SHEDDING THE POUNDS

OBESITY MANAGEMENT, NICE GUIDANCE AND BARIATRIC SURGERY IN ENGLAND

OHE Consulting
Office of Health Economics

SHEDDING THE POUNDS

OBESITY MANAGEMENT, NICE GUIDANCE AND BARIATRIC SURGERY IN ENGLAND

2010

Office of Health Economics
12 Whitehall London SW1A 2DY
www.ohe.org

CONTENTS

ISBN: 978-1-899040-93-3

EXECUTIVE SUMMARY

This report details the results of an exercise undertaken by the Office of Health Economics (OHE) looking at trends in obesity, current provision of bariatric surgery in England with particular reference to the NICE clinical guideline for obesity, and potential economic benefits that could be achieved through adherence to the NICE guideline .

The key findings were:

- Longer term trends in the growth in obesity have not changed and mean that Government targets for tackling this issue are in danger of not being met. The UK ranks fifth among thirty-one developed nations for rates of obesity. In ten years the share of the population measured as obese has increased by a quarter in men and one fifth in women. Around one quarter of the population of England is obese.

- The primary tool for implementation of clinical support for obesity in England is the NICE clinical guideline. Returns from a questionnaire to PCTs, official statistics and modelling of predicted patient flows suggest that adherence to the NICE guideline is inconsistent and sub-optimal.

  PCTs were invited to assess whether they follow NICE's guideline for Obesity (CG43)(NICE 2006). Nearly four in ten reported that their referral guidelines were in line with NICE in all respects. Nearly half responded by stating that elements of their guidelines matched CG43. One in ten PCTs responding to the questionnaire said that they do not follow the NICE guidelines at all.

  NICE guidance recommends that patients should be considered for bariatric surgery when they have a BMI of 40 or more, or a BMI of over 35 plus an associated condition (comorbidity) such as diabetes. It also advises that all appropriate non- surgical measures have been attempted before surgery.

  However, official statistics suggest that PCT's are either not following the guidance or interpreting it stringently. An economic model, developed by OHE, estimates that between around 11,000 and 140,000 people in England currently qualify for bariatric surgery under NICE guidelines, while the actual number of surgeries that took place in England in 2009-10 was 3,607. Adherence is generally sub-optimal but the number of procedures commissioned by PCTs ranged from 1 to 194 in 2009-10 indicating a wide variation in practice.

- The contribution of additional paid work generated following bariatric surgery off-sets the costs of surgery. This is achieved one year after surgery. There are also benefits through reductions in benefits paid and, although the evidence base is limited, savings for the health service can also be realised. The two tables below detail costs and savings covered in the report based on five and twenty-five per cent of patients eligible for bariatric surgery receiving this intervention:

Table: **Economic impact if five per cent of eligible patients were to receive bariatric surgery**

Component	Year 1 £m	Year 2 £m	Year 3 £m	Total year 1 to year3 £m
Paid hours gained	135	135	135	405
NHS costs/savings	-8	56	56	104
Total savings	127	191	191	509
Cost of surgery (excluding aftercare costs)	-127	0	0	-127
Total economic impact	**0**	**191**	**191**	**382**

Table: **Economic impact if twenty-five per cent of eligible patients were to receive bariatric surgery**

Component	Year 1 £m	Year 2 £m	Year 3 £m	Total year 1 to year3 £m
Paid hours gained	579	579	579	1,737
NHS costs/savings	-8	56	56	104
Total savings	571	635	635	1,841
Cost of surgery (excluding aftercare costs)	-546	0	0	-546
Total economic impact	**25**	**635**	**635**	**1,295**

In addition, from the Government exchequer point of view, between £35m and £150m per year in benefits would be saved.

- Results from the PCT survey indicate that the current climate in the NHS will mean a reduction in the level of provision of service for obese patients. Although only one in ten PCTs that responded said that they would be reducing funding for obesity services; one third said that they would be applying the NICE guidance more stringently and none that the guidance would be applied less stringently.

1 CURRENT AND PREDICTED TRENDS IN OBESITY IN ENGLAND

Obesity has been identified as a strategic issue for Government for at least ten years.

Despite this awareness the share of the population measured as obese continues to increase. Up to a quarter of the population in 2008 was obese compared to a little less than twenty per cent ten years earlier. The UK currently has the fifth largest rate of obesity among developed nations. The Government has estimated that, on current trends, sixty per cent of all males and half of all females will be obese by 2050.

The impact of obesity on the health service and the health of the nation has been recognised by the Department of Health. They estimate that the obesity currently costs the NHS £4.3bn per year. Obesity has been linked to ten per cent of all non-smoking cancer deaths and severely obese people have a life-expectancy eleven years less than healthy-weight individuals.

Obesity is a significant and growing issue in England. This section will discuss current trends in obesity for England, and reported estimates of its impact.

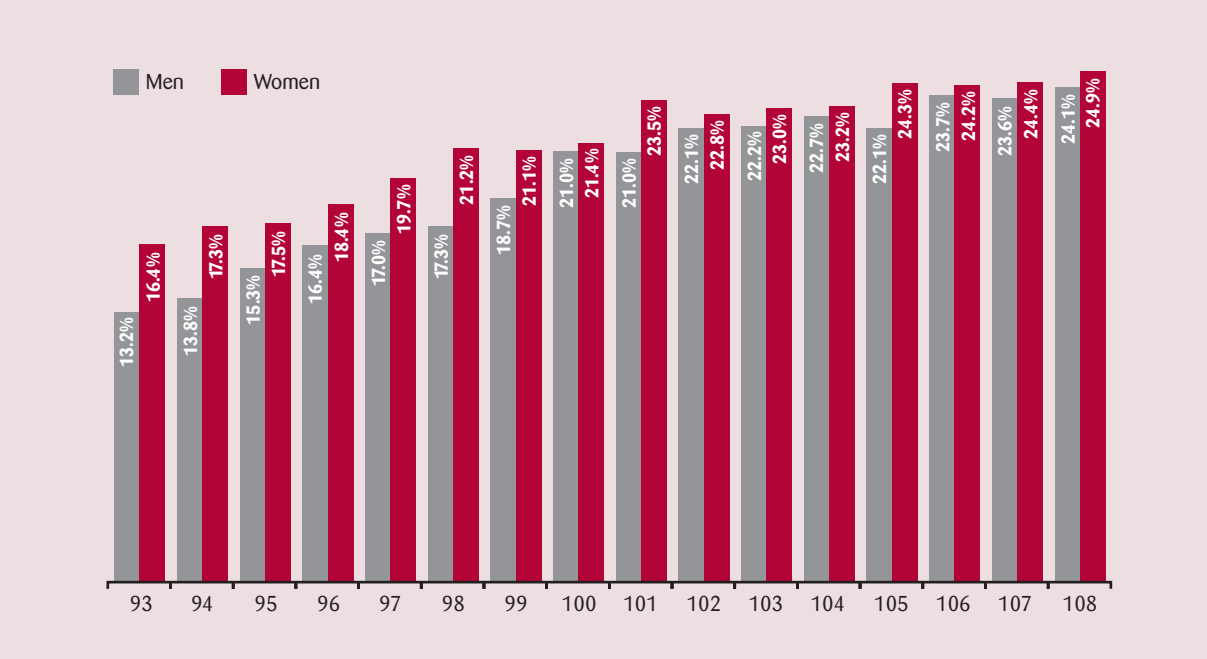
There had been increasing awareness over the previous decade that trends in obesity are a significant issue. The health impact of obesity on England has been recognised by the Government. The Department of Health commissioned a cost-of-illness study to enable estimates to be prepared on the costs of obesity in England. The National Audit Office report, Tackling Obesity in England, published in 2001, was the result of this commission (National Audit Office 2001). The report concluded that obesity accounted for 18 million lost working days due to associated illness and 30,000 deaths in 1998 for England. The direct cost of treatment of obesity and associated comorbidities was estimates at £480m or 1.5% of the total NHS expenditure in England. Sir Derek Wanless' report to the Treasury on future funding and service provision for the NHS in 2002 (Wanless 2002) identified obesity as a key driver of increasing demand for health services. He concluded the ability of society to become "fully engaged" taking responsibility for their health would impact on the capability of the NHS to continue to deliver current levels of service through public funding. His update of this report in 2007 noted that the worse-case projection for the share of the adult population likely to be classified as obese by 2010 had been exceeded by baseline predictions (Wanless 2007).

In 2007 the Comprehensive Spending Review announced the aim that England was to be the first major country "to reverse the rising tide of obesity and overweight in the population, by ensuring that all individuals are able to maintain a healthy weight." (Treasury 2007) This aspiration was given a strategic framework with the launch of "Healthy Weight, Healthy Lives" (Department Health 2008). Much of the focus for this strategy has been on children and a key target for the strategy is to reduce the proportion of overweight and obese children to 2000 levels by 2020.

The most recent official report on trends in Obesity in England (Information Centre 2010) published in February 2010 included the following findings:

- "In 2008, almost a quarter of adults (24% of men and 25% of women aged 16 or over) in England were classified as obese, and 66% of men and 57% of women were overweight including obese." The trend in obesity is increasing as can be seen in the chart below (source: National Obesity Observatory 2010).

Chart 1: **Adults (aged 16 and over) prevalence of obesity as a share of the total population England 1993 -2008**



Reference: National Obesity Observatory 2010

The Information Centre report also concluded that:

- "Thirty-nine per cent of adults had a raised waist circumference in 2008 compared to 23% in 1993. Women were more likely than men (44% and 34% respectively) to have a raised waist circumference (over 88cm for women and 102cm for men)."

- "Using both BMI and waist circumference to assess risk of health problems, for men: 20% were estimated to be at increased risk; 14% at high risk and 21% at very high risk in 2008. Equivalent figures for women were: 15% at increased risk, 17% at high risk and 24% at very high risk."

There can be issues comparing international data on reported rates of obesity as some countries, such as the UK, use measured data whilst others collate self-reported rates and are thus less reliable. Even with this caveat it is the case that the UK population has one of the highest officially reported rates of obesity among developed nations. This can be seen in the table opposite:

Table 1: **Overweight or obese and obese population, % of total population OECD countries**

