Out of the remaining 695 patients, 455 (65%) patients had cultures done upon admission and 572 (82%) patients had at least one blood culture done during their ICU stay. A total of 1830 samples were taken over 5168 patient days, giving the 16 bedded ICU a frequency of 5.7 blood culture per day. Three hundred and eighty five (21.0%) were positive, 1302 (71.1%) were negative, 60 (3.3%) were missing and 83 (4.5%) were contaminated. CoNS was the most frequent (57%) contaminating organism.

Conclusion: On average, there were 5.7 blood culture taking daily. The yield was low. The contamination rate was acceptable.

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HAND-WASHING PRACTICE AMONG VISITORS

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Objective: To see if visitors wash their hands before touching patients and if signage improves compliance.

Design: Prospective observational study using silent observer

Methods: Visitors to the Intensive Care Unit (ICU) at Hospital Sultanah Aminah during evening visiting hours from Monday to Friday were observed by a silent observer to see if they washed their hands before touching the patient they visited. The sample was decided at 100. Then red signage in three languages was put up at the entrance to ICU and at the bedside of each patient. Subsequently the observation was repeated.

Results: Only 18 out of 100 visitors washed their hands before touching the patients they visited. After the placement of signage, the number of visitors who washed their hands rose to 25 out of 100. However, the difference does not reach statistical significance (chi-square 1.07 with p value 0.30)

Conclusion: Although the visitors in the two observations were different, generally visitors to the Intensive Care Unit did not wash their hands before touching the patient. The use of signage was not an effective way of increasing compliance.

MORTALITY RATES FOR NUMBER OF ORGAN FAILURE ON DAY ONE AND DAY THREE

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Objective: To compare the mortality rate of patients with respect to the number of organ failure they have on day one and day three of ICU admission.

Design: Prospective observational study

Methods: The number of organ failure present on day one and day three was determined for every patient admitted to ICU in year 2002, using Knaus' definition of organ failure. These patients were followed up until hospital discharge to determine their outcome. The following patients were excluded from analysis: patients with repeated admission, those transferred out to other hospital, those who stayed less than 48 hours in ICU.

Results: A total of 951 patients were admitted to ICU in 2002, of which 459 patients were excluded. For the 492 patients analysed, the mortality rates for 0 organ failure on day 1 and day 3 were 3.4% and 4.8% respectively, those for 1 organ failure were 29.9% and 29.9%, those for 2 organ failure were 50.0% and 68.2%, those for 3 organ failure were 67.3% and 81.3%, and those for 4 organ failure were 77.8% and 90% respectively. The increase in mortality rates were only significant for 2 organ failure ($p = 0.007$).

Conclusion: For the same number of organ failure on day one and day three, the mortality rates for day 3 were higher than that for day one but the increase in mortality was statistically significant for 2 organ failure.

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A REGISTRY OF SEVERE SEPSIS

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Objective: A registry of severe sepsis in the intensive care unit at Hospital Sultanah Aminah, Johor Bahru

Design: Prospective observational study

Methods: A registry of severe sepsis was set up since 1st January 2004. Any patient in ICU who met the criteria of severe sepsis would be entered into the registry and various data in relation to severe sepsis were collected by the author. A review was made after six months.

Results: From 1st of January to 30th of June, the total number of patients admitted to ICU was 500, of which 115 patients met the criteria of severe sepsis. Five patients were excluded from the study as they were still in hospital by 31st of July. The mean age was 47.1
Forty-three patients were post-operative while 24 patients were post-trauma. Seventy patients had community-acquired sepsis, 13 patients ICU-acquired sepsis and 27 patients hospital-acquired sepsis. The most frequent primary site of infection was the lung followed by blood stream. Gram-negative organisms account for 59% of sepsis. With regards to disease severity, the mean SOFA score was 10.4 while the mean SAPS II score was 48.9. The hospital mortality was 62.7%. The mean hospital stay for survivors was 26 days while that for non-survivors was 14.3 days.

Conclusion: The number of patients with severe sepsis constitutes about 23% of all ICU admissions and this group of patients carries a high mortality.

TIGHT GLYCAEMIC CONTROL WITH A NEW REGIME OF INSULIN INFUSION

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Objective: To see how well the glycaemic control (between 4.4 – 7.2 mmol/l) can be achieved with a new regime of insulin infusion for all patients in the general ICU at Hospital Sultanah Aminah, Johor Bahru.

Design: Prospective observational study

Methods: Doctors and staff nurses in ICU were given briefings on the new regime of insulin infusion. Two weeks were given for them to be familiar with the new regime. All patients above 12 years were included. Data was collected from 16.05.2004 until 15.07.2004. Random blood sugar was taken on admission and daily thereafter at 0600H. At admission a blood sugar level was determined with the Medisense OptiumTM equipment manufactured by Abbott Laboratories and insulin infusion was started according to the regime.

