

The heart of the matter: the case for taking childhood obesity seriously

Scott Brown



INTRODUCTION

I have discovered that I have several things in common with James Mackenzie. Despite my accent, we were both born Scots, completed our MDs from full-time general practice and enjoy golf. There the similarity ends, for James Mackenzie had an outstanding career in both primary and secondary care. He was a man of huge energy and even greater intellect and ability, being driven by an intense desire to advance his understanding of disease.

However I do share his interest in cardiology, which began when I was a junior doctor at the Royal Victoria Hospital in Belfast. It was there that I was influenced by the late Professor Frank Pantridge who pioneered the mobile coronary care unit. His ideas were rapidly embraced by others within the UK and the US. Pantridge's unit frequently received visiting delegations from other hospitals, keen to emulate the system of immediate care which produced such startling survival figures.

*S Brown, MD, FRCGP, Institute of Postgraduate Medicine, University of Ulster, Cromore Road, Coleraine, N. Ireland.
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Address for correspondence

Professor Scott Brown, Institute of Postgraduate Medicine, University of Ulster, Cromore Road, Coleraine, N. Ireland BT52 1SA. E-mail: jsbdoc@btopenworld.com

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Since Mackenzie's day, cardiological knowledge has increased dramatically, possibly only being surpassed by the rate of patient access to that information. Technological advances in diagnosis have also been immense. Furthermore, possible treatment options have expanded dramatically, none more so than the discovery of pluripotent stem cells with the ability to repair adult heart and blood vessels.

Stem cell transplantation may offer immense therapeutic possibilities with a simple and cheap way of repairing end organ, and otherwise terminal, heart damage.¹ As GPs we will need to continue to contribute to the ethical debate that surrounds this technique, and to the more pragmatic business of advising patients on the benefits and risks of such procedures.

MACKENZIE'S CAREER PATH

Having started life as a GP in Burnley in 1879, James Mackenzie then moved to London where he made a significant contribution to medicine and cardiology in particular. He eventually eschewed hospital-based care and became fascinated with primary care-based epidemiology.

With a similar emphasis, I would like to consider the prevention, rather than the treatment, of coronary heart disease (CHD) whose onset, it now appears, occurs during childhood and adolescence. This is an area where GPs can contribute significantly to a reduction in the morbidity and mortality of CHD among patients, rather than by just concentrating on secondary prevention or high-tech interventions in secondary care.

THE SCALE OF THE CHD PROBLEM

A report by the World Health Organisation² predicts that CHD will be the biggest cause of death worldwide in the near future, killing about 7.2 million per annum. In Northern Ireland, for example, despite the introduction of many excellent treatment procedures, the Province remains at or near the top of the world mortality league for CHD.³ In England alone it kills more than 110 000 people a year.⁴ The economic costs resulting from heart disease are truly staggering. For example in the US in 2002 it cost US\$ 351.8 billion, and in 1999 it cost the NHS £1.7 billion.²

Many factors have been identified as suggested contributors to the risk of CHD. The list, which continues to grow, and comprises at least 300 at a recent estimate, is varied and includes among others, not having siestas, living in Scotland and snoring!⁵

THE PROBLEM IN CHILDREN

CHD is a disease process which starts well before adulthood. This has been recognised ever since post-mortem results on apparently fit young American soldiers killed in the Korean war indicated the presence of coronary atherosclerosis.⁶ The presence of atherosclerotic plaques in late adolescence has provided the public health rationale for the initiation of CHD prevention measures in childhood as true primary prevention.⁷ There is also a widely held belief that many lifestyle habits which have an impact on CHD risk factors later in life, have their environmental and behavioural roots in early childhood.⁸

Epidemiological studies of risk factors in children have now been ongoing in the US for many years. The Framingham Heart Study⁹ started in 1948. In 1971 examinations were begun on the children of those in the original study. Called the Framingham Offspring Study (FOS), it was designed to expand upon knowledge of cardiovascular disease, particularly in the area of familial clustering of the disease and its risk factors.¹⁰ One of the first projects to examine children was carried out in Muscatine, Iowa, in the mid-1970s.¹¹