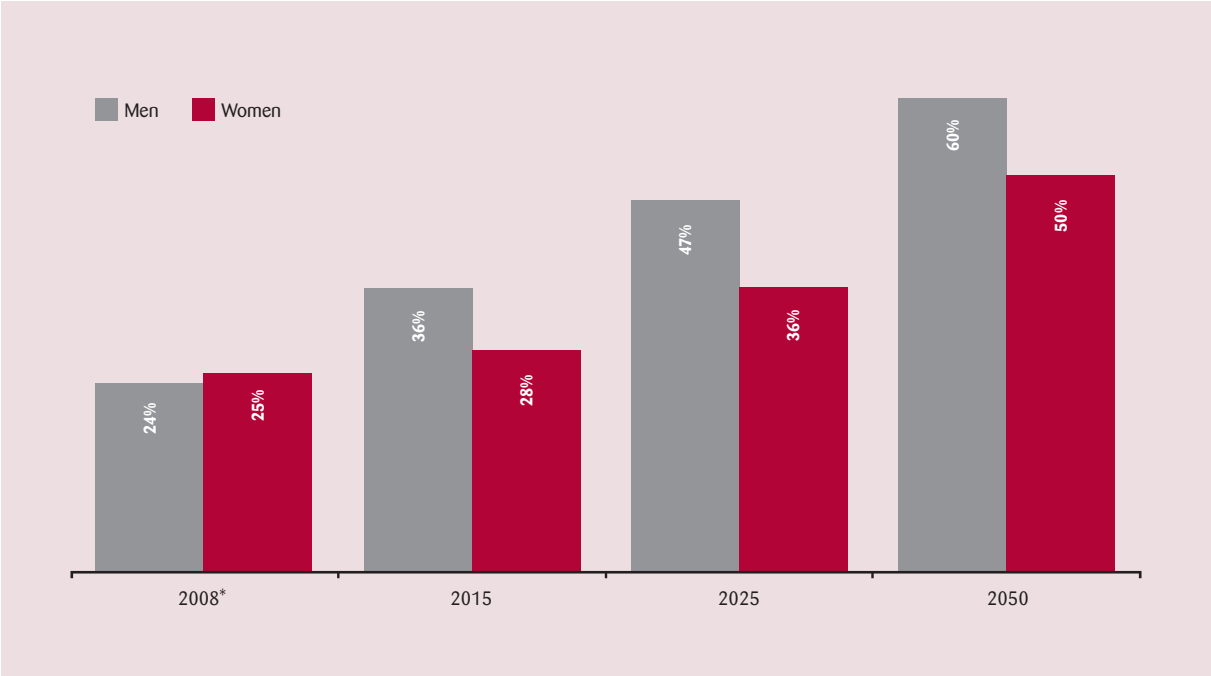
	Overweight or obese as a % of total population	Obese as a % of total population	Year	Measured (M) / self-reported (S) data used
United States	68	34	2008	M
Mexico	70	30	2006	M
New Zealand	63	27	2007	M
Australia	61	25	2007	M
United Kingdom	**61**	**25**	**2008**	**M**
Canada	60	24	2008	S
Ireland	61	23	2007	M
Iceland	60	20	2007	S
Luxembourg	55	20	2007	M
Greece	59	18	2008	S
Estonia	50	18	2008	S
Czech Republic	53	17	2008	S
Spain	55	17	2009	S
Slovak Republic	52	17	2008	M
Slovenia	55	16	2007	S
Germany	52	16	2009	S
Finland	49	16	2008	S
Portugal	52	15	2005	S
Turkey	48	15	2008	S
Belgium	47	14	2008	S
Austria	48	12	2006	S
Denmark	45	11	2005	S
France	38	11	2008	S
Netherlands	47	11	2008	S
Sweden	44	10	2007	S
Norway	46	10	2008	S
Italy	46	10	2008	S
Switzerland	37	8	2007	S
Korea	31	4	2008	M
Japan	24	3	2008	M

Source: OECD Health Database accessed August 2010

The impact of obesity on the health and wealth of England has been clearly established. The most recent reported official figures estimated the financial impact of obesity on the NHS at £4.3bn (Department of Health 2010). The Department of Health reported that "Around 10% of all cancer deaths among non-smokers are related to obesity. The risk of coronary artery disease increases 3.6 times for each unit increase in BMI, and the risk of developing type 2 diabetes is about 20 times greater for people who are very obese (BMI over 35), compared to individuals with a BMI of between 18 and 25. These diseases can ultimately curtail life expectancy. Some studies have shown that severely obese individuals are likely to die on average 11 years earlier than those with a healthy weight, although this figure can vary depending on an individual's circumstances." (Department of Health 2010).

The Government Office for Science provides a view of the expected trends in obesity (Government Office for Science 2007). Their predictions suggest that rates of obesity will double by 2050 if no action is taken and this progression can be seen in the chart below:

Chart 2: **Predicted trends in obesity rates for England**



Source: Government Office for Science

2 CURRENT OBESITY GUIDANCE FOR ENGLAND

NICE clinical guidance for obesity, published in 2006 is the benchmark for provision of services for obese patients in England.

The guidance encourages primary care trusts to actively monitor their patient population to identify obese patients and any clinical risks arising from their weight and size.

Three clinical interventions are recommended: support to improve diet and increase physical activity, pharmacological interventions and bariatric surgery. The choice of intervention is based on measured weight relative to height (Body Mass Index (BMI)), waist size and consideration of comorbidities. Clinicians are required to interpret applicability of guidance in specific cases, notably when it is possible to consider more than one intervention.

The guidance recommends that bariatric surgery should be considered for all patients with a BMI above 35 and with co-morbidities and all patients with a BMI above 40.

Based on the limited evidence available NICE have estimated that, for England, recurrent annual savings of £55m can be achieved with initial costs of £63m through implementation of the guidance.

The longer term strategic initiatives already mentioned do not directly address how the National Health Service should provide ***clinical care*** to the adult population currently dealing with the consequences of being overweight or obese. The primary means for this has been through the NHS National Institute for Health and Clinical Excellence (NICE) and the publication in December 2006 of their guidance "Obesity: guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children" (NICE 2006a). This guidance covered the following issues:

- How staff in GP surgeries and hospitals should assess whether people are overweight or obese.
- What staff in GP surgeries and hospitals should do to help people lose weight.
- Care for people whose weight puts their health at risk.
- How people can make sure they and their children stay at a healthy weight.
- How health professionals, local authorities and communities, childcare providers, schools and employers should make it easier for people to improve their diet and become more active.

This was the first national guideline addressing both prevention and treatment of obesity in adults and children. In line with other documents in this area the recommendations were wide ranging including catering in schools and provision of cycling and walking routes for town planners. For the NHS the importance of the guidance was made clear stating that "Managers and health professionals in all primary care settings should ensure that preventing and managing obesity is a priority, at both a strategic and delivery level. Dedicated resources should be allocated for action."(NICE 2006a p8) The scope of the analysis of this report covers the implications of adherence to the clinical care for obese adults and outlines this component of the guidance.

The recommendations for clinical care by the NHS for the overweight, especially for adults, are initially based on the use of the body mass index (BMI) as a means of assessment. The classification based on BMI is used as the basis to place adults on different pathways of intervention and care. The table below lists the categorisation as stated in the clinical guideline.

Table 2: **BMI classification used in NICE clinical guideline for Obesity (CG43)**

Classification	**BMI (kg/m2)**
Healthy weight	18.5-24.9
Overweight	25-29.9
Obesity I	30-34.9
Obesity II	35-39.9
Obesity III	40 or more

A patient classed as either overweight or in class obesity I and II should be further assessed using the measurement of waist circumference to determine the level of increased risk associated with their BMI.

Once initial measurements are made an assessment should be undertaken. This is done jointly between the healthcare professional and the patient. Among the issues that should be addressed are comorbidities, including type 2 diabetes, hypertension, cardiovascular disease, osteoarthritis, dyslipidaemia and sleep apnoea. Aside from comorbidities a number of social and psychological issues should also be considered to determine whether there are underlying factors that ought to be taken into account when developing a strategy for intervention. Broadly the range of interventions recommended by NICE, based on BMI, waist circumference and comorbidities if necessary, are as follows:

BMI classification	**Waist circumference**			**Comorbidities present**
	Low	High	Very high	
Overweight				
Obesity I				
Obesity II				
Obesity III				

General advice on healthy weight and lifestyle

Diet and physical activity

Diet and physical activity: consider drugs

Diet and physical activity; consider drugs; consider surgery

Source: NICE clinical guideline CG43

NICE recommend that where there is a high BMI (greater than 50kg/m2) and if medicines or surgery are being considered then the patient should be referred to a specialist.
Virtually all patients falling within the classes between overweight and obesity III should receive an intervention to improve diet and physical activity. This advice is not only intended to provide information to patients but also takes the form of interaction between the patient and relevant health professionals to change behaviours.

The next level of intervention is the use of medicines. NICE recommend that this should not be introduced until after failure of reaching targets for weight loss using changes in diet and physical activity. At the time of publication there were two therapies available: orlistat and sibutramine. A third medicine indicated for obesity, Rimonabant, was launched following publication of the guieline. The choice of therapeutic interventions has reduced following the withdrawal of the marketing authorisation for sibutramine and withdrawal of rimonabant. Success for medicines intervention has been clearly defined, both by the scope of their licence and by NICE, in terms of loss of relative to initial body weight.

Using NICE criteria patients can be considered for surgical intervention as a first line option only where their BMI is greater than 50 kg/m2. Where this is not the case surgical intervention for patients should only be considered where all of the following criteria are met:

- They have a BMI of 40kg/m2 or more, or between 35 kg/m2 and 40 kg/m2 and other significant disease (for example, type 2 diabetes or high blood pressure) that could be improved if they lost weight.

- All appropriate non-surgical measures have been tried but have failed to achieve or maintain adequate, clinically beneficial weight loss for at least 6 months.

- The person has been receiving or will receive intensive management in a specialist obesity service.

- The person is generally fit for anaesthesia and surgery.

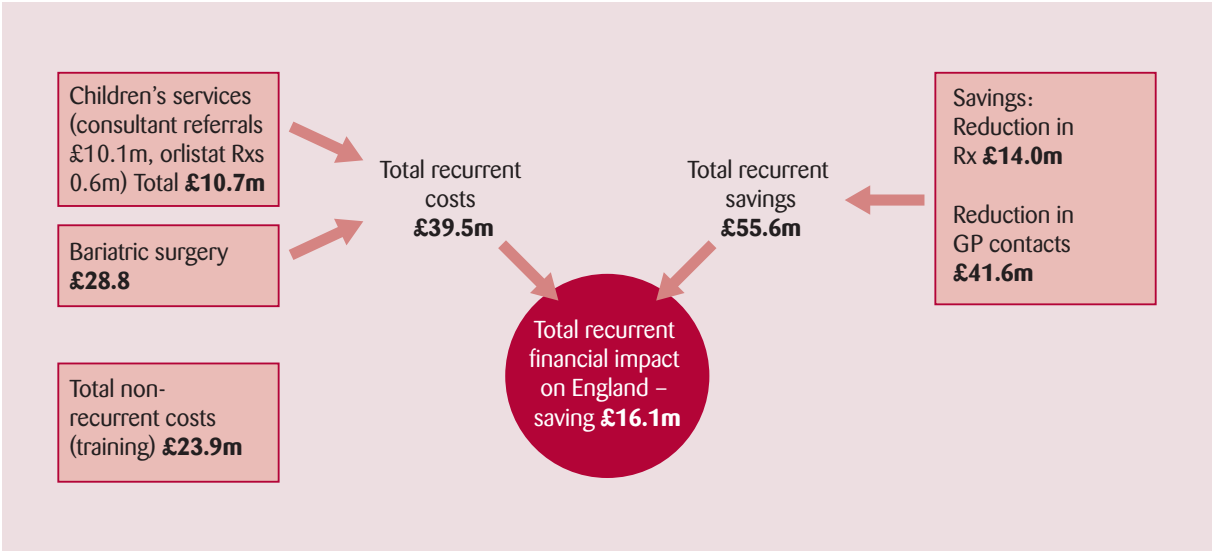
- The person commits to the need for long-term follow-up.

Among the various surgical options the most commonly performed are gastric bypass and gastric banding (Picot 2009 p12).

The status of NICE clinical guidelines is not as clearly established as recommendations made using the technology appraisal process. For the latter, funding to enable usage of the technology has to be provided within three months following publication of the guidance. For clinical guidelines adherence is not mandatory and systematic monitoring of guidance adherence is not undertaken by NICE nor the Department of Health. The guidance contained in CG43 is not as prescriptive as those for other conditions such as management of chronic obstructive pulmonary disease (NICE 2004) or hypertension (NICE 2006c). As such this will mean that there will be an element of interpretation as the guidance is implemented, notably what considerations should be taken when patients are offered either pharmacological or surgical intervention.