Results: The number of patients was 153 with a total of 860 patient-days. There were 27 diabetic patients. Mean age was 44.3 ± 18.0 years. Mean stay in ICU was 5.6 ± 7.4 days. Mean RBS on admission was 6.31 ± 2.59 mmol/l. The mean of daily means was 6.53 ± 1.11 mmol/l. Looking at patient-days, 14.6% had one or more episodes of hypoglycaemia at 3.2 mmol/l or less. Looking at total number of blood sugar measurements done, 56.3% were within the range of 4.4 -7.2 mmol/l and only 1.7% were 3.2 mmol/l or less. Seventy-four (48.3%) patients had 1 or more episodes of hypoglycaemia.

Conclusion: This small study showed that a tight glycaemic control (betweeen 4.4 – 7.2 mmol/l) can be achieved with this new regime of insulin infusion but at the risk of developing episodes of hypoglycaemia.

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NON-INVASIVE POSITIVE PRESSURE VENTILATION IN HOSPITALISED CHILDREN - A DESCRIPTIVE STUDY

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Respiratory failure is a common cause of admission to the paediatric intensive care unit (PICU). Tracheal intubation with positive pressure ventilation is often necessary for management of respiratory failure. Positive pressure ventilation recruits atelectatic alveolar lung units and improves gas exchange, and at the same time allows the respiratory muscles to rest. However tracheal intubation is invasive. The patient has to be admitted to the PICU where bed availability is limited. Furthermore prolonged tracheal intubation carries the risk of subglottic stenosis in children and ventilator associated pneumonia. These limitations have led to the use of non-invasive positive pressure ventilation (NIPPV), a technique previously used in hypoventilation to avoid tracheal intubation. In 2002, PICU in UMMC introduced the use of NIPPV in more than 60 children.

Objective: To describe prospectively the use of NIPPV in the PICU.

Methodology: All children who were started on NIPPV were included in the study. Apre-set data collection was applied.

Results: From June 22 2004 to July 31 2004, nine children were recruited. Their ages ranged from 7 days to 11 years and weights were between 2.3 kg to 30 kg. Four children aged less than 1 year weighed less than 5 kg. All children had respiratory indications such as pneumonia (2), pulmonary oedema (1), pleural effusion (1), meconium aspiration (1), asthma (1) graft versus host disease of the lungs (1) and congestive heart failure with increased pulmonary blood flow (2). Three children were on conventional mechanical ventilation while the others were on high flow mask oxygen before starting NIPPV. The duration of NIPPV ranged from 1 day to 35 days. All but one patient survived. The latter died of his underlying disease after going on to conventional mechanical ventilation.

Conclusion: NIPPV has an important role in the respiratory support of children with respiratory distress or failure.

PREVALENCE OF NOSOCOMIAL INFECTIONS AND ANTIBIOTIC RESISTANCE PATTERN IN INTENSIVE CARE UNIT, HOSPITAL MELAKA (2002)

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A retrospective review was conducted to determine the prevalence of nosocomial infection, to identify the causative organisms and to study the antibiotic resistance pattern in patients requiring ICU admission in an eight-bedded Intensive Care Unit in Hospital Melaka.

Results: We had a total of 44 patients who had nosocomial infections, out of 587 patients in ICU (7.49%). The three commonest organisms identified were Acinetobacter sp. (25.56%), Pseudomonas sp. (16.79%) and Klebsiella sp. (16.04%). Our antibiotic resistance pattern showed that both Acinetobacter sp. and Klebsiella sp. were consistently resistant mainly to ceftazidime, cefotaxime and gentamicin. Pseudomonas sp was resistant mainly to cefoperazone/sulbactam, cefotaxime and gentamicin. Our results showed that there are differences between Hospital Melaka and data collected from five other hospitals inclusive of three teaching hospitals. Our approach to decrease the prevalence of development of antibiotic resistance includes rotation of antibiotics used in empiric therapy and the use of combination of drugs from different classes.

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A PROSPECTIVE STUDY OF INTERVENTION BY THE CRITICAL CARE OUTREACH TEAM ON OUTCOME IN MALAYSIAN MEDICAL IN-PATIENTS

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Adverse events occur in 4 to 17% of admissions. Studies show that up to 70% were potentially preventable. 66% of cardiac arrests had deterioration in vital signs in the 6 hours preceding cardiac arrest. The belief that earlier intervention may improve outcome led to medical emergency teams (MET) in Australia and critical care outreach teams (CCOT) in the United Kingdom. Intervention by MET resulted in a 50% reduction in mortality from cardiac arrests and earlier referral to ICU. The concept of CCOT in averting ICU admission and improving outcome may be relevant to Malaysia where there is a shortage of ICU beds.

We conducted a prospective study of intervention by a CCOT on outcome in medical inpatients on 2 wards (Study and Control) at University of Malaya. On the study ward, the CCOT was renamed AWAS (Advanced Warning System). All patients were scored with the modified early warning system (MEWS). Nurses recorded and scored vital signs (respiratory rate, heart rate, systolic blood pressure, conscious level, urine output). If a patient scored 3 or more the AWAS team (ICU lecturer and ICU sister) was called. On the control ward, management was based on existing systems. Nurses recorded vital signs but did not score or have access to the AWAS team. The scores on the control ward were calculated after discharge. Data collected include patient demographics, scores, interventions, length of stay and outcome.

