CRITICAL CARE IN SRI LANKA

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In 1952 an area in the thoracic ward at General Hospital Colombo was designated as a recovery area with an ECG monitor to monitor post-operative patients. In the early 1960s an East Radcliffe ventilator was introduced in this recovery area. This was soon followed by the placing of the 'Iron lungs' ventilators at the General Hospital Colombo and few outstation hospitals. The 15th of June 1968 reminisced a major milestone of medical history in Sri Lanka by inaugurating the first intensive care unit. This was spearheaded by Dr. Thistle Jayawardhane, consultant cardio-thoracic anaesthesiologist.

In 1976 the second intensive care unit was established as the recovery unit in General Hospital, Colombo to accommodate general surgical and medical patients. The radiometer pH and blood gas machine in that unit was the first blood gas machine in the country. In 1980 the third ICU was started at the Teaching Hospital Peradeniya.

EXPANSION OF ICU FACILITIES IN SRI LANKA

Though the first ICU at GH Colombo was started in 1968, the exponential growth of ICU's occurred since 1995 .Currently, as to the end of year 2017, there are 99 adult level 3 ICUs (level 3 ;ability to provide basic and advanced respiratory support and support for minimum of two organ systems), distributed across the country (Fig 1, 2, Table 1)

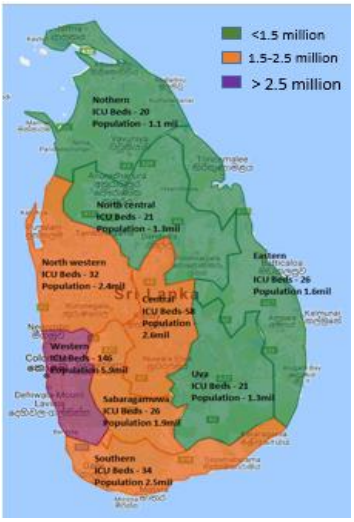


Fig 1: Distribution of ICU

Province	Population	Number of ICUs
Western	5,851,130	36
Central	2,571,557	14
Southern	2,477,285	11
Sabaragamuwa	1,928,655	4
Northern	1,061,315	9
North central	1,266,663	5
North western	2,380,861	8
Eastern	1,555,510	7
Uva	1,266,463	5
Total	20,359,439	99

Table 1: Provincial distribution in relation to the population

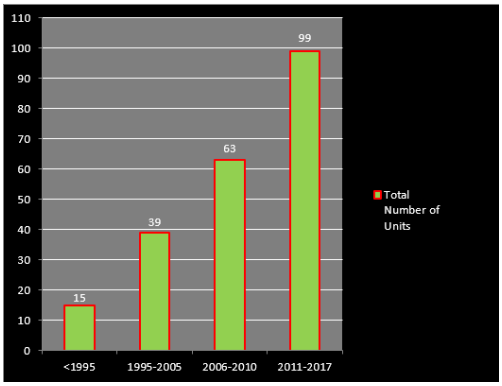


Fig 2: The growth of the ICU

The rapid progression of the intensive care units occurred when the expansion and extension of medical services to the provinces took place. During this period, anaesthesia emerged as a leading specialty in the country. Thus, the specialty of anaesthesia was able to provide:

