

Adolescent Admissions to a Tertiary Paediatric Hospital: A Dynamic Pattern

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Abstract

Introduction: Adolescent inpatient facilities emerged in Australia in the 1980s to cater for an increasing number of young people with chronic illness and disability. Yet, there is minimal published data on the number of young people admitted to hospital within these units, their unit of admission, length of stay or reason for admission. A 12-year audit of adolescents admitted to a tertiary hospital with a dedicated adolescent unit and adolescent medicine programme in Victoria, Australia, was conducted to review the pattern of hospitalisation in young people in order to provide data to assist healthcare policy and planning agendas. **Materials and Methods:** Admissions to the Royal Children's Hospital in Victoria, Australia, of adolescents aged 10 years and above were reviewed over a 12-year period from 1990 to 2001. We identified the annual number of adolescents admitted, the proportion of adolescents admitted to the Adolescent Inpatient Unit (ward) and annual admissions under the Adolescent Medicine Unit (department). **Results:** Adolescents now constitute nearly 30% of all admissions at this children's hospital. Over this period, admissions to the Adolescent Inpatient Unit have nearly doubled and annual admissions under the Adolescent Medicine Unit rose from 38 to 288. The majority of adolescents were admitted under specialty medical and surgical units. **Conclusions:** The knowledge that nearly one in three admissions to this tertiary children's hospital is over 10 years old should help promote the development of planning and policy agendas that better balance both health and developmental priorities in this age group.

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Introduction

The nature of paediatric practice is changing worldwide. In developing countries, infant mortality from infectious diseases continues to fall with improved immunisation, medical care and pharmaceutical advances.¹ This has resulted in a corresponding rise in the number of adolescents, who now constitute 30% of the world's population.^{1,2} In the developed world, medical and public health advances are similarly reflected in improved health outcomes. This is especially the case for infants and children with previously fatal conditions, such as spina bifida, congenital heart disease, leukaemia and cystic fibrosis, who are now generally expected to survive through adolescence.³

The World Health Organisation defines adolescence as the age between 10 and 24 years.⁴ In Australia, as in other parts of the developed world, research suggests that the milestones and transitions associated with specific ages are shifting. A picture is emerging where young people are engaging earlier in behaviours traditionally

associated with adolescence, such as drug use or sexual relationships. At the same time, the events that previously marked the end of adolescence, such as full-time work, leaving home, getting married and having children, are increasingly delayed.

While young people with chronic illness and disability are surviving more than previously, as with young people generally, they are experiencing increased morbidity and mortality from accidents and injuries, including peer group violence, self-harm and suicide attempts.^{5,6} Other conditions that increasingly contribute to the changing patterns of youth morbidity and mortality in Australia include mental health disorders such as depression, bipolar disorder and eating disorders; harmful patterns of drug use; and sexually transmitted diseases.^{5,6}

How are these changing demographics and patterns of health reflected in the way that healthcare services are arranged for adolescents? Adolescent medicine is an example of a medical field that has expanded the concept

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of health care within paediatrics as well as primary care, adult medicine, and obstetrics and gynaecology.⁷ In the United States, adolescent inpatient units first appeared in the 1960s to provide age appropriate medical and psychosocial care for teenagers requiring hospitalisation.⁸ In Australia, adolescent inpatient units emerged in Melbourne and Sydney in the 1980s, catering primarily to adolescents with chronic illness and disability.³

More recently, "Centres of Excellence" in adolescent health have become established in Australasia with a commitment to adolescent health that extends well beyond inpatient or clinical care.³ Generally, these programs adopt an age definition of young people that extends from 10 to 24 years.⁴ One example is the Centre for Adolescent Health which was established by the Royal Children's Hospital in 1991 with the goal of integrating clinical services, research, education and training, and community programmes to advance the health and well being of young people.

There are many issues to consider about how best to provide developmentally and medically appropriate health care to adolescent inpatients.^{9,10} An important corollary is to identify what settings provide the best health care to hospitalised adolescents. A related issue is at what age are young people better managed in adult hospitals. Paediatric hospitals within Australia have different upper age criteria for admission, ranging between 14 and 18 years for new admissions, while adult hospitals in Australia commonly accept young people from 14 years. In Southeast Asia, paediatric hospitals currently generally admit adolescents up to only 12 to 16 years of age, with a commensurate reduction in the age at which adult hospitals accept adolescents, being more commonly from 12 years. Upper age criteria become blurred for adolescents with chronic illness managed by tertiary paediatric hospitals in both Australia and Southeast Asia.