Rigorous follow-up of this cohort and those from other studies over 25–30 years suggest that the risk factors for CHD in adults, including a family history of heart disease, elevated blood lipids (serum cholesterol and triglycerides), obesity, hypertension, smoking, diabetes mellitus and inadequate physical activity, can be identified in children. It is these risk factors that we will be focusing on today, as it is now clear that we can detect most children and adolescents who are potentially at risk for CHD.¹²

Within the UK similar correlations have been found. Research carried out by Dr Keith Steele and myself, revealed an unexpectedly high incidence of CHD risk factors in an apparently healthy population of Northern Irish 18–20 year olds.¹³ In another Northern Ireland study involving over 1000 school children aged 12–15 years, there was a significant relationship between the five major CHD risk factors, obesity and cardiorespiratory fitness.¹⁴

TRACKING

The concept of 'tracking' some of the most common CHD risk factors in children has been used in several studies. Tracking is defined as: 'the maintenance over time of the relative ranking of an individual within their age–sex group for a given variable,' and has been applied to risk factors and behaviours in childhood as

predictive of those in adult life. It was data from the Bogalusa Heart Project in Chicago that provided evidence for the persistence of CHD risk factors in children and adolescents into adulthood.

During the project, Webber *et al*¹⁵ examined 2336 children aged from 2–14 years in three cross-sectional surveys between 1973 and 1979. Highly significant correlation coefficients were documented for repeated observations of lipid and lipoprotein fractions, in particular, serum total cholesterol (TC) and systolic and diastolic blood pressure (BP).

In a second seminal study of the 8909 American school children sampled in the original Muscatine Study, 820 children were examined repeatedly over a 6-year period and again showed significant tracking coefficients for serum TC and systolic and diastolic BP.¹⁶ More recent reports from the Bogalusa Heart Study have suggested strong 12-year correlations for lipid and lipoprotein fractions with approximately 50% of children with TC above the 75th centile on entry remaining elevated 12 years later.¹⁷

In Europe two ongoing studies in Finland are also worth noting. These are the Cardiovascular Risk in Young Finns study, which started in 1978,¹⁸ and the Special Turku Coronary Risk Factor Intervention Project for Children (STRIP), which started in 1989.¹⁹

In the Young Finns study of 3596 children and adolescents, aged between 3 and 18 years, cardiovascular risk factors were first assessed in 1980 and then again at 3-year intervals. The latest data available in 2001 show that an individual's CHD risk factor profile is regulated by early lifestyle-related factors and that exposure to risk factors in childhood tracks through to adulthood. In the STRIP study involving 1062 infants, the inference from the latest data is the same.

RISK FACTOR MODIFICATION — AN EXAMPLE

So what can be done? There can now be little doubt about the aetiological importance of smoking, hyperlipidaemia, hypertension and physical inactivity in children as modifiable CHD risk factors.

I'd like to briefly consider obesity, and its modification, which can act as a model for the other major risk factors, through which we can consider the consequences of implementing intervention programmes in children and adolescents.

While obesity is a risk factor in its own right, it also has the capacity to cause major ill-health in the future by linkage to the pathogenesis of other major illnesses, which in turn increase the risk of CHD (for example: diabetes mellitus, which has exhibited a dramatic increase in children mirroring the rise in obesity rates).

Although it is a problem which is treatable we know that the prevalence of obesity is increasing at alarming

rates among school aged children, as has been highlighted in a recent Irish report.²⁰ The WHO²¹ and others²² have made us aware that this is an epidemic of the entire developed world. In England there has been a 25% increase in overweight and obese children since 1995 with almost 17% of children now estimated to be obese.²³

LONG-TERM STUDIES

While there are very few long-term follow up studies available for analysis, data does exist that highlights the correlation between obesity and increased risk of childhood hyperinsulinaemia, hypertension and dyslipidaemia.²⁴ It has now been shown that childhood obesity has adverse effects on the cardiovascular system, which are similar to those well known in adults, and that the extent of asymptomatic atherosclerotic lesions in childhood and adolescence is predicted by the number of cardiovascular risk factors present.²⁵

