ABC of adolescence Epidemiology of health and illness

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This is the third in a series
of 12 articles

Adolescents constitute a large percentage of the population, have a distinct pattern of health and illness, and are one subset of the population that has experienced little or least improvement in overall health status over the past 40 years.

The youth demographic

In most developed countries young people aged between 10 and 20 years account for 13-15% of the population. The World Health Organization classifies young people as 10-24 year olds, with adolescence (10-19 years) and youth (15-24 years) overlapping within that age range. There were 7.6 million adolescents aged 10-19 years in the United Kingdom in mid-2000, making up 12.7% of the population. Projections suggest that the numbers of adolescents will grow by 8.5% between 1998 and 2011.

Health problems among adolescents seem to be increasing. This partly reflects a rise in the proportions of black and other ethnic minority groups in the adolescent population. Ethnic diversity is greater in young people than in the general UK population, and minority ethnicity is linked to poor health outcomes in adolescence, such as suicide, teenage pregnancy, sexually transmitted infections, and mental disorders; the most plausible link is through socioeconomic disadvantage.

Patterns of disease and health risk

Disease and health behaviours in adolescents have patterns that are distinct from those of children or adults. In particular, adolescent mortality and morbidity rates show worrying trends in national priority areas such as mental health—for example, male suicide, sexual health (teenage pregnancy and sexually transmitted infections), and cardiovascular risk (obesity and type 2 diabetes).

Mortality

The considerable recent improvements seen in mortality in 1-4 year olds have not been matched in adolescents, and death rates among 15-19 year olds are now higher than in the 1-4 year age group. This is due to the rise of "social" causes of mortality, including road traffic injuries, other injuries, and suicide, which have replaced communicable diseases as the most common causes of death in adolescents.

Causes of death in 15-19 year olds in United Kingdom, 1997

UK population by age, mid-2000

Age distribution of ethnic groups in United Kingdom, 2001-2

Mortality by age group in United Kingdom, 1960-92

Road traffic injuries

Road traffic injuries are the leading cause of death in adolescence (with road traffic accidents causing 27% of deaths in 15-24 year olds), particularly in young men, with motor vehicle collisions the main contributor. This contrasts strongly with mortality for all adults, in whom traffic injuries account for 1-2% of deaths. Far from being random events, road traffic injuries in young people are strongly associated with risk factors such as alcohol, depression, social disruption, and stress. Transport patterns are an important determinant of health in adolescence, and transport is one area where health promotion strategies could greatly reduce mortality in this age group.

Suicide

Suicide by young males has become one of the most worrying public health issues for developed countries in the past three decades. In the United Kingdom, the suicide rate for older male teenagers almost doubled between 1970 and 1988 and remained high through to the late 1990s. This has occurred alongside a doubling in the rate of deaths from undetermined causes for this group during the same period, suggesting that many suicides may still be unreported. Comparable data from other developed countries show similar trends.

Drugs and alcohol

Regular alcohol drinking (defined as once a week or more) in the United Kingdom rises from 3% of 11 year olds to 38% of 15 year olds, with boys and girls nearly equal until age 15.

Like smoking and drinking, the prevalence of drug misuse in adolescence increases sharply with age. In 1998, only 1% of 11 year olds in England had ever tried drugs, compared with 31% of 15 year olds.

The likelihood of having ever used drugs is strongly related to smoking and drinking experience. Few adolescents who have never smoked or drunk try drugs, but up to three quarters of regular smokers who drink at least once a week have tried drugs. Similar risk and protective factors to those for smoking operate for substance use, with depression a particular risk factor.

Proportions of 11-15 year olds in England who have ever tried cannabis or class A drugs (heroin, methadone, cocaine, ecstasy, LSD, injected amphetamines), by age, 2001. Adapted from Coleman and Schofield (see Further Reading box)

Teenage pregnancy and sexual health

Teenage pregnancy rates in the United Kingdom are among the highest in western Europe. Teenage mothers have poorer antenatal health, have children with poorer health, have poorer health themselves, and have poorer educational and financial outcomes later in life. Key risk factors for teenage pregnancy include poverty, living in a city, poor parental supervision, low

Male death rates related to road traffic injuries among teenagers aged 15-19 years in England and Wales, 1985-95. Adapted from DiGiuseppi et al (*BMJ* 1998;316:904-5)

Alcohol misuse disorders in adolescence are not benign conditions; they often continue into adulthood and are associated with later substance misuse, depression, and antisocial behaviours

Prevalence of cigarette smoking among 15-16 year olds in England, 1982-2001. Adapted from Coleman and Schofield (see Further Reading box)

Births per 1000 women aged 15-17 years in member countries of the Organisation for Economic Co-operation and Development, 1998. Adapted from Coleman and Schofield (see Further Reading box)

educational expectations, and lack of access to services; many of these factors probably relate to social disadvantage.