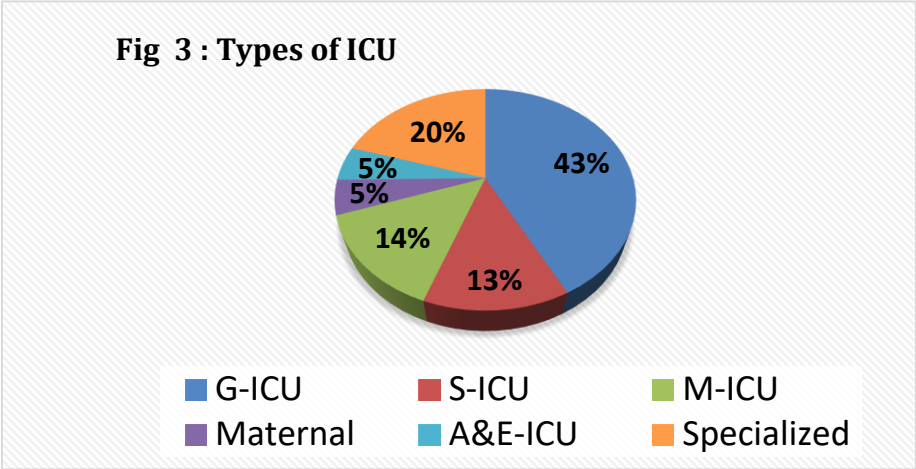
- Dedicated specialists to man the ICUs-that included administrative responsibilities
- A 24 hour service, seven days a week- including weekends and public holidays
- Advice to the Ministry of Health because of their expertise on the range of equipment required, leadership and training of medical officers and paramedical personnel in intensive care

Further, the post-graduate curriculum prepared by the Board of Study in Anaesthesia included an essential and comprehensive component of critical care. The inclusion of critical care increased the range of skills and knowledge of the specialist in anaesthesia. Further, post-graduates in other specialties were provided with the necessary theoretical and practical expertise to care for patients in ICUs. This encouraged the concept of multidisciplinary care of patients in the ICU's.

DETAILED DISTRIBUTION OF ICUs IN THE COUNTRY

General ICU's were the first to be established outside Colombo. Most were multi-disciplinary ICUs under the administration of the consultant anaesthetist. However, care was always provided by both the admitting clinician and the anaesthetist, and thus a wide range of patients from different specialties were able to receive care. Increasing trend towards specialisation

across all specialties resulted in establishment of specialised ICUs. These were developed to provide-specific care for selected patient populations such as medical, surgical, maternal, accident and emergency and other specialties. (Fig 3)



The total number of ICU beds in different category of Hospitals was identified as follows. (Fig 4)

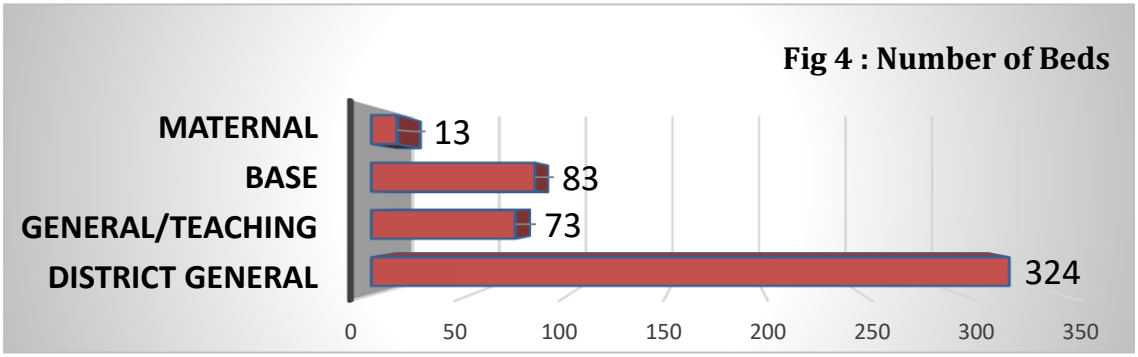


Table 2: Bed availability in relation to the population

POPULATION TO ICU BEDS RATIO

Often considered more relevant to the degree of care is number of beds per 100000 populations- displaying the availability of specialised care and reflects the development of the speciality in the country. No standard requirement was agreed upon across countries. Sri Lanka has an average of 2.42 beds per 100000 populations . Internationally, reports available reveal a range from 1 to 30 ICU beds per 100,000 people. (United Kingdom 3.3-6.6 /100,000 and 24.0-29.2/100,000 in Germany).