Freedman and his colleagues in the States have also shown in obese children significant 'clustering' or the aggregation of cardiovascular risk factors in the same individual. For example in one trial, over half (58%) of the obese children studied had two or more risk factors present.²⁵ Worryingly, overweight children are twice as likely as normal weight children to be obese as adults.²⁶

Why is obesity such a problem? In simple terms, obesity results from an imbalance between the number of calories consumed and the number of calories expended in physical activity. There has clearly been a falling off in levels of physical activity in children, particularly adolescent females as data from most European countries shows,²⁰ but the major contributing factor to problems of overweight and obesity is food.

GPS AS NUTRITIONISTS?

As GPs we need to become much more aware of and understand better what our younger patients are eating. I am not advocating that we all retrain as nutritionists but rather that we need to better understand the composition of the most popular foods and beverages. This is not a new concept for doctors as it was one of our colleagues, Dr Arthur Hassall, who in 1866 discovered that the coffee houses of London were serving a beverage which was being systematically and routinely adulterated by the addition of roasted chicory, peas and wheat. The then editor of the *Lancet*, Thomas Wakely, told Hassall that he would never achieve anything until he defied the libel lawyers and named and shamed the perpetrators of the adulterations.²⁷

The series of articles which followed in the *Lancet* exposed a scandal of immense proportions and was instrumental in the 1875 Sale of Food and Drugs Act being enacted by parliament. The manufacture and sale of food is now heavily regulated by national and European Union legislation. While nutrition may still

be a science that is relatively poorly understood by doctors, the most visible impact of diet on health, the current obesity pandemic, is not. In a conference speech in 2004 on 'Tackling Obesity in Young People', the Minister of State for Health said:

*'Overweight and obesity have a profound effect on the nation's health and our own Chief Medical Officer has called it a health time bomb.'*²⁸

It is encouraging to see that issues of health as well as safety are now on the political food agenda.

INTERVENTION APPROACHES

While preventative strategies are needed, the results of obesity treatment programmes in adults have been disappointing, but it has been shown that children do better than adults.²⁹ It is vital to treat and, if possible, prevent obesity in childhood, as lifestyle behaviours that contribute to and sustain obesity in adults are less well established in children and may be more amenable to change. The objective should always be healthy eating in combination with physical activity.

SCHOOL-BASED INTERVENTION PROGRAMMES

Scientific data as to the worth of school-based intervention programmes has until recently been principally from the US.³⁰ However, UK based research data are emerging. Sahota and others,³¹ carried out a randomised controlled trial in 10 primary schools in Leeds using all of the pupils rather than only those who were already obese. The programme involved teacher training, modification of school meals, and the development of school action plans targeting the curriculum, physical education, tuck shops, and playground activities.

Over one academic year, the programme only showed a modest increase in consumption of vegetables, but this may have been due to the small sample size of 600 pupils, or any change being too little compared to the alarming increase in the prevalence of overweight and obesity in the entire school population.³²

FAMILY-BASED INTERVENTION PROGRAMMES

It has now been shown that the family provides the most suitable environment for the treatment and prevention of further weight gain in children.²⁹ This is an area where the GP can have an input and an impact. Following the Leeds study, Rudolf and colleagues stated that the results may have been more dramatic if the families had been targeted more directly, by greater involvement from primary care particularly from GPs.³²

This, they felt, was not least because GPs were well

placed to identify families who may be resistant to change and who may benefit from counseling to improve their motivation, or be deferred from obesity therapy until they are more receptive. It may even be the case that techniques such as motivational interviewing,³³ normally used with adults to prepare them to change addictive behaviour, may have applications in obesity treatment.

Space does not permit a detailed consideration of several novel dietary approaches, which are now known to have successfully reduced calorie intake and improved eating behaviour in children, but the addition of physical activity (both supervised and unsupervised) to careful eating has been shown to greatly improve the long-term chances of weight control.^{34,35} This fact has been highlighted by the UK Parliament's Public Accounts Committee²³ and indeed by the Minister of State²⁸ when she stressed the importance of increasing levels of activity, particularly in the young. The setting up of a programme of 10 Local Exercise Action Pilots to test community approaches to increasing physical activity among children is to be welcomed.

