

Critical Care Medicine in the Western Pacific Region

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Abstract

The Western Pacific region has seen rapid recent economic development but variation in the provision and organisation of intensive care units (ICUs) between different countries remains. While Japan, Australia, New Zealand, Singapore, Taiwan, Korea and Hong Kong have well developed intensive care facilities, in other countries the more limited funding for healthcare can be reflected by differential availability of modern medical technology between the public and private sectors.

Other factors important to intensive care include physician training, availability of other staff and whether intensive care is delivered in "open" or "closed" units. At present only Japan, Hong Kong, the Philippines, Australia and New Zealand have a postgraduate examination in intensive care leading to recognition as an intensive care physician. In Japan, Australia, New Zealand and Indonesia each hospital usually has a single multidisciplinary (medical-surgical) ICU, whereas most other Western Pacific countries have divided medical and surgical units. In Japan, Australia, New Zealand, Hong Kong, Taiwan and Thailand, the larger ICUs are usually staffed by full-time intensivists.

Future development of intensive care in the region will parallel economic development. In most countries increasing patient expectations, ageing populations and "Western" diseases will increase demand for intensive care services. Only a few countries currently have recognised programmes of training and certification in intensive care but as more adopt this process it should lead to a clearer recognition and acceptance of the role of the intensivist.

Ann Acad Med Singapore 1998; 27:381-6

Key words: *Administration, Intensive care, Organisations, Staffing, Teaching*

Introduction

The Western Pacific region includes a very diverse group of countries varying in their culture, economic development and per capita income, disease prevalence and medical traditions. The Western Pacific Association of Critical Care Medicine (WAPCCM) includes countries from Japan in the north to Australia and New Zealand in the south, encompassing the ASEAN nations and others of Southeast Asia. There have also been discussions between WAPCCM and China, which may lead to China formally joining the Association in the future.

International comparisons show a clear association between per capita income and health spending,¹ though considerable variations still exist between countries in the proportion of gross national product spent on health. For example, the proportion in the United States is approximately 14%, Australia 8.6%, Japan 6.5%, Hong Kong 4% to 5%, Singapore 3% and Indonesia 2.5% (1993). In many respects the development of intensive and critical care medicine in the different countries parallels their economic development (Table I) but the

picture is blurred by discrepancies in service provision between the public (government) and private sectors of healthcare, and influences on medical training and organisation. These latter factors have a major effect on the recognition of intensive care and the willingness of physicians to undertake this stressful and demanding branch of medicine so that in many countries of the region there are few full-time intensive care physicians.

The terms "intensive care" and "critical care" are often used interchangeably but may have different meanings in different countries. "Critical care" can be defined as the care of critically or seriously ill patients from the onset of their episode to discharge from an ICU. It may therefore include emergency treatment outside hospital, resuscitation, emergency medicine, management of major disasters and intensive care. Intensive care medicine provides the medical care of patients in ICUs with adult intensive care being the principle focus of this article.

Specialty Recognition and Training

Medical specialties are usually based on an organ

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TABLE I: POPULATION AND REAL PER CAPITA GROSS DOMESTIC PRODUCT (GDP) IN 1995*

Country	Population	Real per capita GDP (US\$)
Japan	125.6	25,209
Singapore	3.0	18,867
Australia	18.1	18,569
Hong Kong	6.3	15,508
New Zealand	3.5	13,598
Brunei	0.3	13,155
Taiwan	21.3	10,480
South Korea	44.8	8,122
Malaysia	19.9	3,255
Thailand	60.2	2,126
Papua New Guinea	4.1	1,094
Indonesia	193.8	772
Philippines	68.4	723
China	1210.0	524

* From information supplied to the Asia Pacific Economic Co-operation Group²

system (e.g. cardiology, neurology), extremes of age (neonatology, paediatrics, geriatrics), a group of diseases (e.g. infectious diseases, oncology), techniques (e.g. anaesthesia, surgery) or a facility (e.g. radiology, pathology). The specialty of intensive care is also facility based, needing specially staffed and equipped units for its efficient practice and the care of patients who are seriously ill, injured or recovering from major surgery that imposes severe physiological stresses on the body.

A medical specialty regulates entry through recognition of experience and training, often associated with the award of a certificate or diploma of qualification. In practice a specialty also needs recognition by other specialty groups as having additional skills and knowledge in their specific field. Recognition by their medical peers of specialty status is accompanied by the specialty group being seen as the appropriate group to provide expert advice to governments, health administrations, professional associations and other external groups.