Rates of sexually transmitted infection increased greatly among teenagers in the late 1990s. Between 1993 and 1999 the overall rate of diagnoses of uncomplicated chlamydia among 16-19 year olds presenting to genitourinary medicine clinics more than doubled, from 340 to 791 per 100 000 population in females and from 90 to 216 per 100 000 population in males. These figures undoubtedly underestimate the rate of chlamydia in the community and indicate the need for screening young people for sexually transmitted infections.

Mental health

Mental health problems during adolescence include the emergence of new mental health issues such as depression, early onset "adult" disorders such as schizophrenia, and the continuation of childhood problems such as attention-deficit/hyperactivity disorder and conduct disorder. The recent UK national mental health survey found that among 11-15 year olds, serious mental health problems are found in 13% of boys and 19% of girls, although if more minor problems are included, about a fifth of young people develop mental health problems during adolescence.

Eating disorders are now the third most common chronic condition of adolescence in girls, in whom it is nine times more common than in boys. Estimates of the prevalence of eating disorders are difficult because of subclinical or hidden problems, but it is estimated that among female adolescents about 0.5% have anorexia nervosa, 1% have bulimia nervosa, and 3% to 5% have subclinical syndromes.

Obesity

Obesity now overshadows all other chronic illnesses in adolescents. Recent estimates based on the new definitions from the International Obesity TaskForce suggest that about 23% of UK 10-15 years olds are overweight and a further 6% are obese. At the root of these high levels of overweight and obesity is a population shift towards eating more calorie dense "fast foods," spending more time in sedentary activity such as playing computer games and watching television, and doing less physical activity. During the past 15 years in the United Kingdom, the average annual distance cycled by teenagers has fallen by 31% and the average annual distance walked has fallen by 24%; car travel during this period has increased by 35%.

Chronic illness

The burden of chronic illness in adolescence is increasing in all developed countries as larger numbers of chronically ill children survive into their teens and 20s.

The most common chronic illnesses are respiratory conditions, and cohort studies in the United Kingdom show that the prevalence of wheezing at age 16 years rose by 70% between 1974 and 1986, with further rises in the 1990s. Other illnesses with substantial rises in incidence include type 1 diabetes (with an annual Europe-wide increase of 2.4% for 10-14 year olds during the past 10 years) and type 2 diabetes, particularly in ethnic minority populations. The particular dangers of the transition from paediatric to adult services is well illustrated by reports of totally inappropriate treatment of patients with congenital heart defects by cardiologists who work with adults with acquired heart disorders. Transition programmes, however, improve health outcomes and patients' quality of life.

Sexually transmitted infections often occur in adolescents who engage in other risk behaviours (including substance misuse), have psychological disorders, and experience violence (or are violent themselves). Reporting rates of both gonorrhoea and syphilis have shown similar rises to chlamydia

Prevalence of mental disorders in 11-15 year olds in United Kingdom, 1999

Prevalence of overweight and obesity (according to definitions of the International Obesity TaskForce) in English children and adolescents (health study for England, 1999). Expected rates (R Viner, unpublished data) are based on the task force definitions

The prevalence of cystic fibrosis among people aged over 15 years in the United Kingdom more than doubled between 1977 and 1985, and currently over 85% of children with chronic illness survive to adulthood

Conclusions

Adolescence is generally a healthy period of life compared with early childhood and old age. However, the recent improvements in mortality seen in young children have not been matched in teenagers, and adolescent morbidity shows worrying trends in key areas such as mental health, sexual health, and cardiovascular risk. As behaviours that both increase and protect against poor health outcomes in later life are laid down in adolescence, increased public health, policy, and clinical focus on the health of young people will have important benefits for the long term health of the population.

