Measuring Childhood Obesity

Uses And Abuses Of The BMI

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The worldwide epidemic of obesity in children and young people is a public health problem because of its association with type 2 diabetes and cardiovascular disease. It is also the cause of much unhappiness. The House of Commons Select Committee on Health, following the USA lead, advised that all children should have their body mass index (BMI) measured on an annual basis and the result sent to each child’s parents. In this article I shall argue that the properties of the BMI make it a useful public health indicator of how the obesity epidemic is progressing, but a very poor tool for identifying individual children at risk.

There are many definitions of childhood overweight and obesity. Each involves a measure of fatness (usually BMI) and a reference centile chart where selected centiles define cut-offs for overweight and obesity. Statistical definitions are inherently arbitrary and none can claim to be the best in predicting future ill health. In public health terms, BMI data can be summarised in several ways and the choice is not crucial so long as there is consistency and clarity when making comparisons with other studies. In clinical terms, however, it does matter, if the aim is to define action points in a whole population programme, since small changes in the definition may generate very different numbers of ‘cases’.

What does BMI measure?

The BMI is derived from the formula weight/height² - it is simply an index of weight adjusted for height. It relies on two familiar measurements that can be made on readily available equipment. However, a change in a person’s weight could be due to changes in muscle, fat or bone - but because it is (unfortunately) easier to add fat than any other tissue, the legitimate assumption is made that a rise in the BMI of the population as a whole is probably due to increased fatness.

BMI as a measure of the fatness of an individual has many weaknesses. Weight can be divided into lean body mass or fat free mass (FFM), and fat mass (FM). The ratio between them varies according to age and gender and there are significant ethnic differences. The ratio can also change as a result of dieting and physical exercise fitness training, even though weight and therefore BMI stay the same. Although BMI and FM are strongly correlated, there is much individual variation - a strong statistical correlation between two measures in a population does not necessarily mean that useful deductions can be made in individuals. The health risks do not relate solely to total fat mass and are more closely correlated with intra-abdominal or visceral fat mass (VFM) which influences metabolic activity in the liver via the portal venous system. Unfortunately BMI correlates poorly with VFM. Furthermore, although obesity in childhood is associated with a significantly increased risk of obesity in adult life, only about half of all obese children are obese as adults; conversely, most obese adults were not obese as children.

Monitoring BMI in populations

The BMI of the UK child and adolescent population is increasing and there is no other convenient measure of fatness for population monitoring. Although significant errors are likely when many different observers are involved, these will probably be random rather than systematic. Changes in the prevalence of overweight and obesity among children and young people could be monitored by measuring height and weight, for example at school entry and at transfer to secondary school, and anonymising the data. These data would then be entered onto a database that would automatically calculate the BMI centile, relate each measurement to postcode, and compare the results with those of previous years. Mary Rudolf and colleagues in Leeds have shown that the impact of interventions would have to be dramatic to be detected with statistical reliability in individual schools but the data could be useful in formulating and evaluating local public health policy.

Using BMI for identifying and advising individuals

Why do I argue that BMI should not be used in the way proposed by the House of Commons Select Committee? There are several reasons:

BMI is a poor measure of body fatness and an even worse measure of the high-risk visceral fat mass.

The interpretation of BMI measures would need to be individualised for gender, ethnicity and, in older children, the stage of puberty.

There is no clear evidence as to which cut-off points on the BMI chart should trigger a communication to parents.

Measurement errors mean that a significant
number of children would be wrongly informed that they were or were not at risk of being overweight or becoming obese.

We do not have any intervention to offer - even highly motivated young people who are desperate to control their weight have great difficulty in doing so. It is naive to imagine that those who have not previously been aware of any problem will do any better.

Suitable software could overcome some of these problems - it could for example trap gross errors of measurement or data entry and generate a standardised interpretation as to the significance of the results, preferably in the parents' own language. It would of course also have to incorporate locally relevant instructions as to where and from whom to seek further professional advice.

Conclusion

The BMI is the best available population marker of how the obesity epidemic is progressing, though the data may be seriously distorted if children who are already overweight or obese opt out of being measured. Whole-school and whole-community approaches to issues of diet and exercise seem likely to be the best way of tackling obesity but, at the level of individual schools, a rise in BMI could easily occur by chance alone and this might demoralise a school that was actually running a good programme.

