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MINI-SYMPOSIUM: BURDEN OF PAEDIATRIC INTENSIVE CARE

The burden of paediatric intensive care: an Australian and New Zealand perspective

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Summary Most seriously ill children in Australia and New Zealand are cared for in specialised intensive care units associated with tertiary children's hospitals. Highly regionalised models of care are in operation. Children from remote areas are transported to intensive care by paediatric emergency transport services. Indigenous children have disease and injury patterns similar to parts of the developing world and are over-represented in the intensive care population. The outcome for children admitted to intensive care compares favourably with international benchmarks. There is also evidence of uniformity of outcomes across paediatric intensive care units in the region and that outcomes have been improving. Although there are some downward pressures on intensive care workloads (preventative strategies such as immunisation, safety campaigns), these are counterbalanced by new surgical initiatives and increasing expectations of extended high tech support for children with life shortening diseases and disabilities. This expanding group of technology-dependent children will be one of the major challenges facing health authorities and intensive care physicians in this region in the coming decade.
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The care of critically ill children ideally takes place in paediatric intensive care units (PICUs) associated with tertiary children's hospitals. This review will describe the models of paediatric intensive care delivery in Australia and New Zealand as well as the caseload, case mix and outcomes. A national registry of children admitted to intensive care (Australian and New Zealand Paediatric Intensive Care Registry (ANZPICR)) was commenced in 1996.[1] The registry is the source of much of the information used in this review. Additional information has been sourced from the 2001/2002 report of the Australian and New Zealand Intensive Care Society Research Centre for Critical Care Resources (ANZICS – RCCCR).[2] The review will examine the factors that are affecting paediatric intensive care workloads. It will then focus on the burden of paediatric intensive care on families and society.

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CHARACTERISTICS OF THE PAEDIATRIC POPULATION

Australia has a population of 20 million people, four million (20%) of which are children aged 0–14 years.[3] Aboriginal and Torres Strait Islander (indigenous) peoples make up 2.4% (460 000 people) of the population overall. Indigenous peoples have a reduced life expectancy, largely as a result of premature death in middle age. As a consequence, 39% of the indigenous population are aged less than 14 years.

There are 4 million people in New Zealand, of whom 21% (850 000) are children aged 0–14 years.[4] The Maori and Pacific Island peoples make up 19% (750 000) of the population overall.

Australia has one of the most urbanised populations in the world. Sixty–seven percent of the population live in the capital cities. This varies from State to State and is lowest in Queensland (46.9%); this is because there are a number of large regional centres in Far North Queensland. Only 30%

of the indigenous population live in major cities, with an equal percentage living in remote and extremely remote areas. Many Australians live vast distances from tertiary facilities. One third of all children live outside metropolitan areas, compromising access to tertiary health care and necessitating specialised retrieval services. Whilst overall only 2.4% of the population are of indigenous origin, in some remote areas the percentage is much higher. For example, 29% of the Northern Territory population and 24% of the population in the Kimberley region of Western Australia are indigenous.

The distribution of the population in New Zealand differs from that in Australia. Whilst Auckland is the only city large enough to support a tertiary paediatric hospital, there are a number of other large cities in both the North and South island with tertiary facilities that care for critically ill children.

MODELS OF DELIVERY OF PAEDIATRIC INTENSIVE CARE

In Australia, most critically ill or injured children are cared for in PICUs associated with tertiary paediatric hospitals. This highly regional model of care delivery is largely a quirk of geography, but is also consistent with best models of care. There is evidence that the outcome of critically ill children is better when they are cared for in specialised PICUs.[5–7] The reasons for this are complex. There is evidence from many areas of medicine and industry that better results are achieved with higher volumes of activity. The specialised training and skills of medical and nursing staff that work in the PICU is an important factor. Such units are more likely to be appropriately equipped. PICUs are also located in tertiary paediatric hospitals with immediate access to a full range of paediatric subspecialties and diagnostic facilities.

The National Health and Medical Research Council (NH&MRC) in Australia has issued statements advocating that critically ill children should not be cared for in adult units apart from for short periods or prior to retrieval.[8] The NH&MRC has also recommended that retrieval services operating from tertiary PICUs be provided to facilitate the safe retrieval of critically ill children to appropriate units.[9] Attempts have been made to follow this model of care across both countries.

In Australia, all of the mainland states have fully developed and separate PICUs. This is not possible for Tasmania, the Australian Capital Territory or Northern Territory where the population is insufficient to support such stand-alone facilities. In these State and Territories, some children are cared for in adult intensive care units (ICUs) whilst others are transferred for more specialised care.

In Queensland the centralised model is also somewhat more difficult to achieve. Far North Queensland has a number of larger cities (100 000 population or more) that support sophisticated adult ICUs. The distances of these cities from Brisbane, the capital city of Queensland, are substantial and as a result some critically ill children are retained and cared for in those centres.

New Zealand is also forced to adopt a somewhat different model of care. Only Auckland, the largest city has sufficient population to support a separate PICU in a tertiary paediatric hospital. The distribution of the population over two islands poses difficulties in terms of regionalisation and inter-hospital transfer and brings with it the problems of family dislocation. As a consequence, some critically ill and injured children are cared for in major regional centres in adult ICUs. Some children are also evacuated from regional centres on both islands to Auckland. Only Auckland has a paediatric cardiac surgical unit.

Specialised retrieval services for critically ill children operate in four States of Australia (Victoria, New South Wales, Queensland and South Australia). The Victorian service supports Tasmania and the southern part of New South Wales. In Western Australia, the size of the State, the sparse population outside the metropolitan area and the small number of critically ill children requiring evacuation is insufficient to support a stand-alone paediatric emergency transport service. In that State, the Royal Flying Doctor Service provides the service.

The lead-time for retrieval in many parts of Australia is long. Consultative services provided by specialist staff in the PICU are essential in optimising resuscitation, coordinating transfer and improving outcomes.

REMOTE AREAS

Many Australian children live in towns with small populations that are remote from tertiary facilities. Staff in these centres have little opportunity to develop and maintain skills in the care of critically ill children. Transfer of these children to tertiary centres is essential but inevitably involves dislocation of parents from their home, family support and employment, often for lengthy periods.

The cost of relocating families is also substantial. In Australia, some of this cost is provided by the Government through the Patient Assisted Travel Scheme but much of the burden falls on families. It may be impossible for the breadwinner of the family to continue working. Payment of mortgages and other expenses becomes problematic. The care of other children in the family may fall to relatives.

Crude data from the most remote areas of the country e.g. the Kimberley region of Western Australia suggest that infant and child mortality rates are significantly higher than that in metropolitan areas. This burden falls predominantly on indigenous children, who make up a larger proportion of children in these areas. In many ways, the situation is akin to that in developing countries. Thirty-four percent of children in these remote areas have long-term health conditions. They are twice as likely to require hospital admission at all ages and are less likely to be immunised. The major causes of death relate to trauma and infectious disease. Undoubtedly, the greatest impact on mortality rate will be achieved through education and preventative strategies. There is, however, some anecdotal evidence that the lack of timely

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