To assist health service providers plan the financial implications of its guidelines NICE develop a costing template, published at the same time as the guidance. Assessing the costs and savings identified in the costing template provides a view of the economic impact of adherence to the guidance. The additional costs identified were year one costs for provision of a children's service for obesity (essentially paediatric referrals and orlistat prescribing) and referrals for surgery. Savings identified were a reduction in prescribing for conditions associated with obesity and concomitant fall in GP contacts. For both the results of the Picot systematic review were used to develop the model (Picot 2009). The diagram below is a summary of costs and savings as identified in the costing template (updated for 2009 HRG costs and prescribing for England). From the costing template savings for England would be expected from the second year of implementation and estimated at approximately sixteen million per year.

Diagram 1: **NICE estimate for economic impact for England of implementation of NICE clinical guideline for Obesity**



The scope of the NICE costing template does not address all costs and savings associated with implementation of the guidance. Notably it does not include savings outside of the health service economy.

3 OUTLINE OF THE PROJECT

The aim of the project is to understand the current nature of service provision for obesity for England; to estimate some potential socio- economic benefits for the health service and the wider economy through provision of care for patients with obesity in line with NICE guidance, specifically the use of bariatric surgery.

The project comprised three parts:

a. A survey of English PCTs eliciting details of the current practice and policies followed by the NHS with particular reference to the NICE clinical guideline on obesity.

b. A literature review looking at external benefits combined with the Picot report.

c. Finally a model was developed incorporating and expanding the current NICE costing guideline with additional costs and benefits identified in the literature.

The results were used to understand current provision of obesity services compared to the NICE clinical guideline and a method of understanding where greater or lesser adherence to the national guideline would impact on indirect costs for the NHS.

4 PCT SURVEY ON CURRENT LEVEL OF SERVICE PROVISION FOR OBESITY

In order to monitor current service provision for obese patients in England a survey aimed at all PCTs in England was developed and administered

The questionnaire asked PCTs details of their monitored rates of obesity in England, their referral process, adherence to NICE obesity guidance and anticipated future service provision levels.

Nearly nine in ten PCTs reported that they monitored obesity rates in their locality. Four in ten reported that a rate of obesity in their locality was greater than the national average and two in ten less.

Of those that answered the question, four in ten reported that they adhered to NICE guidance when developing local guidance; five in ten said that they had used elements of the guidance and one in ten did not use this national guidance when developing their local protocols. Many PCTs reported criteria in addition to those outlined by NICE when considering referral for bariatric surgery.

Three quarters of responders reported that they did not formally audit outcomes of patients following bariatric surgery.

One third of PCTs stated that they anticipated interpreting the NICE guidance more stringently in future.

(a) Survey Development/Administration

In order to capture information regarding the current level of service provision it was decided to develop and administer a survey of Primary Care Trusts (PCTs) in England. A survey questionnaire was developed by OHE in collaboration with Allergan, the National Obesity Forum, and the Royal College of Surgeons (see appendix 1). The decision was taken not to pilot the survey as the timeframe would not permit this. An online survey instrument was created. The initial survey was designed to be completed using an online survey resource (QualtricsTM) and invitations were sent to all PCTs in England. The first iteration of the questionnaire was sent out in May 2010. The initial response to the survey was disappointing and a further mail shot of the survey was sent to freedom of information contacts at each PCT, requesting completion under the Freedom of Information Act. The request using freedom of information was sent to PCTs in June 2010 and returns were collected until 3 August 2010. To improve the response rate PCTs were allowed to provide returns either electronically using the original survey instrument or by paper copy. In answering specific questions PCTs were also able to supply supporting papers, notably copies of their obesity management policy documents.

The survey sought to elicit information for the following areas:

a. Whether the PCT had independently assessed the rates of obesity and asked for a statement of their rates compared to national trends.

b. The PCT referral process – notably for pharmacological and surgical intervention.

c. What providers of care receive referrals – surgical and pharmacological.

d. Post-operative care.

e. Future service provision.

A copy of the survey can be found in appendix 1.

(b) Survey results

Questionnaires were send to all 152 PCTS. Of these, 93 returns were received by August 3rd 2010. For some PCTs there is joint management of clinical services and hence a small number of returns related to more than one PCT. 12 of the returns were not included as they represented duplicate responses for the same PCT or because there was insufficient detail in the answers provided to enable valid analysis. The final sample size was 81 and included a geographic spread of PCTs, a sample size of 56% (taking into account the joint management responses as outlined above). It is possible that this sample was not fully representative due to potential differences between the responders and non-responders. This is outlined in more detail in the questionnaire discussion. Results by question are detailed below:

Q2.1. Does your PCT monitor rates of obesity in your PCT catchment area?

Obesity rates have been monitored locally and centrally since 2006/07. The mechanism for achieving this is the Quality and Outcomes Framework (QOF) an incentive programme for all GP surgeries in England, where additional funding is awarded in return for GP activities supporting national targets and strategies. The QOF clinical register on obesity was started in 2006/7 and is based on patients aged 16 and over with a BMI greater or equal to 30. Statistics summarising adherence to this requirement have been kept by the Department of Health since 2009. By monitoring obesity rates the PCT will, by default, be at least assessing BMI rates in their population the first component of the assessment process outlined in the NICE guideline. Based on responses nearly nine in ten PCTs confirmed that they had monitored rates of obesity in their area. It is possible that this is an over-estimate of the proportion of PCTs who monitor obesity because obesity should be monitored and hence a greater proportion of the non-responders may be expected not to monitor obesity than the responders. This said, there are national sources of obesity measured for all PCTS which PCTs may use to monitor obesity in their area. In addition, of the 66 "yes" responses 60 did provide information relating to obesity levels or the method by which they were monitored.

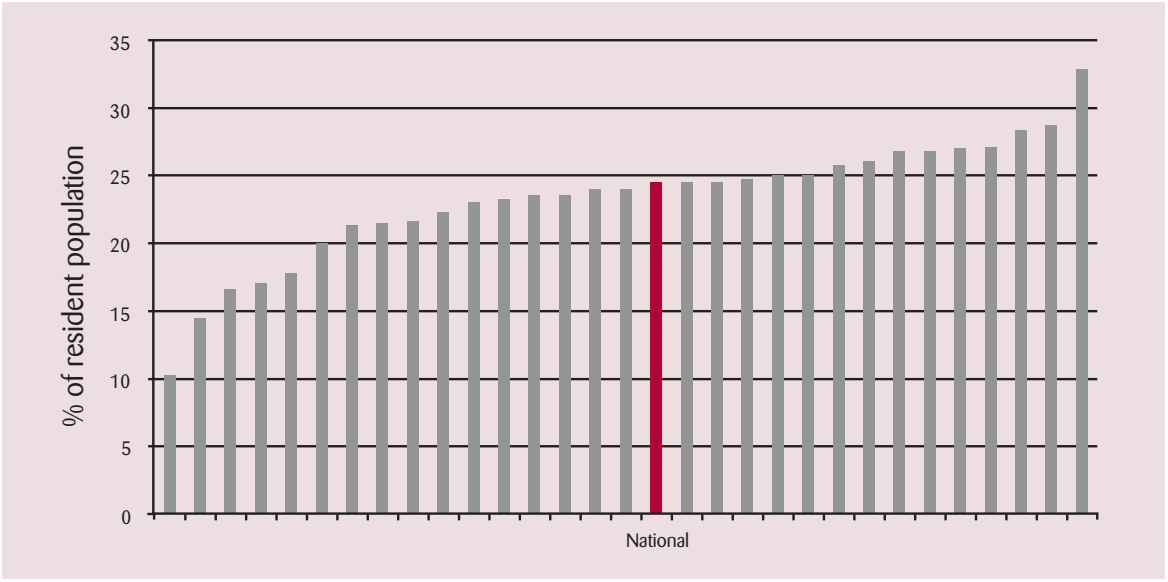
Table 3: **responses to question: "Does your PCT monitor rates of obesity in your PCT catchment area?"**

	Answer	Response	%
1	Yes	66	87%
2	No	10	13%
	Total	**76**	**100%**

Q2.2. What are the rates of obesity and morbid obesity collected for your PCT catchment area?

Sixty responses were received for this question. Of these, information was typically provided both for adults and for children, although, in general only rates of obesity were provided, not rates of morbid obesity. Of those responses, 30 included an estimate of the share of their adult population who were obese.. In the returns 16 supplied an estimate below the national average and 14 above. However, it should be noted that different methods were used to monitor rates of obesity across PCTs including the synthetic estimates from the Health Survey for England and the Quality and Outcomes Framework (QOF). In general the QOF estimates were comparatively low, this is due to known issues with precisely what the QOF estimates represent, namely a clinical register of patients aged 16 and over with a BMI greater than or equal to 30 recorded in the previous 15 months. There was no statistically significant evidence to suggest a difference between responders and non-responders with regards to the proportion of their population who were obese, although there was an indication of higher proportions of obese in those who responded. This may be expected since the PCTs with higher obesity levels may have a greater interest in this area. As such, the levels of obesity and comparisons to the national average made from the sample may include some bias.

Chart 3: **Reported rates of obesity for catchment population for responding PCTs**



References: National estimate (Information centre 2010). PCTs with information provided relating to adult obesity (each bar represents one questionnaire response)

Q2.3. What is the opinion of your PCT regarding rates of obesity in your PCT catchment area compared to the national average?

Sixty PCTs responded to this question, close to the number of PCTs that confirmed that they had been monitoring obesity rates in their catchment area. Comparing this data with obesity estimates based on the NICE costing template as outlined in the economic modelling section, there is no evidence of a correspondence between the opinon regarding rates of obesity and the level of BMI. It may be that those areas where there is a perceived issue for obesity are more active in monitoring and managing this issue. Again, it is important to consider that the PCTs answering this question may not be representative of all PCTs due to potential non-responder bias, as outlined for Q2.2.

Table 4: **responses to question: " What is the opinion of your PCT regarding rates of obesity in your PCT catchment area compared to the national average?"**

Answer	Number of responses	% of respondents	Share of all excluding "not sure"
Above average	21	36%	40%
Average	21	36%	40%
Below Average	11	19%	21%
Not sure	5	9%	
Total	**58**	**100%**	**53**

Questions on Referral Process (or Guidelines)

Q3.1. What is the date of the most recent guidelines at your PCT relating to the surgical and pharmacological intervention of obesity?

Sixty six PCTs provided responses that could be analysed. Almost all PCTs have produced their most recent guidance since publication of the NICE clinical guidance on obesity in 2006. Over half (38/66) have updated their guidance since the start of 2009 and a small number (4/66) noted that they updated guidance annually.

Table 5: **PCT year since publication of local obesity guidance**

Year of update	Count
2002	1
2005	4
2006	13
2007	3
2008	7
2009	21
2010	17
Total	**66**

Q3.2. Please outline the process used to refer patients for surgical and pharmacological intervention of obesity

This was a text response for information relating to referral to surgical or pharmacological specialist services. An analysis of the text responses and guidance documentation enabled identification for the principle process for referral to pharmacological or surgical intervention. In total 62 text responses were received to this question.

This information was used to extract the key features that were mentioned. Some responses did not outline the process for pharmacological and surgical referral separately and in general more information was provided relating to the process for referral to surgical intervention, as opposed to pharmacological.

The text responses were reviewed and binary responses created relating to whether key criteria were listed in the text response, these criteria were based on a random sample of 10 text responses. The results which follow are not mutually exclusive, in that one response may have referred to a diabetologist and GPs in describing their method for referral, in this instance both the criteria will be highlighted. Although this process helped to provide an indication of the processes that were present among the PCTs, it is important to note that the referral procedure extracted from the text was taken from information provided to different levels of accuracy. For example some PCTs provided short written text, whereas others referred to their full guidance documents. If the timeframe had permitted it would have been of additional benefit to obtain and review the guidance for all PCTs where available in detail.