The use of BMI as a clinical tool for identifying individual children would be a screening test but, as such, would fail to fulfil the standard criteria for screening on several counts. It is of course quite possible that, notwithstanding my doubts, the benefits of such a programme might outweigh the harms but, as we have no evidence one way or the other, any such intervention would be an experiment and as such should be subjected to the usual ethical and governance controls placed on research projects.

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Following the debates about the measuring of obesity in children, both in and outside the pages of BACCH, Mary Jones has invited me to write about the issue from the perspective of the Department of Health (DH).

The issue of measuring childhood obesity follows the recommendation of the Health Select Committee on Obesity and the publication of Choosing Health, the public health white paper. The NHS now has an LDP target for ‘SHAs/PCTs to be in a position to track changes in obesity prevalence’. This has been deferred, for now, but the overarching PSA target to halt the rise in childhood obesity by 2010 still stands.

On the ground, the PCTs want to know where to target their limited resources. They also want to be able to evaluate the work they are already doing. Epidemiologists need high quality, low-level data that will allow examination of the causes and effects of the obesity ‘epidemic’. In some quarters there is a call for annual growth monitoring of every, individual child.

The Health Development Agency review of the evidence suggests that childhood obesity and overweight can be tackled through a whole school approach, and through family therapy, if the family are motivated. There is, currently, no evidence base for an individual intervention for individuals identified by routine measuring.

So what is the DH doing?

An Expert Advisory Group has been brought together to inform thinking at the DH. It includes names that will be familiar to BACCH readers - Rudolph, David Hall and David Elliman. The group also has representatives from school nursing, education, the Children’s Commissioner and PCT public health. The group feeds into the Public Health Information and Intelligence Task Force through the Child Obesity Measures subgroup. The task force has a regular newsletter. If you wish to join the distribution list e-mail:

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The first issue that needed to be discussed was the issue of screening individual children as opposed to monitoring a population. The NSC made its position clear that an annual BMI measure, upon which referral of individuals could be based, was, by default, a screening programme that they could not support. The Expert Advisory Group has discussed the difference between screening individuals and population monitoring at length.

It became apparent that a number of places around the country have invested time and resources in developing a wide variety of models for measuring children. These places, including Birmingham, Leeds and Middlesbrough, have been generous in sharing details of their work. Models range from incorporating height and weight measurement into a maths class, to sampling children across a city, and using parent helpers to measure children. DH plans to evaluate these models in more detail over the next few months. I would be keen to hear from other places that have experience in setting up such systems. There are lessons to be learnt, particularly around...
ANNUAL BMI CHECKS STILL ON TRACK

Tam Fry,
Child Growth Foundation

Several BACCH readers took exception to the article I wrote in the Spring News reporting the Government’s acceptance of a House of Commons’ Health Committee recommendation that yearly BMI checks for every primary school child be introduced and the data sent home to the parents. From the letters that the Editor received she chose to reprint one in the Summer News to represent concern that my piece went unchallenged in a serious journal. The author thought my report quite ‘ludicrous’.

If you thought that might be the end of the matter you should know that it is not. The ‘ludicrous’ idea is still current, is being addressed jointly by the Departments of Health [DH] and Education & Skills [DfES] and was the subject of a June workshop called to inform the two Departments just how a group of health specialists felt about it all. On your behalf your Editor attended and can now verify that not a single word of my Spring copy was fiction and that many of the Child Growth Foundation’s views expressed in it were being seriously discussed. The conclusion to the discussion, summarised below in a proposal made Professor Sir David Hall, has been formally submitted to the DH/DfES, each of which was well represented on the day by senior civil servants, and though his proposal may be somewhat amended by the time a policy is published, he gave direction to the route that the Government might follow.

David Hall was just one of a number of community paediatricians, public health doctors, educationalists, primary care workers and their union representatives invited by the Foundation to discuss the implications of yearly BMI assessment. The discussion was both full and frank, as the saying goes, and frequently went around in circles. It was an interesting mix of views from people who wanted to take the idea of annual BMIs forward and others who simply took to their barricades.

