

## Year 5 MBBS Elective Report

### *Vancouver General Hospital ICU*

*April – May 2014*

Word Limit: 1200

**1. Describe the pattern of disease/illness of interest in the population with which you will be working and discuss this in the context of global health.**

a) Comment on reasons for ITU admission in Canada. Does this differ from the UK?

Unlike other specialities of medicine or surgery which tend to be defined by organ system, disease process, or nature of intervention, the concept of *critical illness* is difficult to quantify, and thus it remains a challenge to compare the disease burden of critical illness between regional populations. In both the UK and Canada, patients admitted to an intensive care unit are likely to have acute organ dysfunction, or monitoring for potential organ dysfunction. In the UK, one of the main criteria for ICU admission is the necessity for what is defined as “Level 3 care”:<sup>1</sup>

“Patients requiring advanced respiratory monitoring and support, or patients needing monitoring and support for 2 or more organ systems, one of which may be basic or advanced respiratory support.”

Table 1, below, highlights the categories of organ system monitoring and the differences between basic and advanced respiratory support.

#### Categories of organ system monitoring and support

(Adapted from *Guidelines on admission to and discharge from intensive care and high dependency units*. London: Department of Health, 1996.)

##### Advanced respiratory support

- Mechanical ventilatory support (excluding mask continuous positive airway pressure (CPAP) or non-invasive (eg, mask) ventilation)
- Possibility of a sudden, precipitous deterioration in respiratory function requiring immediate endotracheal intubation and mechanical ventilation

##### Basic respiratory monitoring and support

- Need for more than 50% oxygen
- Possibility of progressive deterioration to needing advanced respiratory support
- Need for physiotherapy to clear secretions at least two hourly
- Patients recently extubated after prolonged intubation and mechanical ventilation
- Need for mask continuous positive airway pressure or non-invasive ventilation
- Patients who are intubated to protect the airway but require no ventilatory support and who are otherwise stable

##### Circulatory support

- Need for vasoactive drugs to support arterial pressure or cardiac output
- Support for circulatory instability due to hypovolaemia from any cause which is unresponsive to modest volume replacement (including post-surgical or gastrointestinal haemorrhage or haemorrhage related to a coagulopathy)
- Patients resuscitated after cardiac arrest where intensive or high dependency care is considered clinically appropriate
- Intra-aortic balloon pumping

##### Neurological monitoring and support

- Central nervous system depression, from whatever cause, sufficient to prejudice the airway and protective reflexes
- Invasive neurological monitoring

##### Renal support

- Need for acute renal replacement therapy (haemodialysis, haemofiltration, or haemodiafiltration)

Table 1: Categories of organ system monitoring<sup>2</sup>

As such, strict guidelines for the diagnosis of critical illness, and as such criteria for ICU admission remain difficult to define. In a country with extremely limited intensive care resources such as the UK, one might speculate that patients admitted to the ICU might be sicker on the whole, leading to the increased ICU mortality in the UK compared with other European and North American countries seen in Figure 1, below.

It is worth noting, that although this might initially seem to reflect poorly on the quality of ICU care in the United Kingdom, it is difficult to extract a meaningful comparison between the UK and Canada due to the confounding factor of resource availability.

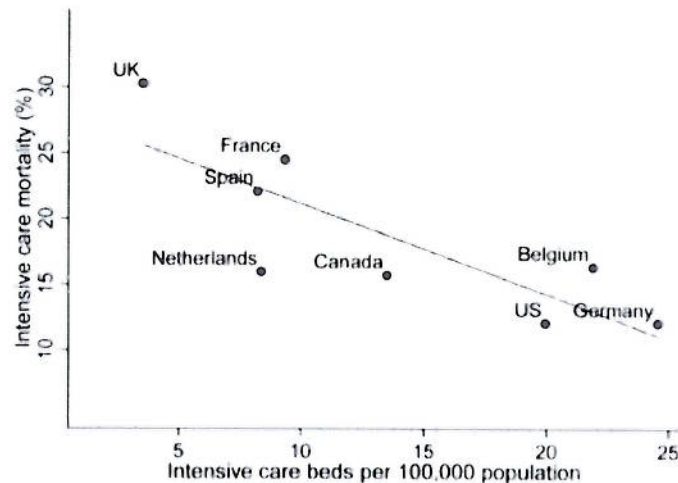


Figure 1: ICU mortality as a function of ICU bed availability<sup>3</sup>

**2. Describe the pattern of health provision in relation to the country in which you will be working, and contrast this with other countries or with the UK.**

- a) Compare and contrast how critical care services in Canada differ from the UK.  
Comment on resource utilisation in this context.

Until 2012 in which a dedicated intensive care training programme was introduced,<sup>4</sup> intensive care medicine in the United Kingdom was a subspeciality of anaesthetic medicine. As such, the vast majority of intensivists in the UK currently originate from an anaesthetics background, compared to Canada in which intensive care practitioners may be from specialities such as internal, respiratory, anaesthesia, general surgery, or emergency medicine.