A detailed analysis of the state in Sri Lanka is presented in Table 2

Province	Population	No Of ICU Beds	ICU BED PER 100000
Western	5,851,130	193	3.27
Central	2,571,557	63	2.42
Southern	2,477,285	57	2.28
Sabaragamuwa	1,928,655	26	1.3
Northern	1,061,315	40	4
North Central	1,266,663	23	1.76
North Western	2,380,861	37	1.54
Eastern	1,555,510	32	2
Uva	1,266,463	21	1.61
Total	20,359,439	492	2.42

HOSPITAL BEDS TO ICU BEDS RATIO

The extent of care provided to seriously ill patients within a hospital is reflected by the ratio of the hospital beds to ICU beds. At present, this ranges from 76% in District general Hospitals to 93% in hospitals dedicated to Obstetrics and Gynaecology. (Table 3) Internationally, the norm is to dedicate 10-40 beds per 1000 patient's .However, in Sri Lanka, this ratio is reaching 12. This could be attributed to the rapid increase of hospital beds that took place during the past two decades. (Table 3)

This ratio probably reflects the increased number of hospital beds that took place during the past two decades, but the need for similar increases in ICU beds was not achieved.

Table 3: Availability of ICU beds in relation to Hospital bed

Type of Hospital	Hospital :ICU Beds Ratio	%	Ideal %
District General	76: 1	1.3	10-20
General	80: 1	1.2	7-10
Base	84: 1	1.1	-
Maternal	93: 1	1	-

THE LEAD SPECIALIST IN ICU

Most ICUS in the country function as Semi closed system. In this model, even though one lead speciality is in-charge of the ICU, the patient's primary physician actively participates in the care of the patient and contributes to patient management along with the ICU lead; hence the primary physician is not isolated. In Sri Lanka the lead specialists in the ICUs are illustrated in Table 4.

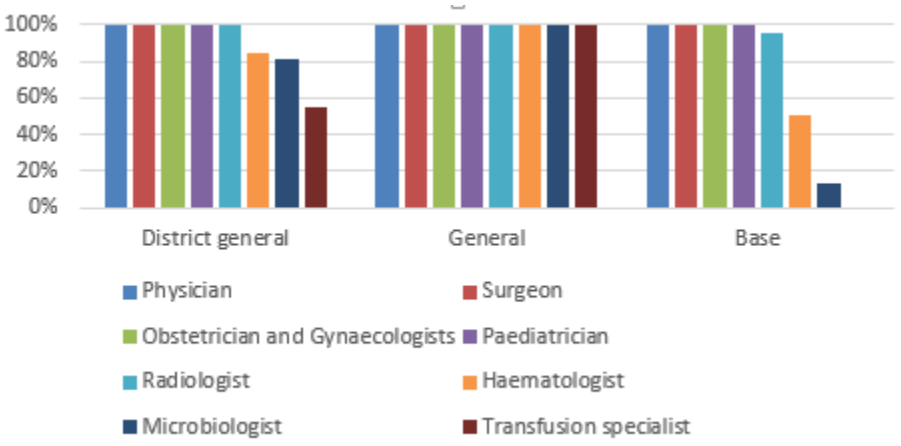
Type of ICU	Total No	Anaesthetist	Physician	Surgeon
General/Multi-disciplinary	40	38	2	O
Medical	13	8	5	0
Surgical	13	13	0	2
Neurosurgical	6	4	0	2
Cardiothoracic	5	4	1	0
Neurotrauma	5 (1 NT-ETU)	3	0	2
Oncology	2 (exclude Paed)	1	1	0
Obstetric	4	4	0	0
Accident Service	5 (ETC1+AT1)	4	0	1
Neurology	1	0	1	0
Cardiac	1	0	1	0
Nephrology	1	1	0	0
Respiratory	1	1	0	0
Toxicology	1	0	1	0
Dental	1	1	0	0

Table 4: The Lead specialist in ICU

MEDICAL PERSONNEL ASSOCIATED WITH EXPANSION

Even though the lead clinician is most often the anaesthetist, the other specialists are readily available for the provision of multidisciplinary care (Fig 5)