In the final analysis, the proposal was a ‘political’ compromise. It was voiced to get the maximum public health benefit from the deal yet protect the viewpoint of many clinicians that individual children’s BMIs should not be sent to their parents — surprisingly not complained about in the Summer News. If a school had implemented its Healthy School policy or was working towards its implementation, Hall conceded, it could indeed take a complete snapshot of all children’s BMIs at the end of every year using some kind of nationally agreed public health minimum dataset. Whether the data were taken anonymously or "pseudo-anonymously" — i.e. able to be linked retrospectively to an individual child — might still be open for discussion even though the workshop voted overwhelmingly for the latter.

Putting the data into an annual report would allow a school to describe to its parents how it was doing as a whole. This would allow Ministers to fulfil their publicly declared commitment to the Health Committee’s decision. They could declare that the Government had a good handle on local public health and there was also an incentive on the school to do well. The measurements could be taken by properly trained and equipped classroom assistants/support staff in PE time, maths lessons or wherever and whenever was convenient. School nurses should not be expected to take the measurements — there are not enough of them to complete the job anyway — and, advantageously, taking the measurements in class could “demedicalise” a sensitive procedure by making it an educational experience.

The published reports could not only be filed with the local education authority but also with the PCT Director of Public Health much like GP practices file their ‘flu uptakes with their PCT. When published at a local level, local councillors, PCTs, media, parents and children could see what was being done by the schools in improving meals, getting rid of vending machines etc — and could ask searching questions if they weren’t. When published at regional or national...
level, the statistics would allow Public Health Observatories to provide overall analyses of how the fight against obesity was faring. Most importantly, David Hall stated, they should choose a single definition of overweight/obesity from the three currently available and stick to it.

The DH/DFES now have to decide what to do and will take their time [maybe 2yrs] in doing so. They should also have been greatly helped by what they heard at the workshop. For instance, the school route had already been successfully tested in a pilot project in North Birmingham which is now to be rolled out across the city. Project team members were able to talk enthusiastically about the success of measuring Yr 9 children and their school adviser saw no reason why classroom measurements should not be carried out in every school year. They had encountered no problem around weighing children as long as it was done sensitively and the children had enjoyed their measuring ‘lessons’. They also had shown little inclination to stigmatise or bully fellow pupils who appeared overweight. Projects similar to the Birmingham experience were also being considered in Amersham, Blackburn with Darwen, Middlesborough and Hull.

As well as voting for pseudo-anonymity and its preference for the 91st/98th definitions of overweight/obesity, the workshop also voted several times on what the measurement frequency should be. By the end of the day however these votes became less and less significant particularly because they contradicted similar votes taken by a similar workshop in December to advise how BMI could be positively considered, it will have been a hot June day worth going through.

David Hall’s political, practical and relatively inexpensive solution however allows them to advise Ministers that BMIs can be positively considered, it will have been a hot June day worth going through.

Update On Childhood Obesity & Measurement Of BMI In Schools

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Following the article by Tam Fry in the spring Newsletter and Helen Daly’s response in summer 2005, I would like to share some information with BACCH news readers. Firstly, I would like to outline the history behind the proposal to measure BMI in school children.

1. In 2004 the House of Commons Health Committee published its report on obesity. The committee had taken evidence from a wide range of experts and interested parties, including Paediatricians and the Child Growth Foundation. The Health Select Committee recommendation number 58 states, ‘We recommend that throughout their time at school, children should have their Body Mass Index measured annually at school, perhaps by the school nurse, a health visitor, or other appropriate health professional. The results should be sent home in confidence to their parents, together with, where appropriate, advice on lifestyle, follow-up, and referral to more specialised services. Where appropriate, BMI measurement could be carried out alongside other health care interventions which are delivered at school, for example inoculation programmes. Care will need to be taken to avoid stigmatising children who are overweight or obese, but given that research indicates that many parents are no longer even able to identify whether their children are overweight or not, this seems to us a vital step in tackling obesity.’

2. The Department of Health’s response to the Health Select Committee repeated the recommendation and also stated that ‘to support the development of local data sources, and improvements in data quality, the DH will continue to work closely with the DfES to develop appropriate systems for recording lifestyle measures, for example obesity through weight and height measurements, among school age children.’