We performed an audit of all adolescents admitted to the Royal Children's Hospital over the past 12 years to review the pattern of hospitalisation in young people in order to provide data to assist healthcare policy and planning agendas.

Materials and Methods

Hospital admissions were reviewed over a 12-year period from 1990 to 2001. 1990 was identified as the starting year of the audit. This was one year prior to the establishment of the Centre for Adolescent Health, which was considered would impact upon the way in which adolescents were managed in hospitals due to the Centre's effect in raising awareness about adolescent health.

Data were obtained from two sources within the Royal Children's Hospital: Health Information Services, and the Clinical Analysis and Development Unit. The following

information was sourced:

1. Annual admissions of all adolescents to the hospital.
2. Annual admissions of adolescents to the Adolescent Inpatient Unit (ward).
3. Annual admissions of adolescents under the Adolescent Medicine Unit (department).

From the information obtained, we were able to identify age, admitting unit and length of stay. The main diagnosis for each admission was obtained for all adolescent inpatients in 2001.

Inclusion Criteria

Our definition of an adolescent inpatient was a patient aged 10 years and above who was admitted to the Royal Children's Hospital. The age criterion for admission to the Adolescent Inpatient Unit is 12 to 18 years, depending on availability of beds in the ward and throughout the hospital. The Adolescent Inpatient Unit accepts patients from all hospital departments, whether medical or surgical, general or specialty: children aged 12 years and above are encouraged to be admitted there if a bed is available. Occasionally, younger children aged 10 and 11 years are accepted by the ward if they have particular diagnoses such as eating disorder or self-harm. Older adolescents are also accepted if hospital admission is required. A number of specialist units continue to admit young people into their primary ward (e.g., haematology/oncology), but in general, most units will admit adolescents to the Adolescent Inpatient Unit, except when a highly specialised level of nursing care cannot be provided, thereby necessitating admission into their primary ward (e.g., cardiology).

The Adolescent Medicine Unit functions as a general paediatric unit or department within the Royal Children's Hospital. Patients aged 12 to 18 years are accepted if they are not connected to another hospital department. As there is no psychiatric inpatient unit on site, young people with a psychiatric diagnosis and medical complications (e.g., malnutrition from anorexia nervosa, injuries from parasuicide) are admitted under the Adolescent Medicine Unit.

Specialty medical departments at the Royal Children's Hospital (13 in total) include the Adolescent Medicine Unit, Cardiac Services (includes Cardiology and Cardiac Surgery), Child Development and Rehabilitation, Dermatology, Endocrinology, Gastroenterology, Genetics, Haematology and Oncology, Immunology, Neurology, Nephrology, Psychiatry and Respiratory Medicine. Specialty surgical units (7 in total) include Burns, Dentistry, Otorhinolaryngology, Ophthalmology, Neurosurgery, Orthopaedics and Plastic Surgery. There are four general medical units and four general surgical units.

Exclusion Criteria

Day cases were excluded from our definition of inpatient stay. Inpatients aged 18 years and above were excluded if they were mothers admitted to the Postnatal Mothers Unit or if they were transplant donors. However, for technical reasons, these numbers were unable to be excluded from the overall hospital admission numbers.

Results

Adolescent Inpatient Admissions

The annual number of inpatient admissions to the Royal Children's Hospital is shown in Table I. Over the past 12 years, adolescents have formed an increasing percentage of total hospital admissions. In 1990, 26% of total admissions were aged 10 years and above compared to 29% in 2001. This has occurred in the setting of a decrease in the hospital's total inpatient admissions. There has been a consistent increase in admissions in the 15 to 17 years age group; admission of other age groups were more stable over this period of time (Fig. 1).

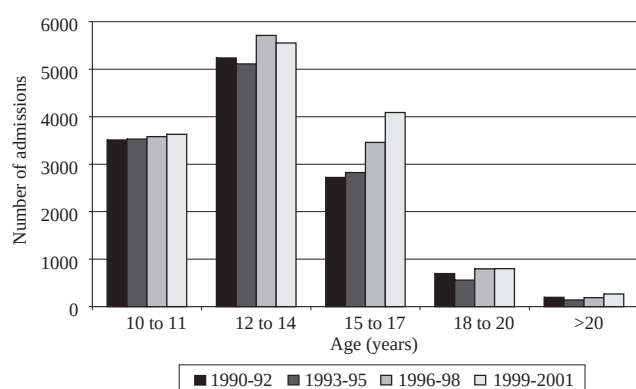


Fig. 1. Admissions by age (1990 to 2001).