Fig 5: Other specialties available for multidisciplinary care



NON-SPECIALIST MEDICAL STAFF

Medical Officers

Table 5: The availability of Medical Officers in the ICU

Type of Hospital	No of Medical Officers	No of Patients	Patient /MO	No of Beds	M0/Bed ratio
District General	676	2234	3.30	332	2.03
General	173	715	4.13	76	2.27
Base	155	527	3.40	83	1.86
Maternal	33	140	4.24	13	2.53

The international recommendations indicate the ICU residents/Patient ratio should not exceed 1:8. We only have data to express medical officer to bed ratio assuming all the beds are fully occupied. The figure being less than 5 is indicative of a level of adequate care in the country (Table 5)

The designation of these medical officers as mainly as anaesthetists in ICU's indicate that they are not being handpicked from the pool of doctors but trained for intensive care by the consultant anaesthetist. Even the other Medical officers allocated to ICUs as ICU MOs were being trained by the lead specialist anaesthetist.

Table 6: The Trained Medical officer's designations in ICU

Type of Hospital	No of Medical Officers	MO Anaesthesia	MO ICU /Anaesthesia
District General	302	74	300
General	46	53	74
Base	38	42	75
Maternal	29	0	4

B.PARAMEDICAL OR OTHER HEALTH PROFESSIONALS

Nursing officers

Table 7: The availability of Nursing Officers

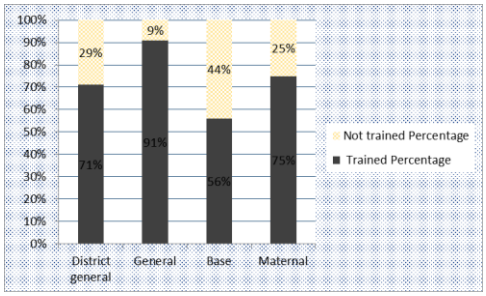
Type of Hospital	No of Beds	Number of nursing Officers	No of Nursing officers per bed
District General	332	1325	4
General	76	218	3
Base	83	272	3
Maternal	13	54	4

The Requirement of nurses according to the beds is a minimum of3 Nurses per ICU bed with a provision of an extra 50%, thus the ratio is 4.5. We are achieving that target with time. (Table 7)

Levels of training of lead Nursing Officers

Table 8: The Levels of training of lead Nursing Officers

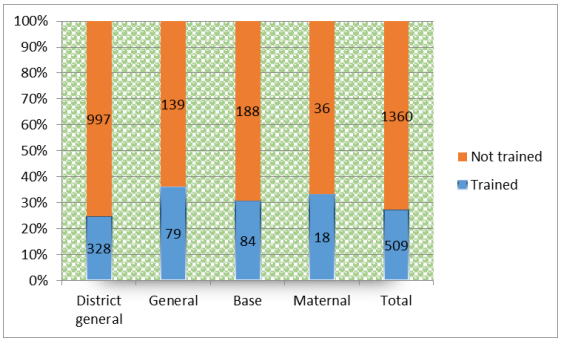
Type of Hospital	Trained	Percentage	Not trained	Percentage
District General	44	71%	18	29%
General	10	91%	1	9%
Base	12	56%	10	44%
Maternal	3	75%	1	25%



Levels of training of other Nursing Officers

Table 9: Levels of training of other Nursing Officers

Type of Hospital	Trained	Not trained	Percentage
District General	328	997	25%
General	79	139	36%
Base	84	188	31%
Maternal	18	36	33%
Total	509	1360	27%



Ideally, a minimum of 50% of registered nursing staff should have had post registration training in Critical Care Nursing.
It is pleasing to note that in 69% of the ICUs, the nurse-in-charge has been trained as recommended. However, training of the other nursing staff is low - 27% and there is a necessity to improve on this below par percentage. (Table 8, 9)

Other paramedical personnel

Table 10: Availability of Other paramedical personnel

Type of Hospital	Physiotherapists (for ICU care)	Pharmacist (in the Hospital)	Nutritionist (in the Hospital)
District General	100%	100%	55%
General	100%	100%	85%
Base	95%	95%	22%
Maternal	100%	66%	100%

Even though in general there is a shortage of Physiotherapists in the country, their availability for patients in the ICU appears to be adequate. (Table 10) Critical care pharmacy and pharmacist services are essential for ICUs and pharmacists should participate regularly with the critical care team during their assessments of patients in the ICU. However, this practice does not occur in Sri Lanka probably due to the inadequate numbers of trained pharmacists. There is also a deficiency of Nutritionists in the country.