Regarding resource utilisation, Canada operates a part-public, part-privately funded healthcare system with a 70:30 ratio between the two, the private sector being mostly accounted for by drugs, dental, and optical services.<sup>5</sup> In the United Kingdom, the National Health Service is considered free at the point-of-care, with approximately 8% of the population utilising private health insurance that exists parallel to the NHS. As of data from 2013, annual healthcare expenditure per capita in Canada was approximately USD5,700; compared to USD3,600 in the United Kingdom.

In both countries, critical care services represent a large percentage of total healthcare expenditure, however it is apparent that the UK, critical care beds are underrepresented compared to the total number of hospital beds per population. Figure 2, below, indicates that Canada possesses roughly 3 times the number of ICU beds per population than the United Kingdom, despite having approximately the same number of total hospital beds per population.



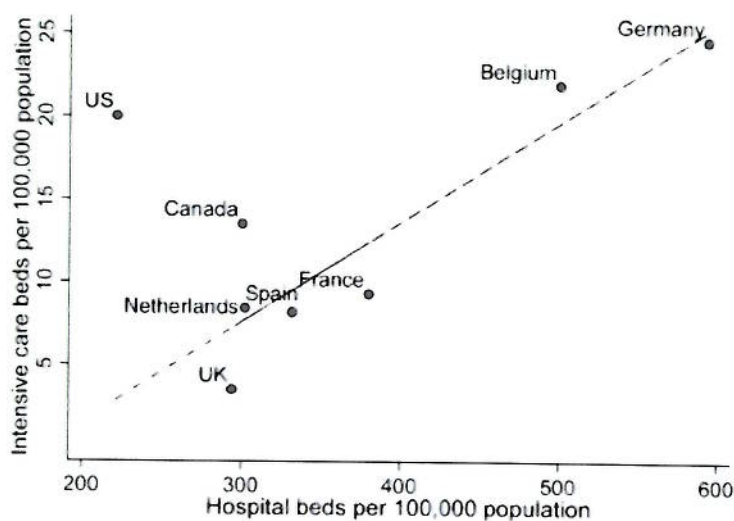


Figure 2: ICU beds compared to hospital beds per 100,000 population<sup>3</sup>

### 3. Health related objective

- a) Describe the role of invasive ventilation in the management and outcomes of the critically ill patient.

The field of intubation and mechanical ventilation is clearly far too broad to be discussed meaningfully in a 300-word paragraph, as such only a very brief summary of some of the indications, benefits, and objectives of mechanical ventilation will be outlined.

Mechanical ventilation encompasses a number of strategies in which a mechanical device is used to replace or augment the work normally performed by the ventilatory muscles.<sup>6</sup> A somewhat comprehensive list of absolute indications for mechanical ventilation can be seen in Table 2 overleaf. A more simplified approach, however, might be to consider ventilation as a strategy to protect the airway; rest exhausted patients; manage severe hypoxaemia or hypercapnia; manage airway secretions; or prevent any suspected or potential deterioration.<sup>2</sup> It should also be noted that elective intubation and ventilation is associated with fewer risks than emergency ventilation,<sup>8</sup> so the clinician should use his own judgment to assess whether or not it is better to ventilate sooner rather than later.

Intubation and mechanical ventilation is contraindicated if it would be contrary to a patient's prior expressed wishes; if such life-supporting interventions would constitute medically futile therapy; or if there is no clinical indication for invasive ventilation in preference to noninvasive ventilation modalities.<sup>9</sup>

The primary benefit of mechanical ventilation is the control gained over the airway and work of breathing, in addition to safely permitting the use of heavy sedation and neuromuscular blockade.<sup>7</sup> There is no single *best* method of ventilation, however methods of ventilation that allow some spontaneous work of breathing are thought to be preferable where indicated.<sup>2</sup> Ventilation strategies may aim to protect the lung by limiting tidal volume and/or airway pressure, thus avoiding alveolar overdistension and potential barotrauma, in addition to providing PEEP in order to maximise recruitment and maintain alveolar volume.