TABLE I: THE ROYAL CHILDREN'S HOSPITAL'S ANNUAL HOSPITAL ADMISSIONS AND ADOLESCENT ADMISSIONS INCLUDING LENGTH OF STAY (1990 TO 2001)

Year	Total no. of inpatients	Total no. of adolescent inpatients	Adolescent inpatients as a % of all inpatients	Mean LOS of all inpatients	Mean LOS of adolescent inpatients	Adolescent ward admissions	% of total adolescent inpatients	Mean LOS in adolescent ward (days)
1990	16,548	4366	26.4	4.9	5.4	793	18.2	7.3
1991	16,517	4014	24.3	4.8	5.4	846	21.1	6.9
1992	17,150	3982	23.2	4.6	5.4	900	22.6	6.6
1993	16,412	3780	23.0	4.2	5.0	905	23.9	6.3
1994	17,738	4268	24.1	4.1	5.0	1127	26.4	5.4
1995	16,976	4115	24.2	4.2	4.8	1145	27.8	5.0
1996	17,818	4326	24.3	3.9	4.7	1249	28.9	4.7
1997	17,764	4446	25.0	3.9	4.3	1414	31.8	4.1
1998	17,992	4963	27.6	4.9	4.2	1511	30.4	4.0
1999	17,226	4893	28.4	4.2	4.6	1414	28.9	4.4
2000	16,524	4716	28.5	4.1	4.5	1401	29.7	4.2
2001	16,198	4733	29.2	4.3	4.5	1438	30.4	4.4

LOS: length of stay

The average length of stay (annual) for all inpatients at the Royal Children's Hospital over this period ranged from 4.9 days to 3.9 days, with a trend to shorter inpatient stays more recently. This trend was mirrored in the adolescent age group, which ranged from a mean of 5.4 days to 4.2 days over the same period (Table I).

Specialty medical and surgical units together admitted approximately three-quarters of adolescent inpatients annually (Table II), a pattern that has been consistent over the past 12 years. General surgery units admit the largest number of adolescents within the hospital each year.

Admissions to the Adolescent Ward

a) 1990 to 2000

Admissions to the Adolescent Inpatient Unit, as a proportion of total hospital admissions, have nearly doubled over the past 12 years, increasing from 5% to 9%. Annual admissions to the Adolescent Inpatient Unit have also nearly doubled over this time, climbing from 793 in 1990 to 1438 in 2001. The proportion of adolescents admitted to the Inpatient Unit as a proportion of all adolescent admissions has also increased from 18% to 30% over the past 12 years (Table I). The mean length of stay has decreased from 7.3 days in 1990 to 4.2 days in 2000, which is consistent with the reduction in length of stay across the hospital. In the past four years, the majority of adolescents admitted to the Adolescent Inpatient Unit were aged between 13 to 16 years. The number of admissions aged 20 and above years remained relatively stable over the past 12 years despite the increasing number of younger adolescents being admitted.

b) 2001

The majority of admissions to the Adolescent Inpatient Unit were admitted under various specialty medical units,

TABLE II: ANNUAL ADMISSIONS OF ADOLESCENT INPATIENTS TO THE ROYAL CHILDREN'S HOSPITAL BY UNIT

Year	Total adolescent inpatients	General medical units*	% of total adolescent inpatients	General surgical units*	% of total adolescent inpatients	Specialty medical units**	% of total adolescent inpatients	Specialty surgical units	% of total adolescent inpatients
1990	4366	423	9.7	790	18.1	1965	45.0	1188	27.2
1991	4014	463	11.5	704	17.5	1648	41.1	1199	29.9
1992	3982	403	10.1	721	18.1	1708	42.9	1150	28.9
1993	3780	361	9.6	644	17.0	1573	41.6	1202	31.8
1994	4268	376	8.8	664	15.6	1742	40.8	1486	34.8
1995	4115	355	8.6	597	14.5	1763	42.8	1400	34.0
1996	4326	404	9.3	676	15.6	1764	40.8	1482	34.3
1997	4446	324	7.3	663	14.9	1945	43.7	1508	33.9
1998	4963	365	7.4	706	14.2	2260	45.5	1632	32.9
1999	4893	359	7.3	755	15.4	2186	44.7	1593	32.6
2000	4716	351	7.4	697	14.8	2120	45.0	1548	32.8
2001	4733	326	6.9	752	15.9	2074	43.8	1581	33.4

* There are four units in each.