The specialty recognition of intensive care varies be-

tween different countries of the Western Pacific region and between other countries of the world. In few is intensive care yet recognised as a distinct specialty, but in many it does have formal recognition as a sub-specialty or supra-specialty. These may be differentiated as follows:

* **Specialty:** a specific programme of postgraduate training and certification in intensive care medicine followed by full-time practice of intensive care.

* **Sub-specialty:** postgraduate training and certification in a primary specialty (e.g. anaesthesia, internal medicine, respiratory medicine) followed by a specialty specific module of training, with or without certification, in intensive care medicine. In this model the practice of intensive care medicine is usually part-time.

* **Supra-specialty:** postgraduate training and certification in a primary specialty followed by a common recognised postgraduate training programme in intensive care medicine and its full-time or part-time practice.

In some countries there is no specific recognised training in intensive care medicine. The practice in some of the countries of the Western Pacific region is summarised in Table II. The duration of intensive care training varies from one to six years depending on whether it forms a specific training pathway after graduation or forms a one- to two-year module undertaken later in training.

Organisation of Intensive Care

In many countries the basic organisation of ICUs has still to be resolved. There are two principal patterns of organisation: the "open" and the "closed" unit:

Open unit: admission to the ICU is under the control of the physician or surgeon who admitted the patient to the hospital, the patient remaining primarily under the care of this same person during their admission to the ICU. Multiple referrals or consultations, usually to organ system based specialties (e.g. pulmonology, cardiology, nephrology, endocrinology) are used to advise on the various clinical problems with immediate care co-

TABLE II: SPECIALTY STATUS OF INTENSIVE CARE MEDICINE IN SOME COUNTRIES OF THE WESTERN PACIFIC REGION

Country	Specialty status*	If a sub-specialty, which specialties	Postgraduate examination in intensive care medicine
Australia	Specialty or supra-specialty		Yes
Hong Kong	Sub-specialty	Anaesthesia, Internal medicine	Yes
Indonesia	Sub-specialty	Anaesthesia	No
Japan	Supra-specialty		Yes
South Korea	None (planned sub-specialty)	Anaesthesia	No
Malaysia	Sub-specialty	Anaesthesia, Paediatrics	No
Philippines	Specialty		Yes
Thailand	None (planned sub-specialty)	Pulmonology	No

* See text for definition

ordinated by the junior medical staff (i.e. interns or residents) rotating through the unit. Discharge from the unit is determined by the admitting specialist. This model makes it difficult to have consistent management plans because of the diversity of medical input, does not encourage a multidisciplinary team approach to intensive care involving physicians, nurses, physiotherapists, pharmacists and social workers because of the large physician pool involved and can produce conflicting advice to those with responsibility for co-ordinating care because of the single organ system focus of the consultative process. This system may work when there is an excess of intensive care beds over demand, but the deficiencies can easily be exposed when demand exceeds supply with the decisions on admission being made by junior medical staff or allocated by nurses. "Open" units are common when there are multiple single specialty orientated ICUs (e.g. medical, surgical, respiratory, cardiothoracic, neurosurgical, trauma) in a single hospital.

Closed units: admission and discharge from the unit is determined by the responsible intensive care physician, usually in consultation with the referring physician or surgeon who resumes responsibility for patient care. Primary responsibility for patient care in the ICU lies with the intensive care physician who co-ordinates care as appropriate with the referring team and may consult with other specialists when particular advice or opinions are sought. In this system the intensive care physicians have a regular on-going commitment to the unit which encourages teaching, consistency of approach and teamwork directed towards the best management of critically ill patients. This model has been described³ as providing the most efficient care of critically ill patients by bringing some aspects of all specialties to the bedside and allowing patient specific titration of resources. It also ensures there is a single point of contact for the families of critically ill patients who benefit when under stress from having a consistent, available source of information from a person skilled and experienced in talking to distressed families. Although there is no prospective, randomised study, a considerable amount of evidence now supports the "closed" system. Patients in a surgical ICU cared by an intensivist-led team had a shortened duration of ICU stay and mechanical ventilation and had one third the number of complications when compared to a less severely ill group of patients (as assessed by APACHE II score) cared for by surgeons.⁴ A prospective study in a medical ICU showed a greatly reduced comparative mortality rate in patients cared for by intensive care physicians,⁵ supporting other evidence from the United States that intensive care provided by trained intensive care physicians improves care and efficiency.⁶

Closed units are more common when there is a single

ICU facility providing services to critically ill patients from all sources in each hospital. Nevertheless, this model is often opposed by those who fear loss of "control" of their most seriously ill patients, the inevitable peer review of previous care or loss of income that may result from fewer patient consultations from the ICU. The high profile and resource intensity of intensive care may also be seen as important to control, even if there is little desire to provide immediate care, especially outside normal working hours.