The study was conducted over a period of 1 month in September 2003. We had 46 patients on the study ward and 75 patients on the control ward. The mean age was 52 years and 51 years. Comparing outcome of patients scoring 3 or more: control ward (8 deaths, 20 survivors) vs. study ward (1 death, 14 survivors); odds ratio 5.6 (0.63 to 49.95). Comparing outcome of patients in both wards scoring 3 or more (9 deaths, 34 survivors) vs. less than 3 (1 death, 71 survivors); odds ratio 18.79* (2.29 to 154.41). Comparing length of stay of patients scoring 3 or more (Median 4 days Interquartile range 3 to 7 days) vs. less than 3 (Median 4 days Interquartile range 3 to 5 days); p 0.0125*. Only 1 out of 122 nursing observations were filled in inaccurately.

In conclusion, this study validates the use of the MEWS in Malaysian patients to identify patients at risk of death. There is increasing evidence that earlier intervention in improves outcome. Patients with higher scores had similar median lengths of stay but some had significantly longer lengths of stay. This may allow for hospitals to plan for future bed provision. It also shows that Malaysian nurses are able to record and score patients accurately with the MEWS after a period of training. Further study is required to look into whether intervention by AWAS can improve outcome and avert ICU admission in medical and surgical inpatients.

Abstracts

ON THE OUTLOOK FOR COMMONLY MISSED NEUROLOGICAL PROBLEMS IN THE ICU PATIENT

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Objective:
This study was undertaken to detect common co-existing neurological morbidities in ICU patients which may complicate or delay their recovery. Clinical criteria were mainly monitored.

Methods:
The study included 60 patients admitted to the ICU within a period of 6 months. The primary illness varied from Septicemia to Dengue Haemmhorragic Fever to Chronic Renal Failure to Hepatic Encephalophaty to an Addisoman Crisis, to severe Bronchial Asthma and several other conditions. In all patients a detailed history was taken and a thorough physical examination was performed. A detailed neurological examination was performed in all patients. Routine lab results were sent and monitored. Serum electrolyles and thyroid functions were sent in all patients. Arterial blood gas were done in all.Patients with weakness of any or multiple muscle groups with or without reduced deep tendon reflexes and signs of sensory neuropathy were studied. Electrophysiological studies, Nerve Conduction Studies and Muscle Biopsies were however, not done. Patients on drugs which could affect the muscles or cause a neoropathic clinical picture were omitted from this study. e.g. steroids, thiazides or alcohol etc.

Results:
Retrospective analysis of the results were carried out. Out of the 60 patients 8 (13%) had some amount of neurological involvement.2 patients(3%) developed symptoms within the first 72 hoursof the illness. The commonest finding was an acute myopathy (6 patients-10 %). This was mainly (5 patients-8.5%) a proximal and reversible myopathy. One patient showed evidence of severe muscle necroses. All the patients with myopathic symptoms (100%) had some electrolyte imbalance (hypokalemia, hyperkalemia, hypocalcemia or hypercalcemia). One had a raised free T4 level. 5 patients out of 8(62%) had difficulty weaning from the ventilator. Muscle involvement and weakness improved spontaneously within 2 weeks in 6 patients.(75%), after treatment for the primary disease.

5 out of 60 patients (12%)demonstrated a rapidly progressive muscle weakness 1-4 weeks after the primary disease. All these patients had some sort of infective ectology. The weakness was noted on both upper and lower limbs and more in the proximal than distal muscle groups. 2 patients(3%) had respiratory muscle weakness, 2 patients(3%) developed distal parasthesias and limb pains, 1(1.5%) developed bulbar and facial muscle weakness.
In all the patients the muscle weakness progressed in the first 1-2 weeks despite therapy. Only 1(1.5%)had rapid deteoration in his symptoms within hours. On examination, there were varying degrees of weakness in all proximal muscle groups with loss of reflexes.

A critical illness polyneuropathy was noted in 17(56%) of the patients with sepsis(total 32)..All these patients demonstrated an acute onset flaccid paralysis with areflexia.Causes such as aminoglycoside, Gullaine Barre.pancreatic disease, nutritional deficiencies, manifestations of malignancies and porphyria and other causes of neuropathy were excluded in this group.Cranial Nerves were spared in all these cases.None of these patients were on muscle relaxants. The CIP ran a self limiting course in13 (78%)of these patients if the patient had been treated early and aggressively for the sepsis.

The protein CSF was normal in 50% but rose after 10 days in the rest..CMV, Mycoplasma and Compylobacter were excluded. Steroids were tried in 3 patients but were ineffective in all. IVIG was not tried. Institution of early treatment within 14 days reduced the period of ventilation and improved prognosis. One patient died in this group of patients (80%) recovered fully 2 had permanent disability.