** Includes Adolescent Medicine Unit.

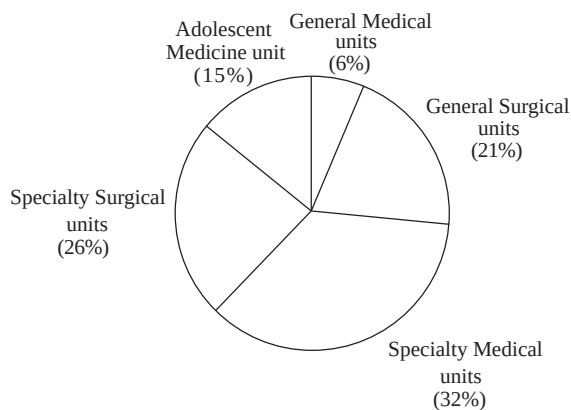


Fig. 2. Admissions to Adolescent Ward by unit (2001).

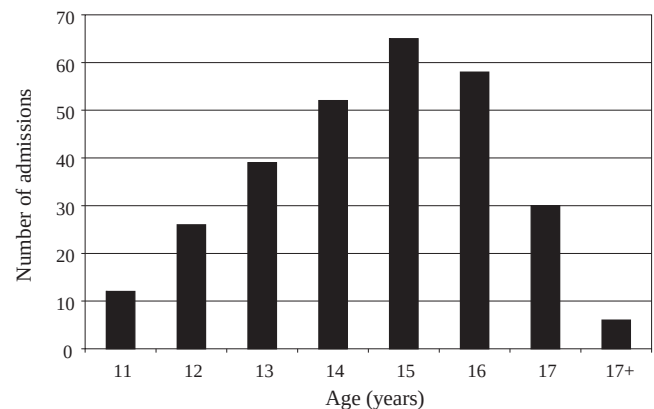


Fig. 4. Admissions under Adolescent Medicine Unit by age (2001).

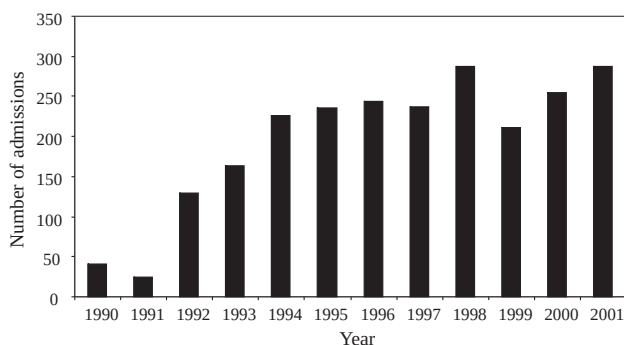


Fig. 3. Annual admissions under Adolescent Medicine Unit.

specialty surgical units and the general surgical unit. The general surgical and specialty surgical units together made up 47% of all admissions to the ward (Fig. 2). The three most common admissions were for management of insulin-dependent diabetes mellitus, management of exacerbation of cystic fibrosis and management of abdominal pain (including appendicitis).

Admissions Under the Adolescent Medicine Unit

a) 1990 to 2001

A dramatic increase in the number of admissions to the Adolescent Medicine Unit was seen in the four years after the establishment of the Centre for Adolescent Health. A steady increase has been seen in the years since then, with the exception of 1999 (Fig. 3). The annual number of admissions rose dramatically from 24 in 1990 to 129 in 1992 when the Centre first commenced. It is noteworthy that the largest increase in annual admissions (1993/1994) was at the time of appointment of the inaugural Fellow in Adolescent Medicine. Over the past four years, annual inpatient admission figures ranged from 211 to 288.

b) 2001

Two hundred and eighty-eight adolescents were admitted under the Adolescent Medicine Unit in 2001. The largest proportion of young people admitted were aged 14 to 16 years, with a diminishing number of adolescents admitted who were above 17 years of age (Fig. 4). The four leading

reasons for admission were management of eating disorders, asthma, parasuicide and abdominal pain for investigation. These four diagnoses formed 47% of total admissions that year. The mean length of stay in 2001 was 5.2 days (SD 8.3, range 1 to 69), compared to the mean length of stay of 4.3 days for all hospital inpatients.