Pharmacological

For pharmacological intervention, key criteria considered are outlined below along with the number of questionnaire responses to Q3.2 that mentioned them specifically in their text. Of the 34 responders to Q3.2, one of the criteria outlined below was mentioned in 21 responses, and two criteria were mentioned in 13 responses. The majority of those who mentioned one of the criteria listed below, specified GP referral.

Table 6: **Criteria used for pharmacological intervention**

Question	Yes	No	Reponses
GP referral	29	0	29
Diabetologist	4	0	4
Endocrinologist	1	0	1
Specialist Unit	3	0	3
Patient Funding Panel	5	0	5
Other	8	0	8

Surgical

Similarly for surgical intervention, 36 Reponses mentioned one of the criteria outlined below. Of those responses around half listed just one of the criteria, and the remainder mentioned two or more criteria. As for pharmacological referral, GPs were often identified in the response.

Table 7: **Criteria used for surgical intervention**

Question	Yes	No	Reponses
GP referral	23	0	23
Diabetologist	3	0	3
Endocrinologist	2	0	2
Specialist Commissioning Group	8	0	8
Patient Funding Panel	9	0	9
Other	14	0	14

Q3.3 Please list the key criteria for determining whether a patient is suitable for referral for pharmacological intervention of obesity

This was a text response relating to the suitability for referral pharmacological specialist services. As for the above question the text responses and guidance documentation was reviewed. Based on a random sample of 10 responses a set of key criteria outlined in the responses was determined. This enabled identification for the principle process for determining whether patients are suitable for referral for pharmacological intervention. Where information relevant to this classification was contained elsewhere in the questionnaire it has been utilised. As for Q3.2 this process helped to provide an indication of the processes that were present among the PCTs, it is important to note that the suitability criteria extracted from the text was taken from information provided to different levels of accuracy. As for Q3.2, some PCTs provided short written text, whereas others referred to their full guidance documents. Again, it would have been of additional benefit to obtain and review the guidance for all PCTs where available in detail.

Pharmacological

Some of the responses did not explicitly mention any of the key criteria, or refer to suitability for pharmacological intervention. Of the 36 who mentioned one of the criteria below, the majority mentioned NICE. It is possible that this proportion is not an accurate respresentation of those that follow NICE since a) responders may have followed NICE but not explicitly mentioned this in their response and/or b) a greater proportion of non-responders may deviate from NICE guidance.

Table 8: **Criteria used for assessment of suitability for pharmacological intervention**

Criteria	Criteria specified
NICE	26
GP	6
Dietetics	6
Motivation	1
Compliance with Intervention	1
Patient funding	0

Q3.4 Please list the key criteria for determining whether a patient is suitable for referral for surgical intervention of obesity

This was a text response relating to the suitability for referral surgical intervention of obesity. As for the above question the text responses and guidance documentation was reviewed. Based on a random sample of 10 responses a set of key criteria outlined in the responses was determined.

This enabled identification for the principle process for determining whether patients were suitable for referral for surgical intervention. Where information relevant to this classification was contained elsewhere in the questionnaire it has been utilised.

Many of the responses which outlined suitability for surgical referral listed separate information relating to obese and morbidly obese patients. In an attempt to capture this level of detail, the responses were provided categorised into the criteria that was listed for these subsets of patients separately. Looking specifically at the category of morbidly obese 46 responses specified one or more of the criteria listed below.

Table 9: **Criteria used for assessment of suitability for surgical intervention**

Question	Yes	No	Reponses
NICE	15	0	15
GP	1	0	1
BMI cut off no comorbid	26	1	26
Compliance with intervention	7	0	7
No contraindications for surgery	10	0	10
Patient funding	0	0	0
All other strategies tried and failed	14	1	15
First line option	4	0	4
Weight management programme	17	0	17
BMI cut off with comorbid	26	0	26

Information was extracted relating to the BMI cut-offs if explicitly outlined in the responses.This indicated a wide variety in the BMI cut-offs specified in the responses to suitability for referral to surgery. BMI cut-offs from 35+ to 60+ were listed for surgical referral. in the case of no-comorbidities, and 30+ to 50+ when comorbidities were present. The comorbidities typically outlined were diabetes and sleep apnoea. As for the above criteria, those that did not explicitly refer to NICE may still have suitability criteria that meets NICE guidance.

This was a text response for the general response and for referral to surgical or pharmacological specialist services. An analysis of the text responses and guidance documentation enabled identification for the principal process for determining whether patients are referred for pharmacological or surgical intervention.

PCTs were then invited to assess how their guidelines match NICE's guideline for Obesity (CG43). The table below details their responses. Just over one third reported that their referral guidelines were equal to those in CG43 in all respects. Nearly half responded by stating that elements of their referral guidelines matched CG43, from responses to other questions this may include additional criteria. Around one in ten PCTs who were able to compare their criteria to CG43 stated that theirs did not match this guideline.

Table 10: **PCT view of local guideline for obesity compared to NICE guideline**

Answer	Response	%
Our referral guidelines are equal to those in CG43 in all respects	17	35%
Elements of our referral guidelines are equal to those at CG43 as deemed appropriate	23	47%
Our guidelines do not match those at NICE but are specific to our PCT	4	8%
Unsure	2	4%
Other (please specify)	3	6%
Total	**49**	**100%**

Q4 Private provision: There is a recognition that private provision is used as an alternative. The questionnaire included questions requesting referral rates of NHS and private provision but responses rates to these questions were too low to enable analysis. For example, we asked "If your PCT has facilitated the provision of private surgical intervention of obesity in 2008/09, what have been the main factors driving the choice of this option? please rank (1 most important, 5 least important). The factors listed were (i) Patient convenience, (ii) Your trust did not meet criteria for NHS provision (iii) Length of waiting time for surgery at your PCT (iv) Insufficient capacity at your PCT (v) Other Factors (please specify). There was a very clear hierarchy in the responses. Of the twenty responses to this question patient convenience was cited in eighteen cases as the most important, not meeting criteria was almost always cited as the second most important (19/20), waiting lists was cited as third most important in 17 out of 20 cases and capacity as the fourth most important for the same number of PCTs. For other criteria most did not include a relevant comment but in two instances a tendering process was cited.

Q5 Post-operative care: Post-operative care is important to ensure that the benefits of surgery are fully realised. PCTs were asked to provide details of their post-operative care pathways. In addition PCTs were asked: "Is there a formal audit at your PCT to track outcomes of patients who have surgical intervention of obesity?" In response to the latter three-quarters of the forty responders said that they did not. Eighteen PCTs provided details of the post-operative care pathways, these were generally expressed in terms of process and interaction between PCT and other components of the healthcare service e.g dietician, to monitor progress and not setting of specific targets for weight loss.

Q6 PCT plans for future: Finally PCTs were asked for a view for future service provision. This was in the form of an answer to four questions: "What are your PCTs plans regarding expenditure on surgical and pharmacological intervention of obesity during the next five years?", "What are your PCTs plans with regards to the following interventions during the next five years?"; "During the next five years do you anticipate that your criteria will be (please circle one) More stringently applied, Less stringently applied, Applied at the present level, Other, please specify (e.g. unsure, not yet decided)"; Has your PCT identified review dates for referral criteria?

In response to the budget question just under one quarter stated that they would be maintaining current levels of expenditure around one in seven anticipated increasing and one in ten decreasing expenditure. Around half were not yet certain generally as this was not decided. Detailed responses can be found in the table below. Maintaining the budget does not necessarily entail that the service provision will be kept at present levels as demand may increase.

Table 11: **Responses to question "What are your PCTs plans with regards to the following interventions during the next five years?"**

Answer	Response	%
Increase expenditure	7	16%
Decrease expenditure	5	11%
Maintain current level of expenditure	10	22%
Other, please specify (e.g. not yet decided, unsure)	23	51%
Total	**45**	**100%**

Specifically for pharmacological and surgical provision PCTs were asked to estimate whether provision would change. Generally PCTs suggested that current service provision would be maintained. Twenty per cent anticipated decreasing provision and about the same thought that provision would be increased.

Table 12: **Responses to question "What are your PCTs plans with regards to the following interventions during the next five years?"**

Question	Decrease provision	Maintain current provision	Increase provision	Responses
Pharmacological intervention of obesity only	4	14	4	22
Surgical intervention of obesity only	4	14	5	23
Pharmacological and surgical intervention of obesity	4	11	5	20

One third of respondents anticipated that the NICE criteria for pharmacological and surgical intervention will be more stringently applied, none thought that it would be less stringently applied and around a quarter thought that the current criteria would be maintained. As the evidence suggests that current provision is variable and sub-optimal then these responses raise the concern that this will increase.

Table 13: **Answers to the question "During the next five years do you anticipate that your criteria will be…."**

Answer	Response	%
More stringently applied	15	34%
Less stringently applied	0	0%
Applied at the present level	12	27%
Other, please specify (e.g. unsure, not yet decided)	17	39%
Total	**44**	**100%**

(c) Questionnaire discussion

The sample size obtained is above the target originally established for this survey. However, it is possible that the sample is not representative of all PCTs. For example it may be expected that a greater proportion of those who adhere to NICE guidance would respond compared to those who do not adhere to NICE guidance.

It was possible to perform some comparisons between the responders and non-responders using obesity estimates. The HES data obtained and the difference between observed and expected rates as estimated from the modelling. Comparing the sample who responded to those who did not, there was no statistically significant evidence of a difference in the level of obesity as estimated based on the NICE costing template, nor was there any statistically significant evidence of a difference between those who responded and those who didn't and the average number of discharges with a bariatric surgery procedure. In addition, there was no statistically significant evidence to suggest that the deviation from expected levels of surgery (as per the NICE guidance) differed between the two groups. It is possible that bias does exist between the groups, but has not been detected by the tests outlined above, as such, some results, particularly exact proportions should be interpreted with caution.

Despite this possible bias, the results do indicate a level of variation which could not be explained by non-responder bias. These included deviations from NICE guidance within some PCTs and variations in for example the BMI cut offs used to determine suitability for bariatric surgery. These are outlined in the following section. The NICE guidance has been firmly established and is the primary resource for the NHS for planning clinical management of obesity in England. It has been noted that the nature of the guidance provides scope for PCTs to interpret how the guidance should be implemented. As systematic benchmarking of NICE guidelines is not undertaken by the Department of Health nor NICE it is not possible to use this as a means of context for establishing whether the reported adherence to the guidance, around four in ten PCTs matching NICE guidance exactly, is a good response. The guidance has been in place for nearly four years, according to the survey results around half of PCTs use this resource to partially determine their obesity guidance, and one in ten have chosen to develop guidance that does not match the guideline does suggest that for the majority of patients using the NICE guideline as the basis for their expectation of treatment will not necessarily meet the

only national standard for England. By far the most common divergence was the creation of additional criteria before patients are referred to specialist services. In particular there was a wide variety in the BMI cut-offs specified in the responses to suitability for referral to surgery. BMI cut-offs from 35+ to 60+ were listed for surgical referral in the case of no-comorbidities, and 30+ to 50+ when comorbidities were present.

The questionnaire was administered in May although the majority of responses were received during July following the FOI request, during a period when planning for future service provision in the NHS was being undertaken in a climate of expected significant budget restraint. In this context one third of PCTs expected to apply NICE criteria more stringently, none less and nearly four in ten had not yet decided. Of the smaller number of respondents able to estimate changes in future budgets for obesity services, around one seventh stated that expenditure would increase one in ten that it would decrease and a little under one quarter that it would remain the same. An increase or maintenance of budget, if used for an increasing number of patients, will not result in protected or increasing levels of quality in service provision. Based on these responses it is reasonable to expect that the use of specialist services and the share of patients with obesity treated with pharmacological or surgical intervention will at best be maintained and in likelihood decrease.