THE PSYCHOLOGICAL CONSEQUENCES OF CHD RISK-FACTOR REDUCTION AND EARLY INTERVENTION PROGRAMMES

Most studies in this area have failed to identify any evidence of significant adverse psychological or behavioural effects in relation to any of the major CHD risk-factor intervention programmes.

For example, in one of the most authoritative studies to date, Lauer and his colleagues¹² carried out a large randomised controlled trial on the efficacy and safety of intervention to reduce low density lipoprotein cholesterol in 8–10-year-old children. After 3 years no evidence of significant psychosocial problems was observed in the intervention group, which actually had a lower depression score than the controls.

Again, if we look at obesity in a little more detail, no major psychological sequelae have been reported in children as a result of obesity reduction programmes. Some researchers have used psychological tools to carry out self-perception profiling in children, and again failed to find any significant increase in levels of anxiety, self worth and body shape preference.^{35,36} In probably the most rigorous analysis to date, Whitlock and others recently³⁷ carried out an extensive review of all high quality research evidence relating to such programmes and found no evidence of disordered eating, poorer health habits or any negative impact from parental concerns about their children's weight.

While it is true that most of these studies have not involved long-term follow up of children, when considering the full psychological impact of this type of intervention, we need to remember the consequences of doing nothing to help obese children alter their

weight and behaviour. Data already exist to suggest that these may be considerable, with longitudinal cohort studies indicating that overweight children are likely to suffer many psychological problems.²⁹

This would seem to be particularly true of teenage females,³⁸ but it has also been found that by 6 years of age, children have picked up societal messages that being overweight is undesirable, or they may have already developed a distorted body image, which can persist into adulthood.³⁹

PSYCHOLOGICAL DAMAGE OR BENEFIT?

While we might pause to reflect upon the potential psychological impact on our children of intervention, and particularly of obesity reduction programmes, the power and benefit of harnessing psychological intervention has long been recognised by the advertising industry.

Our children's choice of food is powerfully influenced by advertising, with the food industry spending over £450 million each year advertising in the UK. About three-quarters of that is spent on marketing to children.⁴⁰

The biggest categories of food advertised are sugary breakfast cereals, confectionery, soft drinks, and savoury snacks such as crisps.⁴⁰ Exposure to this manipulation of our children's appetites starts young and the techniques used have become increasingly sophisticated. A survey by Sustain⁴¹ found that more than half of the adverts shown during children's television were for food and drink products and, of these, 99% were for processed food high in fat and/or sugar — commonly known as 'junk food'.

Equally worrying is the finding that that children do not discriminate between television programmes and adverts until between the ages of 4 and 7 years and they do not recognise bias until the age of 8 years.⁴² Animated characters that children recognise are used to endorse products; sporting heroes are used to associate products with social acceptance; and repeat purchases are encouraged with collectable free toys. Many advertisements make appeals to 'pester power', that phenomenon that is most subversive to parental control. The food industry clearly believes that the allocation of such substantial resources to encourage children to buy and eat their products is warranted. Why? Because it works. Perhaps the question we should be asking is not 'what are the problems if we do intervene?' but rather 'what are the implications for our children and young people if we do not?'

SO WHAT NEEDS TO BE DONE?

The first thing to say is that the government has already realised the importance of prevention and has started to address some of the risk factors involved, albeit for slightly different clinical reasons. Various

public health initiatives and campaigns have been put in place and the government has identified £1 billion for the implementation of the 'Choosing Health' public health initiative.⁴³

From this initiative arose the Standard 1 document *Promoting Health and Well-being, Identifying Needs and Intervening Early* so that:

*'The health and wellbeing of all children and young people is promoted and delivered through a coordinated programme of action, including prevention and early intervention wherever possible, to ensure long-term gain, led by the NHS in partnership with the local authorities.'*⁴⁴

Furthermore the then Minister of State for Health confirmed at the 'Tackling Obesity in Young People' conference that primary care has a major role to play, by stating that:

*'Primary care has a particularly important role in the prevention and management of obesity and we are working with the primary healthcare sector to develop ways of enhancing evidenced based prevention.'*²⁸

THE PROBLEM WITH CURRENT INTERVENTIONS

However, the current initiatives are deficient because they do not sufficiently engage primary care, and general practice in particular. If this can be overcome the impact could be considerably augmented. This view is shared by a number of authoritative sources.