The organisation of ICUs varies not only between countries but also between different hospitals in most countries. In Japan, the Japanese Society of Intensive Care Medicine is promoting development of well staffed units, but the proportion of intensive care physicians working full-time in intensive care remains low.⁷ Most of the over 550 board-certified intensive care physicians in Japan have medical specialty training in specialties other than intensive care, with nearly 30% of the Directors of intensive care being anaesthetists, 21% intensive care physicians, 18% surgeons and 11% from internal medicine.⁷ ICUs are typically confined to the larger hospitals, with only 20.6% of hospitals having an ICU, most having 5 to 8 beds, and there is usually a single ICU in each hospital.⁸

In contrast, Thailand, Taiwan and, to some extent, China have followed the path of multiple specialised ICUs.⁹ For example, the Siriraj Hospital associated with the Mahidol University in Bangkok, Thailand, has 11 separate ICUs. The evolution of intensive care has occurred through a lack of well-trained staff, making it difficult to set up a comprehensive ICU, and the system of funding University hospitals in which the budget is allocated among the various individual clinical departments.¹⁰

Indonesia, Australia and New Zealand^{11,12} generally have single multidisciplinary (medical-surgical) units with separate coronary care units whereas most units in other countries of the Western Pacific region have divided medical and surgical units.⁹ Nearly all the larger ICUs in Australia and New Zealand are staffed by full-time intensivists but, apart from Japan, this pattern of staffing is found in just a few units in Hong Kong,¹³ Taiwan and Thailand. Elsewhere most units have a medical director with the surgical units being directed by anaesthetists or the primary surgeons and medical units by physicians in pulmonary or internal medicine, with specialists dividing their time between practice of their primary specialty and the care of patients in the ICU. In South Korea the patients in some ICUs are managed mainly by the primary specialist rather than the ICU staff who have little control over the admission and discharge of patients. Even in multidisciplinary units under the charge of intensive care doctors in South Korea, the ICU staff usually do not control antibiotic

treatment, fluid therapy, tracheostomy or nutrition.⁷ These aspects of patient management are generally referred to other specialists. However, the intensive-care specialist nearly always controls decisions on admission, discharge and respiratory care.

Facilities

Although cost containment is having an impact on healthcare delivery in all countries, the effect of resource limitations is clearly greatest in the most economically disadvantaged countries. In even the least well off countries however, there has been a trend towards the development of private hospitals and medical centres in the larger cities. These provide high levels of equipment and access to the most modern medical technology for those able to pay. They also tend to be better staffed and the staff relatively well paid compared to standards in state hospitals.¹⁰ The result is a wide variation in the standard of facility to which the term ICU is applied between countries and even within a given country. For this reason it is not possible to provide any meaningful comparative information on the number of ICUs or number of ICU beds in the different countries of the Western Pacific region.

Some country-specific definitions of intensive care facilities are available¹⁴ but there has been no agreed minimum standard of facility and service provision that would provide a common understanding across the countries of the region. However, as part of the first Asia Pacific Consensus Meeting which addressed the early management of septic shock, it became necessary to define the minimum care that would be provided as part of intensive care (unpublished). Ultimately, this and other Regional Consensus Meetings may lead to definitions of minimum standards that would allow a better appreciation of the provision of facilities in the different countries.

In Japan the ICUs are well equipped with monitoring, diagnostic and therapeutic devices (Table III). Similar facilities would be available in level 3 ICUs in Australia¹⁴ and large private hospitals or university hospitals in Singapore, South Korea, Taiwan, Hong Kong and New Zealand with more limited provision of such facilities in other ASEAN countries and China.⁹ In Thailand only 50% of general hospitals had an ICU in 1991.¹⁰ Outside the principal cities of some of the less developed countries, the term “intensive care unit” may be applied to an area with no specifically trained staff and minimal facilities, equipment or drugs. It is possible, however, to provide a basic essential standard of intensive care with mechanical ventilation, cardiac monitoring, endotracheal suction, nasogastric feeding, closely supervised intravenous infusions, regular nursing observations and high level nursing care relatively cheaply.¹⁵ In 1987 the cost of this type of care was estimated at US\$76 per

TABLE III: FACILITIES AVAILABLE IN JAPANESE INTENSIVE CARE UNITS (ICUs)—FROM INFORMATION IN REFERENCE 3

Facilities available in virtually all hospitals with an ICU

- Intravascular pressure monitoring
- Pulse oximetry
- Blood gas analysis
- Electrolyte analyser
- Bronchoscopy
- Portable X-ray
- Electroencephalography
- Electrocardiography
- Cardiac output measurement
- Echocardiography
- Computed tomography scanning
- Mechanical ventilation
- Cardiac pacemakers
- Infusion pumps
- Emergency power supplies

Facilities available in over 90% of hospitals with an ICU

- Bed weighing scales
- Respiratory function assessment
- Cardiac angiography
- Magnetic resonance imaging
- Haemodialysis
- Haemoperfusion
- Plasmapheresis

patient per day. Single, easily repaired equipment is a vital component because sophisticated technical support and spare parts are unlikely to be readily available.