5 LITERATURE REVIEW

To support the economic modelling a literature search was undertaken.

A recent systematic review of the cost-benefits of bariatric surgery, specifically for the healthcare system had been undertaken by Picot (Picot 2009). His conclusion, that addition studies are required to support a comprehensive cost benefit analysis of the impact of bariatric surgery were required, was echoed by an update of the search strategy he adopted.

From the limited literature of indirect benefits ten papers were identified of which Hawkins (2009) was chosen as the primary resource for modelling.

A number of literature searches were performed to locate quantitative information to be used within the modelling of the indirect costs of obesity in the UK and the potential savings from using bariatric surgery as per the NICE guidance in the UK. Three different strategies were implemented, which are outlined below.

Search strategy one – direct link between obesity and indirect costs in the UK

A literature search was conducted using PubMed based on key words, this was restricted to UK focused papers and recent publications, from 2000 onwards. Key words were determined in consultation with the group. The search terms are outlined below:

({obesity} OR {BMI} OR {gastric bypass} OR {weight loss} OR {anti-obesity surgery} OR {obesity surgery} OR {anti obesity surgery} OR {body mass index} OR {Bariatric surgery}) In title/abstract

AND

({indirect cost} OR {savings} OR {work} OR {disability} OR {employment} OR {economic} OR {costs} OR {cost} OR {indirect costs} OR {economics}) In title/abstract

AND
{UK} OR {United Kingdom} OR {England}

AND

Publication Date: {2000} OR {2001} OR {2002} OR {2003} OR {2004} OR {2005} OR {2006} OR {2007} OR {2008} OR {2009} OR {2010} OR {2011}

This strategy resulted in 852 hits, which were refined based on title using the following criteria

i) Papers which only focused on countries other than the UK – disregarded
ii) Papers which did not appear to refer to costs in any way (unless they were relevant for point iv below)

iii) Papers which focused on a small subset (e.g. air traffic controllers)
iv) Papers which did not relate specifically to the aims of this search strategy, but which may relate to the later stage three search strategy were retained
v) Papers which referred to key trends in obesity have been retained for general reference

The subset of articles remaining were then considered for inclusion based on whether the abstract (where available) indicated any possibility of the full paper containing information related to the aims of the literature search. From this the primary paper by Hawkins (Hawkins 2009) was used as the primary resource for the economic modelling. This paper was the most recent with a UK focus measuring impact of surgical interventions for the two key measurements of increase of working hours and reduction in benefits claimed.

Search strategy two – following methodology utilized in Picot (2009)

The second strategy utilized the search methodology contained in Picot (2009) broadened to include indirect costs, several of these searches were subsets of search strategy one. The series of searches performed as outlined below:

1. Ti/abs: Gastric bypass and indirect costs li: last 10 yrs: 1 hit from US:
2. Ti/abs: gastric bypass and non health costs li: last 10 yrs: 0 hits
3. Ti/abs: anti-obesity surgery and indirect costs li: last 10 years: 0 hits
4. All fields: anti-obesity surgery and indirect costs li: last 10 years: 2 hits
5. All fields: gastric bypass and indirect costs li: last 10 yrs: 2 hits, 1 new hit
6. Ti/abs: gastric bypass and non economic costs li: last 10 years: 0 hits
7. Ti/abs: anti-obesity surgery and non economic costs li: last 10 years: 0 hits
8. all fields: same search as 6: 11 hits (including Picot paper)
9. all fields: same search as 7: 4 hits, 2 new
10. ti/abs: weight loss surgery and indirect healthcare costs li: last 10 years: 0 hits
11. all fields: same search as 10: 2 hits, no new
12. ti/abs: biliopancreatic diversion and indirect costs li: last 10 years: 0 hits
13. ti/abs: biliopancreatic diversion and non health costs li: last 10 years: 0 hits
14. ti/abs: biliopancreatic diversion and indirect healthcare costs li: last 10 years: 0 hits
15. ti/abs: biliopancreatic diversion and non economic costs li: last 10 years: 0 hits
16. all fields: same search as 12: 0 hits
17. ti/abs: LAGB and indirect costs li: last 10 years: 0 hits
18. all fields: same search as 17: 0 hits
19. ti/abs: bariatric surgery and indirect costs li: last 10 years: 3 hits, no new
20. all fields: same search as 19: 3 hits, same as above
21. ti/abs: bariatric surgery and non health costs li: last 10 years: 0 hits
22. ti/abs: bariatric surgery and indirect health care costs: last 10 years: 0 hits
23. ti/abs: bariatric surgery and non economic costs li: last 10 years: 0 hits

The results of this literature review confirmed Picot's observation that "further research is required…… to provide detailed data on:…… resource use across the entire patient pathway to develop robust costings" (Picot 2009 pxii)

Search Strategy three – staged approach

A staged approach was also considered to supplement the above search strategies. The purpose being to estimate the indirect cost of obesity through a) quantifying the relationship between obesity and a number of diseases for which obesity is implicated as a risk factor and b) determining the indirect costs of those diseases. However, the papers located through this strategy did not provide sufficient information to be able to appropriately adjust for the possibility of double counting of costs resulting from the interdependence between diseases related obesity and hence non-additivity of indirect costs. Further work to establish this was beyond the scope and timescale of this project and was considered non-essential based on the results from search strategies one and two.

6 ECONOMIC MODEL

A model was developed to assess adherence to NICE guidelines for the provision of various treatment interventions, notably bariatric surgery, by PCT for England. This was then used as a basis for estimating the economic impact of adherence to the guidelines for England.

Because the NICE guideline is, to a degree, indicative a range patients receiving either pharmacological or surgical intervention was estimated. The estimate was based on rates of comorbidities from the literature and assumptions about uptake for eligible patients.

The model estimates between around 10,000 and 140,000 of patients could receive bariatric surgery based on the assumption of between 1 per cent and 25 per cent of patients eligible for surgery choose to take this option.

Comparing estimated with actual rates of bariatric surgery suggested that provision is sub optimal. For 2009-2010 only 3,607 bariatric surgery procedures were undertaken in England. Actual rates of surgery commissioning demonstrated a wide variation between PCTS ranging from one surgical procedure to 194 in 2009-10. Only one third of PCTs commissioned bariatric surgery at rates above the lowest estimate in the economic model where one per cent of patients eligible for surgery were chosen for this intervention.

External benefits were calculated essentially measuring paid hours gained for patients following surgical intervention. These off-set the cost of surgery after one year. NHS costs were conservatively estimated by NICE at £56m per year once initial costs had been incurred. Overall the economic benefit ranged between £382m and £1,295m three years after surgery if 25 per cent of patients potentially eligible for surgery chose this option.

In addition to these economic benefits it has been estimated that a potential reduction in disability benefits of between £35m and £150m would be achieved through this level of surgical intervention.

The economic model is intended to estimate numbers of patients receiving the various treatment options outlined in the NICE clinical guideline (CG43). From this indirect costs and savings associated with the use of bariatric surgery and not captured in the NICE estimates of financial impact were incorporated into the model.

(a) Model development

The estimate provided by NICE for the economic impact of the implementation of the clinical guideline is limited in scope. For the impact of bariatric surgery only the costs associated with patients with a BMI greater than 50 were estimated and limited calculations are made concerning the savings associated with this treatment option. The guidance does not estimate the number patients with a BMI between 35 and 40 with comorbidities and for all patients with a BMI above 40 considered and chosen for surgical intervention. The limited scope of savings to the healthcare system is a reflection of the lack of evidence suitable for this type of analysis.

The model used for the estimates was developed in the following stages:

- Estimation of population by WHO weight classifications (overweight, obese I, obese II, obsess III, and greater than 50BMI).

- Estimation of ranges of patients receiving either of the three broad treatment options: improvement in diet and physical activity intervention, pharmacological intervention, surgical intervention. This has been viewed as a hierarchy and those patients receiving either pharmacological or surgical treatment will also receive diet and physical activity interventions.

- Using the estimates of patients receiving surgical intervention a calculation of costs and savings for the wider economy (working days lost, benefits avoided)

- Using patients for the surgical group estimation of health service savings in addition to those included in the NICE costing template for obesity (CG43)

All calculations were done for each PCT and for England as a whole.

Step 1. Estimation of population by WHO weight class definition. Population data by primary care trust for males and females by five year age range was sourced from the information centre (Information Centre 2010). As the estimates were intended to incorporate the NICE costing template for the obesity clinical guidance their assumptions concerning age and sex for obesity prevalence were used as a default (see appendix); this is a conservative assumption as the estimates are based on data collected in 2006 since when rates of obesity have increased. Numbers of working age adults, all adults by sex and in total were also calculated by BMI class, both for each PCT and for England in total. One specific issue was the estimate of patients with a BMI above 30 and below 35 and those above 35 and below 40, required to distinguish between obesity I and obesity II. In the statistics in the costing template and from alternative sources only patients with a BMI between 30 and 40 have been calculated or estimated. Therefore these have been divided by two to create an estimate for 30 to 35 and 35 to 40.

Step 2. Estimation of treatment pathway. Based on the NICE guideline it is possible to estimate among which of the treatment options a patient with a specific BMI will be considered. Issues arise when alternatives for one or more treatment option can be chosen, specifically when the patient also has comorbidities. In the NICE guideline patients falling into the group Obesity I and with comorbidities can be considered for both pharmacological intervention and recommended diet and activity, whereas patients without comorbidities are recommended diet and activity only. As previously noted the nature of the guideline allows each PCT or clinician a degree of interpretation concerning the nature of the considerations. A similar issue arises relating to the recommendations for patients measured as falling within the classes of Obesity II and Obesity III where patients with comorbidities are suitable for consideration for either; diet and activity advice, pharmacological intervention or surgical intervention. As there are a large number of patients falling into each group small changes to the assumptions create a large range in the outputs. The literature does not provide a view on the number of patients that "ought" to fit into each treatment pathway. Using current practice would not provide a suitable benchmark

as it would require the assumption that all PCTs were following and consistently implementing the NICE obesity guideline. To estimate patients the share of patients with co-morbidities was first determined. From the literature review the paper by Must (Must 2009) was used. It linked comorbidities with the WHO weight classifications. The specific comorbidity of diabetes was used as this, together with sleep apnoea, was the most commonly cited comorbidity in the literature. Once the estimated number of patients that could be considered based on comorbidities was established this was then further refined by estimating the number of patients suitable for surgery. The eighty per cent rate of eligibility for surgery used the NICE estimates for patients with a BMI of greater than 50 as this would be conservative. Finally the number of patients choosing surgery was then modelled. The NICE costing template of 100 per cent was considered too high and in the absence of estimates from the literature a range was applied (1%, 5%, 10% and 25%). The table below summarises the variable used to estimate numbers of patients receiving bariatric surgery for these two classes by sex.

Table 14: **Variables used in economic model for determining treatment options**

	Men		**Women**	
	obesity II	**obesity III**	**obesity II**	**obesity III**
Co-morbidities	12.30%	10.65%	13.16%	19.89%
Suitable for surgery	80%	80%	80%	80%
Choosing surgery	1%, 5%, 10%, 25%	1%, 5%, 10%, 25%	1%, 5%, 10%, 25%	1%, 5%, 10%, 25%

Sources: comorbidites Must(2007), Suitable for surgery NICE costing template

To estimate the costs of surgery the national inpatient tariff for healthcare resource group used by NICE in their costing template for 2009 financial year was used and multiplied against the number of relevant patients[1].