Discussion

This audit shows that adolescents constitute nearly one in three of all admissions to this tertiary paediatric hospital. The overall number of adolescent admissions has remained stable in the context of decreasing inpatient admissions within the hospital. We believe this reflects the changed hospital policy on admission criteria for older teenagers. An increasing number of young people were admitted to the Adolescent Inpatient Unit over this period; we believe this reflects tacit acknowledgment by hospital staff of the importance of providing a developmentally appropriate environment for young people. Annual admissions under the Adolescent Medicine Unit have increased dramatically over the past 12 years, from 38 to 288 annual admissions over the period of the audit. We believe this reflects, *inter alia*, the increasing complexity of health issues facing young Australians.

Internationally, there is growing recognition of the health-care needs of adolescents over the past decade.^{1,2,5,6,9-13} This has been particularly prominent in the United Kingdom (UK), where there have been government calls for a greater focus and priority on adolescent health.¹² A recent study of hospital bed use by adolescents showed an increase in the use of hospital beds through adolescence in the UK.¹³ From 1996 to 1997, young people aged 13 years and above accounted for 12.8% of bed activity in a quaternary paediatric hospital (Great Ormond Street Hospital for Children).⁸ This trend mirrors our data from a tertiary paediatric hospital in Australia. A review of adolescent inpatient units in the United States (US) revealed that the major use of adolescent unit beds was for medical (60%) and surgical conditions (28%).⁸ The collective experience over the past 30 to 35 years in the US indicates substantial benefits of inpatient units in meeting the developmental and psychosocial needs of adolescents and enhancing training opportunities for staff.⁸ In both reviews conducted in these two countries, the lack of published data on adolescent medical inpatient units (in contrast to adolescent psychiatric inpatient units) was acknowledged.^{8,9}

The Society of Adolescent Medicine in the US has advocated that adolescent inpatient wards or units be designed to meet the unique developmental and psychosocial needs of teenagers.¹⁴ The creation of a separate ward for adolescents at the Royal Children's Hospital in 1984 did not simply provide a ward with bigger beds.

Rather, nursing staff were appointed with the goal of providing nursing care that acknowledged the developmental issues facing young people; hence, an environment was provided that catered to the psychosocial needs of young people.¹⁵

However, not all adolescents admitted to the Royal Children's Hospital can be admitted to the Adolescent Inpatient Unit. Some units continue to admit the majority of adolescents into a primary ward that caters for children of all ages (e.g., oncology). For others, specific medical needs dictate a particular environment (e.g., a sealed isolation room for bone marrow transplantation, cardiac monitoring). High bed occupancy in the 22-bedded Adolescent Inpatient Unit means that increasingly, beds are simply not available—in effect, we have reached an admission ceiling with current bed numbers. Preference (and frustration) is being expressed by a number of young people who are “voting with their feet and refusing to be admitted unless a bed is available in the adolescent ward”.¹⁶ We believe that the environment provided within the Unit is especially important for young people requiring a longer hospital stay or for those who are admitted recurrently. However, the question of how best the developmental needs of adolescents can be attended to, in the absence of a separate ward, deserves increased attention. Presumably, specialist training in adolescent health for both nursing and medical staff becomes a particular priority.

A limitation of this audit is that it does not provide information about the changing trends in admission diagnoses over this period. Nor does it provide information on how the complexity of admissions has changed over time. This data would promote better matching of support services for young people needing these services, both within the hospital and in the community.

It is interesting to note that while there has been a steady increase in the number of adolescents admitted who are in the 15- to 17-year-old cohort over the past 12 years, there has not been a commensurate increase in the admission of older adolescents. Does this simply reflect the success of the hospital's age admission policy, or are other factors responsible? We argue that the emphasis the various medical units and staff have placed on the importance of transition to adult health care, and the need for timely and planned transfer to adult healthcare services, may be one important consideration.¹⁷⁻²⁰ The increasing number of adolescents who appear likely to transfer their health care from the paediatric setting to the adult specialist healthcare sector over the next decade underlines the importance of continued emphasis on this topic. The high proportion of surgical admissions suggests how important it will be for surgical units to engage in the transition agenda.

Adolescents frequently find health services “unhelpful,

paternalistic and difficult to access”.²¹ We hope the understanding that nearly one in three admissions to the Royal Children’s Hospital is of an adolescent age will drive planning and policy agendas to better balance the provision of health and developmental priorities for this important population.

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