ADVANCES IN EQUIPMENT AND THE SPECIALISED SERVICES PROVIDED AT THE ICUs

To ensure that services are internationally accepted and recognized, there was a need to upgrade the equipment in ICUs. These were carried out following the guidance and advice of the College of Anesthesiologists and Intensivists to the Ministry of Health
Portable CXR 24 hrs a day, prompt availability of CT or MRI and angiography, ultrasonography including Duplex and Echocardiography (transthoracic and Trans oesophageal) and Point-of-care technology should be immediately available to ICU. The need for increasing numbers of such equipment may be considered as urgent. The renal support is considered mandatory , the availability is satisfactory at the Hospital level, but needs improvement to be available in the ICUs

TRAINING OF STAFF IN INTENSIVE CARE

Medical officers

1. Specialist grade

College of Anesthesiologists & Intensivists have had a long-standing dedicated structured program for training of qualified specialists, medical officers and other allied field professionals in the field of Intensive Care.

The postgraduate training of Anaesthesia included a 13 month period to provide the required knowledge, skills and attitudes to the trainees for Surgical and Medical ICUs and specialised ICUs (e.g. neurosurgical, cardio-thoracic, Accident and Emergency, Pediatric). Those undergoing post-graduate training in Respiratory Medicine, Urology, Renal medicine, Gastroenterology and Radiology are also provided with exposure to Intensive Care Medicine. The MD examination conducted by the PGIM always included foreign examiners from Royal College of Anaesthetists & Intensive Care, UK.

After being successful at the MD in Anaesthesiology, the trainees were required to undergo a three months period of training in critical care as a senior registrar in Sri Lanka along with a minimum one year period overseas, also in critical care.

This program also provides a category of specialty training with special interest in critical care of. 6 months for advanced training in General Intensive care and specialized ICU care in Sri Lanka and abroad. Most of the trainees obtained the FRCA or FCARCSI from United Kingdom. These trainees were board certified as specialists in Anaesthesia with special interest in Intensive care.

In 2013 the need for specialized intensivists in the country was discussed and the College of Anaesthesiologists and Board of Study in Anaesthesia initiated a training program. The post MD Anaesthesia and Medicine senior registrars were recruited for specialised training for 2 years in Sri Lanka. They were also required to undergo a 1 year mandatory training in critical care in the UK.

The Royal College of intensivists, UK, exempted the post-graduates from Sri Lanka from training for PART 1 Fellowship of Critical Care Medicine, an indication of the quality of training in Sri Lanka. They become board certified specialist in critical care medicine after obtaining the Fellowship. By formulating these structured programs the College of Anesthesiologists & Intensivists have taken the appropriate action to develop the skilled and competent specialists to uplift the intensive care in the country.

2. Non-specialist

In addition, the College and the Board of Study are involved in training senior grade Medical Officers for a diploma in Critical Care.

The medical officers affiliated to the ICUs in the country were also trained in critical care by the consultant anaesthetists.
In addition, the College of Aaesthesiologist and Intensivists conduct regular workshops and training sessions for medical officers and postgraduates in critical care.

UNDERGRADUATE EXPOSURE TO ICU

There are 8 medical faculties in the country. The undergraduate curriculum of all medical faculties has a devoted period for training in anaesthesia and critical care varying from 2 to 4 weeks.

PARAMEDICAL STAFF-NURSES AND PHYSIOTHERAPISTS

The curriculum for Allied health Professionals also includes a mandatory period for critical care. The consultant Anesthetists from Health Ministry and the academics in the Universities provide this training.The training is conducted by specialists in many fields of medicine that have a role in care of the critically ill, emphasising the multi-disciplinary concept of care.

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