Step 3. Linkage of treatment pathway for surgery to external savings: From the literature review it was decided to use the Hawkins paper (Hawkins 2009). This provided the most recent UK centric view of the impact of bariatric surgery on paid work and state benefit claims. The paper expresses changes pre-and post-surgery in terms of share of patients in paid work 14 months post-surgery and reduction in working hours lost for those patients in work. The results of the study suggested that there was an increase of patients in work from 58% to 76% over the period and average weekly time worked. The share of patients not claiming benefits pre-surgery was 68% and this rose to 90% post-surgery. Data on wages and average hourly working times were extracted from the Office for National Statistics (Office of National Statistics 2010) and the EU Labour Force Survey (Eurostat 2010). For benefits patients would be eligible for either disability living allowance or statutory sick pay (SSP). SSP is currently £79.13 per week, the average of the various components of disability allowance (care and mobility components) is £80.45 per week. The further component of Employment Support Allowance (ESA) was not

[1] HRG F12 National Tariff - Stomach or Duodenum Very Major Procedures, £5,665

incorporated as rates are not based on stated values but linked to assessed needs. An average of both components, calculated at £79.60, was used in the modelling (Direct Gov 2010). In addition average housing benefit, based on latest Department of Work and Pensions (DWP 2010) estimates at £83.51 per week and a range between 50% and 100% of patients claiming this was calculated. In additional £15.74 council tax benefit was added for all patients, again this was from May 2010 DWP statistics (DWP 2010). A conservative assumption was made not to include carers allowance.

Matching ranges of numbers of patients estimated to be selected for treatment for bariatric surgery against the pre- and post-operation rates of employment and claimants were then calculated using employment and benefits costs to provide per PCT and England overall costs and savings.

(b) Model results #1: estimates of patient numbers

Step 1: Updating the population figures from the NICE costing template produced the following estimates for England by sex and WHO bodyweight class:

Table 15: **Estimated patients for England by WHO bodyweight classification**

	WHO bodyweight classification					
	overweight	**obesity I**	**obesity II**	**obesity III**	**BMI 50+**	**Total population**
Males	8,792,610	2,160,200	2,160,200	175,845	1,758	25,127,454
Females	7,228,725	2,153,342	2,153,342	508,763	5,088	26,092,783
Total	**16,021,335**	**4,313,542**	**4,313,542**	**684,609**	**6,846**	**51,220,237**

It was necessary to also estimate number of working age population (19-65) by sex and WHO bodyweight class these are detailed in the table below:

	WHO bodyweight classification					
	overweight	**obesity I**	**obesity II**	**obesity III**	**BMI 50+**	**Total population**
Males	2,563,370	1,532,545	1,532,545	135,451	1,355	15,962,790
Females	4,636,263	1,412,050	1,412,050	366,883	3,669	16,027,667
Total	**7,199,633**	**2,944,594**	**2,944,594**	**502,333**	**5,023**	**31,990,457**

Step 2: Estimation of treatment pathway
The tables below estimate number of patients by treatment pathway using the various assumptions of the number of patients choosing surgery. With the conservative assumptions around half of one per cent of obese patients are, at most, estimated to receive bariatric surgery as an option:

Table 16: **Estimate of all overweight and obese patients by NICE intervention (Males and Females)**

		Males			
		diet and physical activity	**Pharma intervention**	**Surgical intervention**	**Surgical intervention as a per cent of all**
Percent patients choosing surgery as an option (for WHO classes II and III) suitable for surgery and with comorbidities	1%	11,721,686	1,349,225	3,682	0.03%
	5%	11,712,584	1,349,225	12,784	0.10%
	10%	11,701,207	1,349,225	24,161	0.18%
	25%	11,667,075	1,349,225	58,293	0.45%

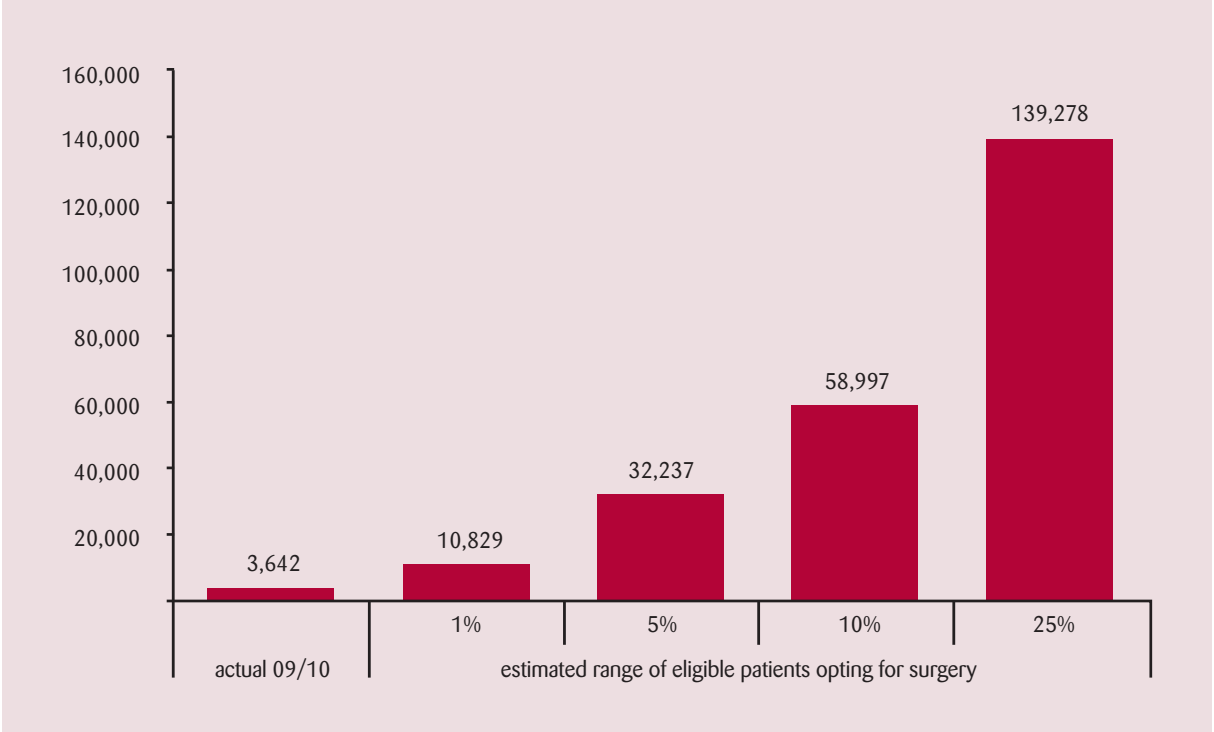
		Females			
		diet and physical activity	**Pharma intervention**	**Surgical intervention**	**Surgical intervention as a per cent of all**
Percent patients choosing surgery as an option (for WHO classes II and III) suitable for surgery and with comorbidities	1%	10,381,128	1,445,652	7,147	0.06%
	5%	10,368,821	1,445,652	19,453	0.16%
	10%	10,353,438	1,445,652	34,836	0.29%
	25%	10,307,290	1,445,652	80,985	0.68%

Table 17: **Estimate of all overweight and obese patients by NICE intervention (all patients)**

		All patients			
		diet and physical activity	**Pharma intervention**	**Surgical intervention**	**Surgical intervention as a per cent of all**
Percent patients choosing surgery as an option (for WHO classes II and III) suitable for surgery and with comorbidities	1 %	22,102,814	2,794,877	10,829	0.04%
	5%	22,081,405	2,794,877	32,237	0.13%
	10%	22,054,645	2,794,877	58,997	0.24%
	25%	21,974,365	2,794,877	139,278	0.56%

Details of statistics on actual levels of surgery in England are outlined in the next section. The chart below plots actual number of procedures for 2009/2010 with the predicted ranges. As can be seen in the section discussing actual activity there is a wide variation in the use of bariatric surgery by PCT. If the range of PCTs below the median value has their activity raised to the median then the number of procedures in 2009/10 would be 4,243. These results suggest that currently there is below optimum implementation of NICE guidance.

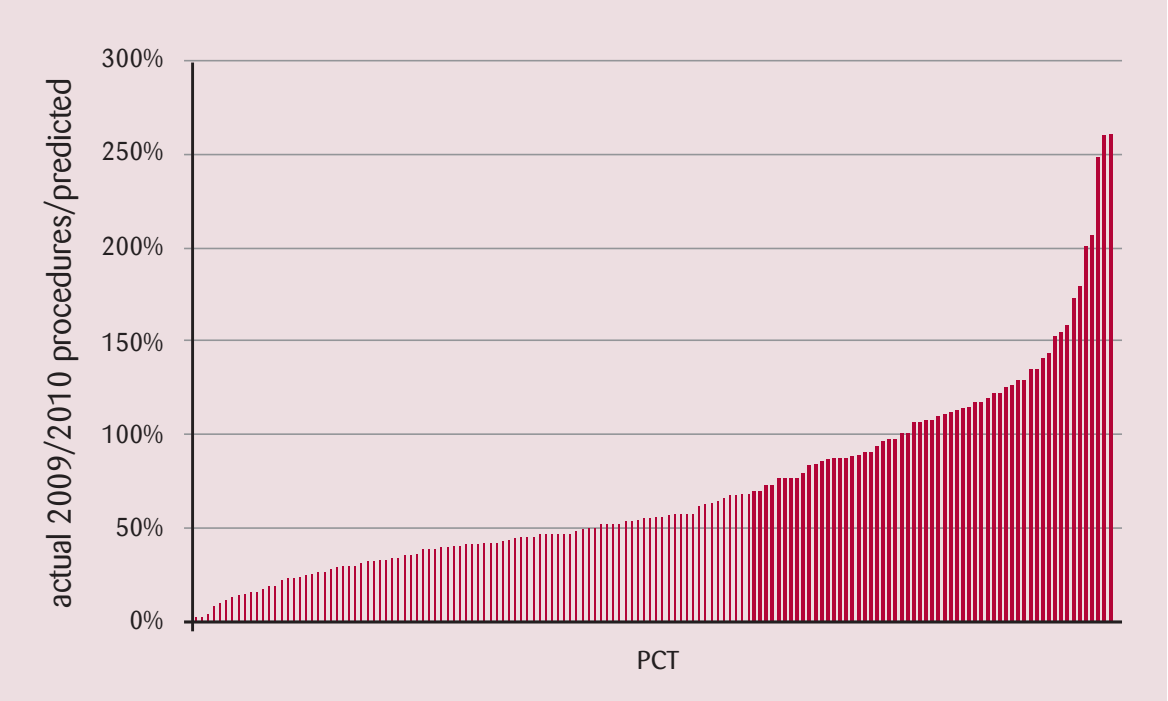
Chart 4: **Bariatric surgery England: actual procedures 2009/2010 compared to various estimates if all PCTs were to follow NICE obesity guidance**



Source: Information Centre, OHE

The chart below plots actual 2009/2010 bariatric surgery procedures divided by predicted (using 1% option rate for patients eligible for surgery). PCTs with a share above 100% indicate that actual levels were above the predicted rate. Thirty-five PCTs were above predicted ranges.

Chart 5: **Bariatric surgery procedures – actual 2009/2010 divided by predicted (>100% greater than predicted). Using lowest estimate of usage.**



Source: Information Centre, OHE

The costs of surgical procedures for the estimated range of eligible patients between using 2009/10 prices were as follows:

Table 18: **2009 costs for bariatric surgery for estimated ranges**

		Cost of bariatric surgery £m per year (2009/10 prices)
Per cent patients choosing surgery as an option (for WHO classes II and III) suitable for surgery and with comorbidities	1%	44
	5%	127
	10%	232
	25%	546

(c) Surgical procedures England

To supplement the modelling and the survey information, and to permit a comparison between observed and expected levels of surgery, data was ascertained on the number of surgical procedures in England. These figures were obtained from the Hospital Episode Statistics (HES) national data warehouse through a data request for admitted patient care to the NHS Information Centre for Health and Social Care.