For example, the Public Accounts Committee pointed this out when it reported that 'The Department of Health acknowledged that they had not made enough effort to equip GPs with adequate resources and information to deal with the problem (of obesity).'²³

In addition, the Scottish Intercollegiate Guidelines Network (SIGN) guideline 69; *Management of Obesity in Children and Young People*, which was recently published,⁴⁵ stated that:

'GPs are hampered by the lack of evidence-based evaluations and guidance on the range of interventions they might use.'

Nevertheless the profession too has not been without blame, as the Public Accounts Committee went on to further state:

*'For most people the first point of contact with medical services is general practice, where there is potential to advise on the issues of being overweight or obese. Yet many GPs do not see this as their role.'*²³

Of the GPs invited to review the draft SIGN guideline, it was recorded that none submitted comments. The profession too needs to engage in the debate.

HOW CAN THE COLLEGE CONTRIBUTE?

This could be done by the Royal College of General Practitioners (RCGP) disseminating information on the importance and benefit of CHD risk factor reduction in the young. The College is an authoritative body and is well used to highlighting important clinical issues and debating best practice in order to inform members and the profession generally and, indeed to help the government shape policy. Another and much more pragmatic way of engaging with GPs would be to modify part of the new GP contract.

While the importance of secondary prevention of CHD in adults in general practice has at last been recognised within the Quality and Outcomes Framework (QOF) of the new contract, has the time not come to also resource primary prevention among our younger practice population? The analysis of the new contract's QOF after the first year has confirmed the view that, if an initiative is properly resourced and is based on convincing evidence, there are few more efficient ways of effecting mass change in patient care within the NHS than through general practice.⁴⁶ Lest anyone charge GPs with having a vested interest in suggesting this, this is also the point of view advocated by Public Accounts Committee.²³

PRIMARY CARE RESEARCH OR LACK OF IT

The government also needs to urgently think about the current parlous plight of primary care research in relation to children in general. The Health of All Children External Working Group, part of the National Services Framework for Children, Young People and Maternity Services,⁴⁷ produced a report on Standard 1 for primary care practitioners. The report commented that, despite the fact that:

'The vast majority of contacts with the Health Service for children are with primary care teams. In a typical year, pre-school children will see their GP about six times ... there is relatively little UK based research which examines the long-term effects of interventions in this area (health promotion and early intervention).'

When CHD in particular is examined, the government's own strategic review on the matter makes disturbing reading. The review noted that:

'... there is an issue with the apparent absence of primary care involvement in this field. At least 90% of health care is delivered in the primary

care setting yet few projects were really focused on primary care.⁴⁸

It also noted the dichotomy between the 'apparent absence of primary care involvement in this field', and the fact that 'at least 90% of health care is delivered in the primary care setting'.

Few of the research projects the committee examined were really focused on primary care. When they looked at the actual research carried out, of 1474 CHD research projects, only 72 covered children. Their recommendation is not new but deserves careful consideration, namely:

'that serious consideration be given to developing CHD research networks, their purpose and the incentives to encourage them to develop'.⁴⁸

RESEARCH IN GENERAL PRACTICE

In the same strategic review, it was recognised that there is an urgent need for 'capacity building' in the whole area of CHD research.⁴⁸ The RCGP has been instrumental in the past in developing the concept of GP research networks in various parts of the UK.

Many vibrant networks now exist, consisting of primarily GPs in NHS practice, rather than those in academic university units, and most have evolved from the College's bold decision to provide initial pump priming funding. While the manner of providing research and development funding to the NHS has been dramatically overhauled over the past 5–10 years, the opinion of the government's own review group into CHD research is that it is currently failing primary care.