---

<b>Routine anaesthesia</b>
Cardiothoracic and abdominal surgery and neurosurgery
Prolonged surgery and surgery requiring prone position
Surgery in frail patients or those with cardiac disease
Clinical investigations (radiology, tissue biopsy) requiring temporary immobility
<b>Postoperative management</b>
Major surgery of the heart or the great vessels
Abdominal distention, debility, or electrolyte imbalance
Pre-existing lung disease, respiratory muscle weakness, kyphoscoliosis, myasthenia gravis, morbid obesity
<b>Respiratory disease (parenchymal or airway)</b>
Pneumonia, asthma, lung contusion
Acute exacerbation of chronic bronchitis, emphysema
Adult respiratory distress syndrome, hyaline membrane disease, cystic fibrosis
<b>Chest wall disease</b>
Trauma with flail segment, ruptured diaphragm
Chest wall burns, kyphoscoliosis
<b>Neuromuscular disease</b>
Polynecritis, Guillain-Barré disease, Lambert-Eaton disease
Myasthenia gravis, myopathies, paralysing poisons
<b>Central nervous system impairment</b>
Drug overdose: narcotics, anaesthetics, barbiturates
Trauma, meningoenephalitis, tumours, infarction
Brain oedema, raised intracranial pressure
Intracranial bleed, status epilepticus, tetanus, rabies
Central hypoventilation
<b>Cardiovascular disease</b>
Cardiac arrest, severe shock—sepsis or other causes
Left ventricular failure—pulmonary oedema
<b>Neonatal conditions</b>
Severe prematurity
Severe bronchopulmonary dysplasia
Central hypoventilation syndrome
<b>Increased metabolism and carbon dioxide production precipitating ventilatory failure in patients with pre-existing disease</b>
<b>Organ donation</b>

---

*Table 2: Indications for Mechanical Ventilation<sup>6</sup>*

**4. Personal/professional development goals. Must also include some reflective assessment of your activities and experiences.**

a) Personal: To assess whether I would like to pursue ITU/Anaesthetics as a career.

Working in the ICU has been a challenging but educational experience. Coming into the intensive care unit in a different country with very high standards expected of staff and students was initially overwhelming, having only completed less than a week of ITU experience in the UK during medical school, which was far more observational and less immersive in nature. An additional level of unfamiliarity was introduced by way of terminology and nomenclature – particularly the use of trade names versus generic names for medications.

However, coming towards the end of the four-week elective I find myself more comfortable with the intensive care environment and have an improved understanding of how to assess, workup, and manage a critical care patient. In addition, I feel I have improved my knowledge of some of the core physiological concepts underlying critical care medicine, and enjoy the fact that many clinical scenarios can be approached by considering the relevant physiology. Having completed this elective I shall proceed to an elective in Anaesthetics in the UK, and look forward to potentially applying for further training in Anaesthetics/ITU once I have completed my junior doctor

foundation years.

b) Professional: To improve my recognition and management of the critically ill patient.

I feel that this rotation has improved my ability to recognise severe deterioration in the context of a patient who has already been admitted to a critical care unit. Additionally, being given the task of assessing and subsequently creating a management plan for ICU patients was initially rather unnerving, but proved to be a useful learning experience as I then received feedback from a senior ICU doctor. This provided insight into the way an intensivist approaches a clinical problem, in addition to identifying areas where my own knowledge could be improved. Some specific scenarios I have encountered included the management of deteriorating myaesthesia gravis, worsening sepsis, and strategies to employ in the management of prolonged ventilator weaning.

c) Reflective: How this placement will influence me as an FY1 doctor.

Having already received notification of my foundation year rotations, with intensive care medicine being one of the four-month placements, I feel that this elective has been of great value in preparing me for work as a junior doctor in the UK. I now feel more secure in my approach towards the workup of the ICU patient in terms of examination, assessment, and management goals. Additionally, having had the opportunity to perform procedures such as arterial line insertion will be of use regardless of which medical or surgical speciality I decide to pursue.

I also feel more prepared in terms of knowing what to expect on ITU in the UK, having seen a wide variety of conditions, ranging from the relatively common (acute severe asthma, intracranial haemorrhage) to rare conditions that I had never previously encountered (haemophagocytic lymphohistiocytosis, double lung transplants). Overall this elective has been a valuable educational experience and I feel well-prepared for starting my intensive care rotation as a UK foundation year doctor.



Good work



## References

1. NICE Clinical Guideline 50, *Acutely ill patients in hospital: recognition of and response to acute illness in adults in hospital*, National Institute for Clinical Excellence 2007
2. Smith, G., Nielsen, M., *ABC of Intensive Care*, BMJ. Jun 5, 1999; 318(7197): 1544–1547
3. Wunsch, H., et al, *Variation in critical care services across North America and Western Europe*, Crit Care Med. 2008 Oct;36(10):2787-93, e1-9.
4. <http://www.rcoa.ac.uk/special-areas-of-training/intensive-care-medicine>, Royal College of Anaesthetists (Online)
5. Exploring the 70/30 Split: How Canada's Health Care System Is Financed, Canadian Institute for Health Information 2005
6. Ponte, J., *Assisted ventilation 2. Indications for Mechanical Ventilation*, Thorax. Nov 1990; 45(11): 885–890.
7. Marino, P., *The ICU Book*, 3<sup>rd</sup> Ed., Lippincott Williams & Wilkins 2007
8. Pierson, D., *A Primer on Mechanical Ventilation* [online] 2008, available at [http://courses.washington.edu/med610/mechanicalventilation/mv\\_primer.html](http://courses.washington.edu/med610/mechanicalventilation/mv_primer.html) (accessed 2014)