The coding around Bariatric Surgery is variable, and it is possible that HES data does not provide the most accurate picture of the rate of bariatric surgery around England, however, in the absence of other more accurate information, this is the best source of data, and has been cross checked with the survey data where appropriate and possible. The inclusion criteria used was chosen to match that applied within a report from NICE and was broader than some other criteria found through search terms, and hence in that respect may be more inclusive than other published data.

The following criteria were included in the HES analysis:

- Elective method of admission (admin method 11-13)

- Bariatric surgery are defined where ICD-10 (International Classification of Diseases, Tenth Revision) primary code: E660, E662, E668 or E669

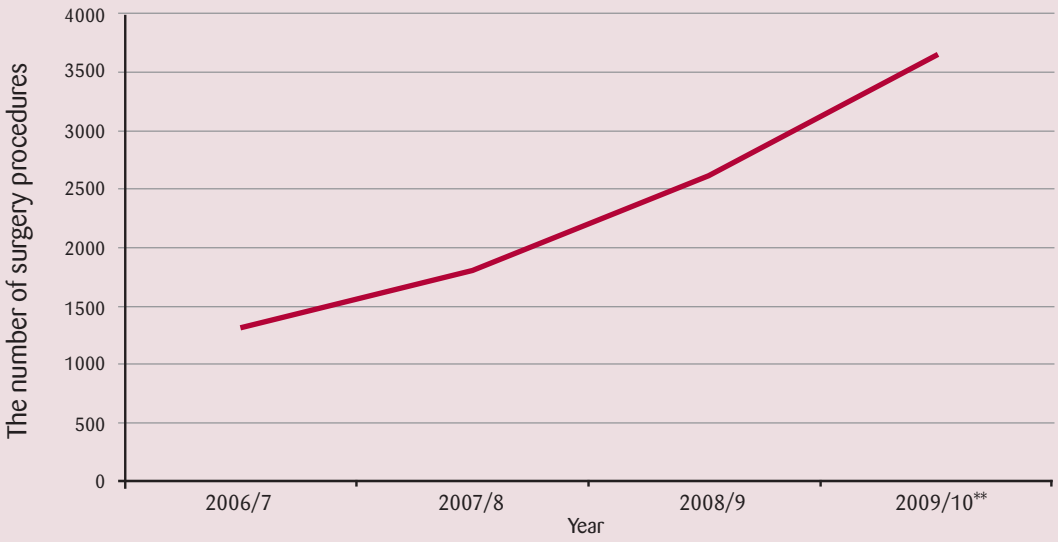
- One of the following OPCS-4 (Office of Population, Censuses and Surveys Classification of Surgical operations and Procedures, 4th revision) procedure episodes anywhere in the episode: G282, G283, G288, G289, G301, G302, G303, G304, G308, G309, G321, G328, G329, G611, G612, G613, G618 OR G619

The number of discharges and the number of episodes for finished episodes (epistat=3), was obtained. The summary statistics to follow relate to the number of discharges was has been used as a proxy for the number of surgical procedures conducted within each time period and for each PCT of responsibility. Data was obtained by PCT of responsibility to match that collected using the survey, this data is likely to correspond closely to PCT of residence, though, would be expected to differ from PCT provider, as it is probable that some individuals who reside or are registered within a particular PCT area would have their surgery conducted at a hospital located within another PCT area. Throughout the following section, PCT is used to refer to PCT of responsibility, unless otherwise stated. Data was obtained for 2006/07, 2007/08, 2008/09 and for 2009/10 provisional data has been obtained. This information was only available un-grossed (i.e. data has not been adjusted for shortfalls).

There has been a clear increase in the number of procedures conducted over the period from 2006/07 to 2009/10 (see chart 6), with 1317 and 3642 procedures respectively (including data where the PCT of responsibility was not coded). There was also considerable variation in the number of procedures by PCT of responsibility in all years, in 2006/07 the highest number of procedures for a single PCT of responsibility was 61, compared to 192 in 2009/10. In each year the data showed that there was at least one PCT of responsibility where there was none or just one procedure. Summary statistics by year, across PCT are shown in Table 19 . One PCT had

information for 2006/07 and no subsequent years, this PCT was not considered in calculating the following summary statistics for 2007/08 onwards, as it was considered that this PCT was most likely no longer in existence due to a merger.

Chart 6: **The total number of bariatric surgery procedures conducted*, England, 2006/07 – 2009/10****



Notes: *The number of discharges where a coding was made for bariatric surgery, see text for further information
**Provisional data
Source: OHE calculations based on data from the Information Centre for Health and Social Care "Copyright © 2010, Re-used with the permission of The Health and Social Care Information Centre. All rights reserved."

Table 19. **Summary statistics regarding the number of surgical procedures for Bariatric surgery from 2006/07 to 2009/10.**

	Median	Minimum	Maximum	25th percentile	75th percentile
2006/07	5.5	0	61	2	11
2007/08	8	0	105	3	15
2008/09	12	0	142	6	20
2009/10	17	1	192	8	30.5

Note: This data does not include procedures where the PCT of responsibility was not available/coded. Where a PCT of responsibility did not have any information provided for a particular year it was considered that there were no associated procedures conducted.
Source: "Copyright © 2010, Re-used with the permission of The Health and Social Care Information Centre. All rights reserved."

Due to the high level of variability in the annual number of procedures for a PCT over time, a three year average was calculated based on the available data for 2007/08 to 2009/10. This indicated a wide spread across PCTs in the average number of annual procedures. In addition, there appears to be a small but increasing number of PCTs for which the number of procedures conducted was relatively high compared to other PCTs. Chart 7 is a box plot indicating the number of procedures conducted across PCTs of responsibility for all years obtained. Over the period from 2007/08 to 2009/10 the median of the three year average number of procedures per PCT of responsibility was 13, with 25% of PCTs conducting less than an average of 7 per year over the period and 25% conducting more than an average of 20 over the period (see chart 7).

Chart 7. **Box plot showing the annual average number of procedures over the period from 2007/08 to 2009/10 across PCTs of responsibility in England.**

Notes: *Interquartile range, the range within which the middle 50% of annual averages lie, ie. There are 7 or less procedures conducted within 25% of PCTs

Sources: OHE calculations based on data from the Information Centre for Health and Social Care: "Copyright © 2010, Re-used with the permission of The Health and Social Care Information Centre. All rights reserved."

(d) Results #2 Economic impact of adherence to NICE obesity guideline (bariatric surgery)

Estimates of ranges for the treatment pathways were calculated for the working population age only using the method outlined above. These results were then used as the basis for the analysis of the impact of adherence of NICE guidance on the wider economy, specifically increases in the number of patients working full time, the reduction in hours lost to illness for existing workers and reduction in benefits paid as discussed above. The economic impact for additional work ranged from £46m to £579m per year. The reduction in benefits paid ranged from £10m to £151m per year.
The tables below summarise the impact of the range of increases in bariatric surgery on the components modelled.

Table 20: **Estimate of economic impact of implementation of NICE guidance for obesity (bariatric surgery) through increase in paid work**

		Additional wages for new workers £m per year	Additional wages for existing workers £m per year	Total additional income earned £m per year
share choosing surgery as an option (for WHO classes II and III) suitable for surgery and with comorbidities	1%	30.6	15.7	46.3
	5%	89.2	45.9	135.1
	10%	162.4	83.6	246.0
	25%	382.2	196.6	578.8

Table 21: **Estimate of economic impact of implementation of NICE guidance for obesity (bariatric surgery) reduction in benefits paid**

		Living allowance £m	Housing benefit (50% uptake) £m	Council tax relief £m	Total low range £m	Total high range £m
share choosing surgery as an option (for WHO classes II and III) suitable for surgery and with comorbidities	1%	7.1	3.7	1.4	10.7	12.1
	5%	20.6	10.8	4.1	31.3	35.4
	10%	37.4	19.6	7.4	57.0	64.4
	25%	88.1	46.1	17.4	134.2	151.6

(e) Economic modelling discussion

Very broadly the modelling above suggests that the costs of bariatric surgery match benefits accrued through additional paid work generated by patients returning to work and reducing the number of hours lost through illness during the first year after surgery. Ranging from £44m costs for surgery against £46m additional income earned if there is a 1% uptake for eligible patients to £546m costs for surgery against £579m additional income in the first year. Underlying these numbers are assumptions that all individuals potentially able to work find employment and that surgery is 100 per cent successful. Statistics for the costs for unsuccessful surgical bariatric surgical procedures are not available.

An alternative approach to measuring the impact of healthcare interventions on indirect costs is the friction cost method (Kroopmanschap 1994). "The basic idea of the friction cost method is that the amount of production lost, and/or the costs to maintain production, due to disease depends on the time-span organisations need to restore the initial level of production and costs" (Kroopmanshap, 1994 p385). If an individual is out of work for a period longer than required to be replaced (the friction period) then the duration of indirect costs lost is limited to this shorter period. The philosophy of this approach would tend to reduce the economic impact of surgical procedures on chronic illness as the employment period lost would be greater than the friction period. Periods of low unemployment would increase the economic impact as the friction period would be relatively longer.

The evidence base for additional savings to the healthcare system is currently very limited. The components supported by the literature and conservatively estimated by NICE at £55m per year only cover a reduction in prescribing and GP visits, and not higher cost elements such as reduced hospital admissions. If it is the case that the cost of obesity for the health service is £4.3bn then a sustained reduction in the number of obese patients should have a non-trivial impact on the NHS.

Care needs to be taken when considering the impact of a reduction in benefits claimed. From a national perspective it would not be correct to off-set costs of surgery against a reduction in benefits claimed as the latter are a redistribution of wealth and are not generating additional income for the economy. From the perspective of Government expenditure the reduction in expenditure could legitimately be seen as beneficial. As with the employment statistics underlying the calculations is an assumption that those no longer claiming benefits associated with their condition find work and do not simply begin claiming alternative benefits.

7 CONCLUSIONS

Even with the limited evidence available the costs of bariatric surgery is off-set by economic benefits within the NHS and in the wider economy.

- Longer term trends in the growth in obesity have not changed and mean that Government targets for tackling this issue are in danger of not being met. The UK ranks fifth among thirty-one developed nations for rates of obesity. The share of the population measured as obese has increased by a quarter in men and one fifth in women in ten years. Around one quarter of the population of England is obese.

- The primary tool for implementation of clinical support for obesity in England is the NICE clinical guideline. Returns from a questionnaire to PCTs, official statistics and modelling of predicted patient flows suggest that adherence to the NICE guideline is inconsistent and sub-optimal.

  PCTs were invited to assess whether they follow NICE's guideline for Obesity. Nearly four in ten reported that their referral guidelines were in line with NICE in all respects. Nearly half responded by stating that elements of their guidelines matched CG43. One in ten PCTs responding to the questionnaire said that they do not follow the NICE guidelines at all.

  NICE guidance (CG43)(NICE 2006) recommends that patients should be considered for bariatric surgery when they have a BMI of 40 or more, or a BMI of over 35 plus an associated condition (comorbidity) such as diabetes. It also advises that all appropriate non-surgical measures have been attempted before surgery.

  However, official statistics suggest that PCT's are either not following the guidance or interpreting it stringently. An economic model developed estimates that between 11 thousand and 140 thousand people in England currently qualify for bariatric surgery under NICE guidelines, while the actual number of surgeries that took place in England in 2009-10 was 3,607. Adherence is generally sub-optimal but the number of procedures commissioned by PCTs ranged from 1 to 194 in 2009-10 indicating a wide variation in practice.