Like many GPs, I am not convinced that the Medical Research Council's (MRC) Primary Care Research framework structure, which has been mentioned by the review group, greatly enhances capacity building among GPs. While this part of the MRC's Trials Unit performs the important function of data collection in designated practices throughout the UK, the research skills deficit among interested and able GPs is never going to be addressed solely through this type of arrangement. I therefore believe that the time is right for the RCGP to re-examine its commitment to funding the training of, and research by, its members.

TARGETING SCARCE RESOURCES

Invariably such a discussion comes down to resources or the lack of them. If GPs are encouraged to think through these types of issue, novel solutions can often arise. For example, one way of better using scarce resources is to target areas of particular need. It has been known for many years that there is a definite geographical variation in mortality from CHD across the UK.^{49,50}

Several studies have now examined the possibility that geographic variations in cardiovascular risk might have their origins in childhood^{51,52} while 'clustering' of CHD risk factors in certain geographical locations has also been well-documented in the adolescent age group both internationally in the US⁵³ and Europe¹⁸ and within the UK.⁵⁴ As this phenomenon may persist into adult life,⁵⁵ a child's postcode may become as predictive of subsequent CHD risk as his or her DNA.

The government has already started to recognise this in its setting up of Health Action Zones and these actions are to be commended. This approach might be further refined by using more sensitive geographical information systems, which would allow primary care trusts, and even GPs themselves, to access detailed data about their registered patients.

For example, using these novel methodologies, colleagues from the University of Ulster's School of Biological and Environmental Studies, have adapted multidimensional regional analytical techniques and created a Synthetic Data Matrix.⁵⁶ This tool uses a variety of demographic, social class and local government markers and is very sensitive in identifying areas of particular need even within individual practices. This could aid the allocation of resources to fund intervention programmes among the practice populations most in need of CHD prevention.

SIR JAMES MACKENZIE

What would James Mackenzie have made of all this? As someone who at the age of 64 years left practice in London to set up a primary care research institute in St Andrews, in order to explore the causes and progress of illness, and to train GPs in the research skills required, he would surely have identified with the current situation.

Believing the long-term health benefits to be considerable, I have no doubt that he would have supported the careful gathering of data from general practice and have made a forceful case for a fair and reasonable allocation of the available resources from government to make this possible. However Mackenzie, for all his standing did not have an established Royal College to call upon for support. Faced with what may be the first generation in the developed world not involved in conflict where children may die before their parents due to the ravages of a largely preventable disease, I have no doubt that he would have looked to the RCGP to champion such a cause.

CONCLUSION

I have endeavoured to give an overview of the risk factors for CHD in our children and young people. I have focused on one of those risk factors, namely, obesity, and have argued that the benefits of early

intervention to attempt to reduce childhood obesity and other risk factors outweigh any risk to the children of adverse effects of such intervention.

I have argued that while change is necessary, any policy of intervention must be evidence based and appropriately evaluated over an adequate timescale. There is, I suggest, no better or more effective place to adequately resource, research and evaluate these intervention programmes, than in general practice.

We have looked at some of the initiatives of government and schools to improve the dietary and lifestyle habits of children and young people by encouraging exercise and physical activity, diet management and healthy eating. All these initiatives are to be welcomed and commended with the proviso that appropriate monitoring and evaluation of these initiatives must be pursued and they must continue to be adequately resourced. These must also be complemented by initiatives in general practice. Such investment, as recently highlighted by the World Health Organisation,² is vital in the fight to prevent the increasing burden of chronic disease.

In conclusion, I would encourage all in primary health care and the RCGP to embrace the challenge to examine what we can do to contribute to this very vital aspect of health care. Through our commitment and our work as GPs and as a College, and with the assistance and support of the other members of our primary health care teams, we can promote the adoption of healthy lifestyles in our children and young people who can be encouraged to continue these patterns into adulthood.

On the evidence, which I have detailed, and, provided that adequate resources are made available by government, we should, by early intervention with our children and young people, be able to have an impact on and potentially reduce the prevalence of CHD in adults.

That, I believe, is the heart of the matter!

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