3. In the Chief Medical Officers update in March 2005 the CMO wrote ‘Other recommendations aimed at children include having their BMI measured annually at school with the result sent to parents with advice or referral to a specialised service and promoting practical cookery skills to school children’.

Many of us were alarmed at this poorly thought through statement and have been working to limit the potential harm from inappropriate implementation of what would effectively be a screening programme. Letters have gone to the CMO explaining our concern.

4. ‘Delivering choosing health’ – the implementation plan for the public health white paper, states ‘DH will continue to work closely with DfES to develop appropriate systems for recording lifestyle measures, for example obesity through
weight and height measurements, among school age children.’

5. The government is now committed to improving public health and as part of doing this there is a public service agreement (PSA) between the Treasury and the DH setting objectives. Objective 1 is;

‘Improve the health of the population. By 2010 increase life expectancy at birth in England to 78.6 years for men and 82.5 years for women.’

One of the eight specific targets underpinning this overarching objective is:

‘Tackle the underlying determinants of ill health and health inequalities by halting the year on year rise in obesity among children under 11 by 2010, in the context of a broader strategy to tackle obesity in the population as a whole.’

So the DH will be expecting PCTs to contribute to the treatment and prevention of childhood obesity.

I am delighted to see obesity so high on the agenda but there are still many unanswered questions. For example, it is not yet been decided how success with these targets will be measured. How will individual PCTs, the DH or the government know whether the target has been met? The obvious answer seems to be that we must make sure that children are measured.

If we are going to measure children we need to decide what the main purpose is

As a source of national data
As a source of local data
As a screening process

The last possibility is what is implied in the health select committee recommendation. However measurement of BMI is a very poor screen for a large number of reasons.

BMI is not a very good measure of obesity in individual children and needs careful interpretation when used clinically

The cut-offs for definition of overweight and obesity are not agreed

We do not have widely available, effective services for the treatment of obesity

We have no idea of the harm that may be done by identifying children who are obese and being unable to support or treat them adequately.

The measuring process itself may cause harm to some children eg by stigmatisation

On the 17th June 2005 Tam Fry hosted a workshop ‘Annual BMI Checks in schools’. A variety of methods of measuring children were discussed. I was particularly impressed by a presentation by Christina Routh, Specialist Registrar in Birmingham. They had designed and carried out anonymous monitoring in seven schools, during a numeracy lesson for Year 5 children (9-10 years old). The process was done sensitively, with careful planning of the detail to allow completely anonymous measuring and recording.

We now have the problem of political expectation of implementation of annual measuring in primary age children without the backing of the national screening committee and many health professionals. The Department of Health have appointed Dr Helen Walters, a Public Health doctor, to take a lead on resolving the measuring problem. Dr Walters held an expert advisory group meeting on 29th June. Community Paediatrics was well represented by Professor Sir David Hall, Dr David Elliman and Dr Penny Gibson. David Hall crystallised the view of the paediatricians present when he described our role there as being ‘damage limitation’. We are all very keen to see that the political imperative to measure is implemented in a way that does minimal or no harm whilst providing useful information. The expert advisory group looked at three main possibilities.

Screening: measuring every child to enable identification of obese children and offer them an intervention

Sampling: measuring a sample of children to give a picture of the whole population

Anonymous monitoring: measuring every child and collating the data anonymously

There will need to be a lot more discussion before implementation of whichever is chosen. The most pragmatic compromise at the moment seems to be anonymous monitoring. There will be plenty more discussion, so please do let me know your views.

Meanwhile NICE is in the process of developing guidelines for the treatment and prevention of adult and childhood obesity. These are due to be ready for 2007. There will be a short consultation period in February 2006. It is very likely that recommendations will have a significant impact on Paediatricians! If you would like to comment on the draft guidelines please let me know.

“The most pragmatic compromise seems to be anonymous monitoring...”
SUPPLEMENT
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VIEWS FROM:
Prof David Hall,
Helen Walters
at the Dept of Health,
Tam Fry of the
Child Growth Foundation
and a letter
from Penny Gibson