Nursing

A major component of high quality intensive care is provided by appropriately skilled and experienced nursing staff. In most countries of the region, such nurses are in short supply either because the expansion of intensive care has exceeded the output from training programmes or a lack of established training programmes and recognition of the specific knowledge and skills required. In many ways, the recognition of nursing expertise in intensive care has paralleled the recognition of intensive care as a medical specialty.

Critical care nursing is not an authorised specialty in Japan and there are problems with nurse shortages, high staff turnover and lack of intensive care experience with only 44% of nurses having three or more years experience in the area.⁷ Any training occurs in the workplace. The shortage of intensive care nurses in Korea results in each nurse caring for up to 3 to 4 patients during the day and 4 or 5 patients at night.⁷ In Singapore, Hong Kong, Australia, New Zealand and Taiwan there are generally sufficient experienced or qualified (certified in intensive care) nurses to ensure standards of patient care are maintained. In other countries of the region the development of critical care nursing is inhibited by the lack of recognition and lack of appropriate teaching or training courses. Problems with nurse staffing of ICUs in Thai-

land may, in part, be associated with the additional work and responsibility carried by ICU nurses without additional remuneration or opportunities for promotion.” In Australia all nurses now qualify through university degree programmes. The tradition of excellence in critical care nursing in Australia and New Zealand was built on hospital-based intensive care nursing programmes. Most of these postgraduate programmes are now also university based, imposing costs on participants and teaching that is remote from the point at which skills are applied.¹⁴ These factors, together with a decrease in the places available, suggest a shortage of critical care nurses is imminent.

Organisations

The Western Pacific Association for Critical Care Medicine, founded in 1980 and with its first Congress in Singapore in 1981, provides a focus for intensive and critical care physicians in the region. It has been structured around individual membership which was appropriate when many countries in the region did not have national organisations for intensive and critical care medicine. A current constitutional review may result in it becoming principally a peak body for intensive and critical care medicine organisations, rather than an association of individual members, now that most nations have their own professional society. The WPACCM holds a bi-annual Congress and communicates through a newsletter—*Critical Care-Asia Perspective*.

Multidisciplinary organisations for intensive or critical care medicine have been established in Australia and New Zealand (1975), Indonesia (1979), South Korea (1980), Hong Kong (1983), Thailand (1985), Taiwan (1985), Philippines (1993) and Singapore (1995). In Malaysia, critical care continues as a section within the Society of Anaesthesiologists; Japan has two national organisations, the Japanese Association of Acute Medicine (JAAM; 1972) and the Japanese Society of Intensive Care Medicine (JSICM; 1973), with a significant overlap in their activities and membership.” The principle focus of the JAAM is pre-hospital care and emergency medicine, with JSICM relating more closely to hospital-based intensive care.

Cultural Issues

The Western Pacific region has a wide diversity of cultures, religions and peoples. Many of the countries also reflect this diversity. Buddhists, Taoists, Hindus, Muslims, Christians and other religions differ in important aspects of underlying philosophy, attitude to death or serious illness and the sanctity of life. Cultural differences produce variations in attitudes to ageing or disability and the role of the nuclear or extended family, to cite just a few examples. Inevitably these factors have an impact on the provision of intensive care, affecting atti-

tudes to withdrawal of futile care, acceptance of brain death and expectations in regard to the outcomes of intensive care. The well-educated and wealthy residents of the major cities of the Western Pacific region are usually aware of the latest techniques for sustaining organ system function, new medical techniques and the latest pharmaceutical products, or else they rapidly develop this awareness through contacts or the Internet when a family member becomes seriously ill. Unrealistic expectations of treatment and the outcome from critical illness can place additional pressures on intensive care physicians. A particular feature of Korean intensive care is “hopeless discharge”(s). Families may insist on taking patients home when their chance of survival is small because of the high value placed on dying at home which is believed to guarantee a better future life. Such discharges can affect the apparent outcomes from intensive care.