- The contribution of additional paid work generated following bariatric surgery off-sets the costs of surgery. This is achieved one year after surgery. There are also benefits through reductions in benefits paid and, although the evidence base is limited, savings for the health service that can also be realised. Around one and a quarter billion in savings to the economy could be achieved if twenty five per cent of eligible patients received bariatric surgery. In addition, from the Government exchequer point of view, around £150m per year in benefits would be saved.

- Results from the PCT survey indicate that the current climate in the NHS will reduce the level of provision of service for obese patients. Although only one in ten PCTs that responded said that they would be reducing funding for obesity services; one third said that they would be applying the NICE guidance more stringently and none that the guidance would be applied less stringently.

REFERENCES

Allender S, Rayner M. The burden of overweight and obesity-related ill health in the UK. *Obes Rev* 2007; 8(5):467-473.

Avenell A, Broom J, Brown TJ, Poobalan A, Aucott L, Stearns SC et al. Systematic review of the long-term effects and economic consequences of treatments for obesity and implications for health improvement. Health Technol Assess 2004; 8(21):iii-182.

Clegg A, Colquitt J, Sidhu M, Royle P, Walker A. Clinical and cost effectiveness of surgery for morbid obesity: a systematic review and economic evaluation. *Int J Obes Relat Metab Disord* 2003; 27(10):1167-1177

Department of Health (2008) "Healthy Weight, Healthy Lives: A Cross Government Strategy for England"
http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_082378

Department of Health (2010) "Obesity"
http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Publichealth/Healthimprovement/Obesity/DH_078098

Directgov (2010). Benefits and financial support
http://www.direct.gov.uk/en/MoneyTaxAndBenefits/BenefitsTaxCreditsAndOtherSupport/index.htm

DWP (2010): Monthly Statistical Summary
http://research.dwp.gov.uk/asd/asd1/stats_summary/stats_summary_may2010.pdf

Eurostat (2010) No turn-around yet for the EU-27 labour market: Latest Labour Market Trends – 2009Q4 data http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-10-022/EN/KS-SF-10-022-EN.PDF

Fisher K. Government initiatives to tackle the obesity epidemic. *Nurs Times* 2005; 101(39):23-24.

Fry J, Finley W. The prevalence and costs of obesity in the EU. Proc Nutr Soc. 2005 Aug;64(3):359-62. Review. Roux-en-Y gastric bypass may not increase patients return to work

Government Office for Science (2007) Foresight report "Tackling Obesities: Future Choices – Modelling Future Trends in Obesity & Their Impact on Health 2nd Edition)

Hawkins SC, Osborne A, Finlay IG, Alagaratnam S, Edmond JR, Welbourn R. *Obes Surg.* Paid work increases and state benefit claims decrease after bariatric surgery. 2007 Apr;17(4):434-7.

Koopmanschap MA, Rutten FFH. The impact of indirect costs on outcomes of health care programs. *Health Economics*, Vol.3: 385-393 (1994)

Monkhouse SJ, Morgan JD, Bates SE, Norton SA. An overview of the management of morbid obesity. *Postgrad* Med J. 2009 Dec;85(1010):678-81.

Must A, Spandano J, Coakley E, et al. The Disease Burden Associated With Overweight and Obesity. *JAMA* Oct 1999 282(16) p1523-1529

National Audit Office (2001) Tackling Obesity in England
http://www.nao.org.uk/publications/0001/tackling_obesity_in_england.aspx

National Obesity Observatory (2010) Trends in Obesity Prevalence
http://www.noo.org.uk/NOO_about_obesity/trends (accessed August 2010):

NHS Information Centre (2010). Attribution dataset GP registered populations 2009
http://www.ic.nhs.uk/statistics-and-data-collections/population-and-geography/gp-registered-populations/attribution-dataset-gp-registered-populations-2009 (accessed August 2010)

NICE (2004). Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care.
http://www.nice.org.uk/nicemedia/pdf/CG012_niceguideline.pdf

NICE (2006a). "Obesity guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children"
http://guidance.nice.org.uk/CG43/NiceGuidance/pdf/English

NICE (2006b). Costing template "Obesity"
http://guidance.nice.org.uk/CG43/CostingTemplate/xls/English

NICE (2006c) Hypertension Management in adults in primary care: pharmacological update
http://guidance.nice.org.uk/index.jsp?action=download&o=30111

Office of National Statistics (2010). Average Weekly Earnings
http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=14015&Pos=&ColRank=1&Rank=240

Picot J, Jones J, Colquitt JL, Gospodarevskaya E, Loveman E, Baxter L, Clegg AJ. The clinical effectiveness and cost-effectiveness of bariatric (weight loss) surgery for obesity: a systematic review and economic evaluation. Health Technol Assess. 2009 Sep;13(41):1-190, 215-357, iii-iv.

Talbot ML, Jorgensen JO, Loi KW. Difficulties in provision of bariatric surgical services to the morbidly obese.*Med J Aust* 2005; 182(7):344-347.

Vlad I. Obesity costs UK economy 2bn pounds sterling a year. *BMJ* 2003; 327(7427):1308.

Wanless D (2002). Securing Good Health for the Whole Population.
http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4076134.pdf

Wanless D. (2007). Our Future Health Secured? A Review of NHS Funding and Performance. Kings Fund http://www.kingsfund.org.uk/publications/our_future.html

APPENDIX 1: PCT SURVEY. THE ROLE OF SURGICAL AND PHARMACOLOGICAL INTERVENTION IN OBESITY MANAGEMENT

Contact details

Q1.1. Please provide the name of your PCT. All of the subsequent responses that you provide to this survey should relate to the PCT that you identify below.

Q1.2. Please provide your e-mail address.

Local prevalence of obesity

Q2.1. Does your PCT monitor rates of obesity in your PCT catchment area? (Please circle one)

Yes

No

Q2.2. What are the rates of obesity and morbid obesity collected for your PCT catchment area? (Most recent available)

Q2.3. What is the opinion of your PCT regarding rates of obesity in your PCT catchment area compared to the national average? (Please circle one)

Above average

Average

Below Average

Not sure

Referral Process (or Guidelines)

Q3.1. What is the date of the most recent guidelines at your PCT relating to the surgical and pharmacological intervention of obesity?

Q3.2. Please outline the process used to refer patients for surgical and pharmacological intervention of obesity (Please use another sheet if necessary)

Q3.3. Please list the key criteria for determining whether a patient is suitable for referral for pharmacological intervention of obesity (Please use another sheet if necessary)

Q3.4. What are the key criteria at your PCT for determining whether a patient is suitable for referral to surgical intervention of obesity? (Please use another sheet if necessary)

Q3.5. How does the criteria used at your PCT compare to NICE Obesity Guideline and Technology Guidance CG43? (Please circle one)

Our referral guidelines are equal to those in CG43 in all respects

Elements of our referral guidelines are equal to those at CG43 as deemed appropriate

Our guidelines do not match those at NICE but are specific to our PCT

Unsure

Other (please specify)

Providers of care

Q4.1. Using the Table below, please indicate the number of patients that your PCT has funded for surgical and pharmacological intervention of obesity in 2008/09

	Surgical intervention only	Pharmacological intervention only	Both pharmacological and surgical intervention
Number of patients treated within your PCT			

Q4.2. Using the Table below, please indicate the number of patients by type to whom your PCT has referred for NHS funded surgical and pharmacological intervention of obesity in 2008/09

	Surgical intervention only	Pharmacological intervention only	Both pharmacological and surgical intervention
NHS Trust Hospital			
Independent Sector Provider			

Q4.3. Using the Table below, please indicate the number of providers by type to whom your PCT has referred patients for NHS funded surgical and pharmacological intervention of obesity in 2008/09

	Surgical intervention only	Pharmacological intervention only	Both pharmacological and surgical intervention
NHS Trust Hospital			
Independent Sector Provider			

Q4.4. If your PCT has facilitated the provision of private surgical intervention of obesity in 2008/09, what have been the main factors driving the choice of this option? Please rank (1 most important, 5 least important)

Patient convenience

Your trust did not meet criteria for NHS provision

Length of waiting time for surgery at your PCT

Insufficient capacity at your PCT

Other Factors (please specify)

Post Operative care

Q5.1. Please outline your PCTs care pathway for patients having surgical intervention of obesity

Q5.2. Is there a formal audit at your PCT to track outcomes of patients who have surgical intervention of obesity? (Please circle one and specify if appropriate)

No

Yes (please specify)

Future Service Provision

Q6.1. What are your PCTs plans regarding expenditure on surgical and pharmacological intervention of obesity during the next five years? (Please circle one)

Increase expenditure

Decrease expenditure

Maintain current level of expenditure

Other, please specify (e.g. not yet decided, unsure)

Q6.2. What are your PCTs plans with regards to the following interventions during the next five years? (Please select one option for each intervention and specify if appropriate)

	Decrease Provision	Maintain current provision	Increase provision	Other (please specify)
i) Pharmacological intervention of obesity only				
ii) Surgical intervention of obesity only				
iii) Pharmacological and surgical intervention of obesity				

Q6.3. During the next five years do you anticipate that your criteria will be (Please circle one)

More stringently applied

Less stringently applied

Applied at the present level

Other, please specify (e.g. unsure, not yet decided)

Q6.4. Has your PCT identified review dates for referral criteria? (Please select one option for each intervention and specify date if applicable)

	No	Yes	Please specify date if applicable
i) Pharmacological intervention of obesity only			
ii) Surgical intervention of obesity only			
iii) Pharmacological and surgical intervention of obesity			

Q6.5. We would welcome any further comments that you wish to add regarding the pharmacological and surgical intervention of obesity at your PCT

APPENDIX 2: OBESITY PREVALENCE STATISTICS USED BY NICE FOR COSTING TEMPLATE TO SUPPORT CLINICAL GUIDELINE "OBESITY" CG43

Prevalence males			
	BMI 25–30	BMI 30–39	BMI > 40
Male			
2_4	14.00%	16.00%	
5_9	14.00%	16.00%	
10_11	14.00%	16.00%	
12_14	14.00%	16.00%	
15_16	23.10%	6.60%	1.60%
17-19	23.10%	6.60%	1.60%
20_24	23.10%	6.60%	1.60%
25_29	41.20%	18.80%	
30_34	41.20%	18.80%	
35_39	50.80%	24.10%	0.40%
40_44	50.80%	24.10%	0.40%
45_49	48.50%	28.00%	1.50%
50_54	48.50%	28.00%	1.50%
55_59	47.60%	28.10%	1.90%
60_64	47.60%	28.10%	1.90%
65_69	48.30%	27.30%	0.60%
70_74	48.30%	27.30%	0.60%
75_79	55.30%	17.90%	
80_84	55.30%	17.90%	
85&over	55.30%	17.90%	

Prevalence females			
	BMI 25–30	BMI 30–39	BMI > 40
Female			
2_4	14.00%	16.00%	
5_9	14.00%	16.00%	
10_11	14.00%	16.00%	
12_14	14.00%	16.00%	
15_16	25.20%	10.50%	1.70%
17-19	25.20%	10.50%	1.70%
20_24	25.20%	10.50%	1.70%
25_29	30.90%	15.50%	2.40%
30_34	30.90%	15.50%	2.40%
35_39	30.00%	20.70%	2.90%
40_44	30.00%	20.70%	2.90%
45_49	36.40%	23.10%	2.70%
50_54	36.40%	23.10%	2.70%
55_59	37.20%	29.60%	2.60%
60_64	37.20%	29.60%	2.60%
65_69	40.20%	24.10%	4.10%
70_74	40.20%	24.10%	4.10%
75_79	45.90%	19.90%	0.40%
80_84	45.90%	19.90%	0.40%
85&over	45.90%	19.90%	0.40%