Further reading and resources

- Coleman J, Schofield J. *Key data on adolescence*. Trust for the Study of Adolescence, Brighton, 2003.
- Viner RM. Adolescent medicine. In: Warrell DA, Cox TM, Firth JD, Benz Jr EJ, eds. *Oxford textbook of medicine*. 4th ed. Oxford: Oxford University Press, 2003.
- Neinstein LS. *Adolescent health care: a practical guide*. Baltimore: Williams & Wilkins, 2002.
- www.euteach.com (for resources for teaching epidemiology in adolescent health)
- www.statistics.gov.uk (for data on young people in the United Kingdom)
- www.relachs.org (Research with East London Adolescents: Community Health Survey is a school based epidemiological study of adolescents in east London that provides insights into aspects of health and wellbeing of inner urban British adolescents)

Health problems in adolescence, and adolescent behavioural and health problems that may lead to major health problems in later life*

Problems affecting young people disproportionately—Accidental injury, intentional injury, substance misuse, teenage pregnancy, sexually transmitted infections, mental illness, suicide, depression, eating disorders, anxiety, attention-deficit/hyperactivity disorder, psychosis

Problems persisting from childhood—Chronic illness (such as asthma, diabetes, epilepsy, metabolic diseases, congenital heart disease), acute childhood illness (such as cancer and meningitis), conduct and behavioural disorders

Behavioural and health problems leading to health problems later—Obesity, physical inactivity, and poor diet; mental illness; substance misuse; sexually risky behaviour

*Adapted from: Patton GC. *The scope for youth health development*. Melbourne, Australia: University of Melbourne, 1999

All the graphs are adapted from data on the website of the Office for National Statistics (www.statistics.gov.uk), except where stated otherwise.

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The ABC of adolescence is edited by Russell Viner, consultant in adolescent medicine at University College London Hospitals NHS Foundation Trust and Great Ormond Street Hospital NHS Trust (rviner@ich.ucl.ac.uk). The series will be published as a book in summer 2005.

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A memorable patient

A simple case of peptic ulcer

I felt elated after having won an unusually tough medicine quiz. My colleagues congratulated me as the "best informed person on the campus." In this euphoric frame of mind I went to conduct a busy medicine outpatient clinic.

One patient was a smart 15 year old girl, who was ushered in by her mother, with a referral from her primary care physician for a three month history of indigestion of progressively increasing severity. The indigestion consisted of recurrent nausea, vomiting, epigastric distress, and pain on eating. She had not responded to antacids or proton pump inhibitors, and the mosapride and ondansetron that were subsequently prescribed did not improve her symptoms and made her drowsy. All the drugs were stopped, but her drowsiness persisted, and, according to her mother, she would even doze off while sitting and in conversation.

Her clinical examination was normal apart from epigastric tenderness and obesity. Her mother complained about her obesity, which I dismissed as being due to her physical inactivity and fondness for "fast foods." I confidently diagnosed peptic ulcer and prescribed omeprazole, erythromycin, and metronidazole. I resisted the temptation to make comments about the shallow knowledge of her primary care doctor. In view of the prolonged symptoms, I referred the patient to a gastroenterologist in case of poor response to treatment.

That night, as usual, I reflected on my unusual patients of the day. The striking feature of this patient was her weight gain in spite of her indigestion. I tried, and failed, to think of anything that I could have missed. The next day, however, I discussed the case with a senior clinician (KPA), who immediately asked about the patient's appetite, which I had not done.

The patient and her family had left for the gastroenterology consultation, at a tertiary care centre 500 km away. There her

"indigestion" (with increased appetite), gain in weight, and drowsiness were put in proper perspective—a suspected hypothalamic region tumour with raised intracranial tension. Magnetic resonance imaging revealed a craniopharyngioma of suprasellar and hypothalamic region.

I felt chastened and humiliated by my mistake, my status as "the most well informed person on the campus" a hollow mockery.

This patient reinforced several important lessons for me. Always take a thorough and complete history in spite of "spot" diagnosis; always listen to a patient's family—they know the patient much better than we can; do not discard a patient's unusual feature that does not fit with the clinical diagnosis; and always discuss such cases with colleagues, who may offer a fresh insight.

Above all, this mistake taught me that "errors should not humiliate us, but they should teach us humility."

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We welcome articles up to 600 words on topics such as *A memorable patient, A paper that changed my practice, My most unfortunate mistake*, or any other piece conveying instruction, pathos, or humour. Please submit the article on <http://submit.bmj.com>. Permission is needed from the patient or a relative if an identifiable patient is referred to. We also welcome contributions for "Endpieces," consisting of quotations of up to 80 words (but most are considerably shorter) from any source, ancient or modern, which have appealed to the reader.