The Future

Rapid economic development in Indonesia, Malaysia, Thailand, the Philippines and China should lead to improvements in medical care. Services now available in the private sector should spread to government and university hospitals so the overall healthcare systems might be expected to more closely resemble those of the countries now enjoying a higher per capita gross national product. Developments in Vietnam and Laos might be expected to move towards catching up with the ASEAN nations while critical care services in countries such as Myanmar and Cambodia will need political certainty to become relevant.

In most countries the ageing of the population, urbanisation and the increased frequency of “Western” diseases such as chronic bronchitis, hypertension and coronary artery disease, perhaps related to increased cigarette smoking, is likely to increase the demand for intensive care services.^{7,16,17}

In all the countries of the Western Pacific region intensive and critical care medicine is a relatively new specialty. Only a few countries now have established critical care training and certification programmes, but it can be expected that these will be established in most countries in the next few years. This process should be accompanied by clear definition of the role of intensive care physicians in the direction of ICUs and their relationship to other medical specialists. Imperatives created by moves to cost containment, the most efficient delivery of healthcare and increasing consumer expectations should promote an organisational model that favours “closed” ICUs and centralisation for intensive care resources within hospitals.

The challenges are likely to be in advocacy of intensive care as an appropriate use of healthcare resources which produces worthwhile, cost effective outcomes, ensuring

there are sufficient well-trained intensive care nurses to maintain standards of care and making a greater contribution to intensive care research. There is the population and manufacturing base to provide simple, robust, low maintenance ventilators, monitoring devices and machines needed for organ system support (e.g. continuous renal replacement) at lower cost, bringing the benefits of intensive care to more patients. A start has been made on consensus development conferences to address issues of common concern to those working in this field in the Western Pacific region, and these have the potential to be a powerful means of fostering regional identity and sense of purpose in improving delivery of care to critically ill patients. Although most of the research evidence comes from North America and Europe it should be possible to use the conclusions to develop care that is appropriate and relevant to the Western Pacific nations and their needs.

All the signs indicate that intensive and critical care medicine in the Western Pacific region can look forward to a future of growth, increased academic and professional standing and professional satisfaction for those involved in its practice.

Acknowledgement

The assistance of members of the Council of the Western Pacific Association for Critical Care Medicine in providing information on their respective countries and the practice of intensive care is gratefully acknowledged. The author would like to thank Ellinis Baarda for her assistance in the preparation of the manuscript.

REFERENCES

1. Chantler C. Nostalgia ain't what it used to be. *J R Coll Physicians Lond* 1997; 31:123-4.
2. Clinton bears APEC hopes. *West Australian Newspaper*, November 20 1996:14.
3. Pinsky M R. Changes in attitude, changes in latitude. *J Crit Care* 1995; 10:151-3.
4. Hanson C W, Deutschman C S, Behringer E C, Anderson H L, Kauder D R, Reilly P M, et al. Patient care: Do intensivists make a difference [abstract]? *Crit Care Med* 1996; 24(Suppl):A56.
5. Costas R C, Costa J L, Assad J A, Gomes P N, Mesquita A. Impact of a co-ordinated team of intensivists on mortality in critical care: a prospective study over twelve months [abstract]. *Crit Care Med* 1996; 24(Suppl):A56.
6. Carlson R W, Weiland D E, Srivathsan K. Does a full-time 24 hour intensivist improve care and efficiency? *Crit Care Clin* 1996; 12:525-51.
7. Yoshiya I, Baik S W. Critical care in Japan and Korea. *Crit Care Clin* 1997; 13:267-85.
8. Tajimi K, Shimada Y, Nishimura S, Sirio C A. Japan. *New Horizons* 1994; 2:404-12.
9. Mustafa I, Yee T H. Critical care in East Asia. *Crit Care Clin* 1997; 13:287-98.
10. Kururattapun S A. Intensive care in Thailand. *Intensive Care World* 1991; 8:86-7.
11. Fisher M M. Australia. *New Horizons* 1994; 2:386-91.
12. Streat S, Judson J A. New Zealand. *New Horizons* 1994; 2:392-403.
13. Ip M, Yam L. Critical care rationing in Hong Kong. *Curr Opin Crit Care* 1997; 3:322-8.
14. Dobb G J. Intensive care in Australia and New Zealand. *Crit Care Clin* 1997; 13:299-316.
15. Watters D A K. Intensive care in Zambia. *Intensive Care World* 1989; 6:212-5.
16. Zhang K L, Lin M, Li D. Healthcare delivery system and major health issues in China. *Med J Aust* 1996; 165:638-40.
17. Kosen S, Gunawan S. Health services in Indonesia. *Med J Aust* 1996; 165:641-4.