

**CHARTERED SOCIETY OF PHYSIOTHERAPY**

## **The Economics of Physiotherapy**

**Summary of Findings from the Literature Reviews**

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# Executive Summary

## 1. INTRODUCTION

The Chartered Society of Physiotherapy (CSP) commissioned York Health Economics Consortium (YHEC) to assist them in demonstrating the value of physiotherapy input to a range of conditions. The project broadly fell into two phases: the identification of and collection of evidence from published literature, followed by the development and population of a series of models each addressing the impact of physiotherapy input to a disease area or condition.

Following a series of discussions between the CSP and YHEC, three areas were selected for review and subsequent modelling:

- Respiratory conditions, focusing on chronic obstructive pulmonary disease (COPD);
- The management of stroke;
- Chronic back pain.

A fourth area, childhood obesity, was selected for review, but was not modelled.

## 2. RESPIRATORY CONDITIONS

There is evidence that:

- Pulmonary rehabilitation improves the health of COPD patients and reduces the number of deaths. Statistical estimates of the reduction in number of deaths are available. Improvement in health is supported by evidence from systematic reviews, especially in the early stages of disease - although one review states that evidence on effect of physiotherapy is often methodologically weak. Staffing levels of a rehabilitation team are likely to be available. However, it is not always clear which elements of a disease management programme have the greatest impact;
- Rehabilitation can reduce hospitalisations in COPD patients with shorter lengths of stay and reduce general healthcare usage: estimates of impact are available. It is not clear which elements of a programme are most important;
- Home based rehabilitation is at least as effective as that offered via outpatients;
- Repeated rehabilitation instead of 'one off' rehabilitation may further reduce risk of hospitalisation;
- Rehabilitation and specifically physiotherapy **following acute exacerbation** can reduce hospitalisation;
- Rehabilitation in hospital **following acute exacerbation** can reduce the number of readmissions.

## 3. MANAGEMENT OF STROKE

- There is plenty of evidence on how models of early discharge following stroke using physiotherapy reduces the amount of time in hospital by between 8 and 10 days;
- There is some evidence that early discharge correlates with improvement in 'activities of daily living' (although also some evidence that says it makes no difference). However, we do not have information on how this potential improvement is linked to reduction in reliance on community health/social care services or on the ability of people to get back to work;

- There is some evidence that ongoing physiotherapy to one year reduces the number of days spent in hospital due to readmission in the year following a stroke by four days. However, there is also evidence that it makes no difference to readmission rates;
- There is weak evidence that ongoing community physiotherapy reduces deterioration in and/or improves ability to perform activities of daily living. The evidence is that any positive effects are only present up to six months after stroke at the most;
- Two studies that have tried to look at the overall cost effectiveness show that early discharge/community physiotherapy is cost effective;
- There is no evidence that either physiotherapy early discharge models or ongoing physiotherapy support produce worse outcomes than therapy delivered in acute hospital. There is some evidence it may result in better outcomes;
- We do not know explicitly the costs associated with early discharge models, nor do we have an explicit method of linking improvements in activities of daily living with health/social care needs.

#### **4. BACK PAIN**

- Large numbers of referrals to secondary care could be avoided, for example by the use of guidelines and triage;
- Physiotherapists have a wide ranging role at all stages of back and neck pain diagnosis and assessment;
- Guidelines recommend, and many studies find, that advice to patients to remain active has a positive effect;
- GPs and patients made only selective use of physiotherapy services;
- Early referral to physiotherapy is recommended for patients with non-specific low back pain for whom first line treatment by GPs has not been effective;
- Early referral to physiotherapy may reduce referrals to secondary care, and improve patient satisfaction.

#### **5. CHILDHOOD OBESITY**

- All of the studies reviewed incorporated some form of independent variables in weight loss intervention which included dietary, physical activity, behavioural changes in reduction of sedentary lifestyles and parental involvement; but not enough data was found to support one variable as being more effective as a weight loss intervention than another;
- According to National Institute for Health and Clinical Excellence (NICE) guidelines, primary and allied healthcare professionals, including physiotherapists, can play an important role in the recognition and management of childhood obesity.

# Section 1: Introduction

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## 1.1 OVERVIEW OF LITERATURE REVIEW

The Chartered Society of Physiotherapy (CSP) commissioned York Health Economics Consortium (YHEC) to assist them in demonstrating the value of physiotherapy input to a range of conditions. The project broadly fell into two phases: the identification of and collection of evidence from published literature, followed by the development and population of a series of models each addressing the impact of physiotherapy input to a disease area or condition.

Following a series of discussions between the CSP and YHEC, three areas were selected for review and subsequent modelling:

- Respiratory conditions, focusing on chronic obstructive pulmonary disease (COPD);
- The management of stroke;
- Chronic back pain.

A fourth area, childhood obesity, was selected for review, but was not modelled.

This report summarises the findings from the review of literature, including evidence collected and methodology employed. It complements the subsequent models developed.

## 1.2 STRUCTURE OF REPORT

The next four sections provide summaries of the individual literature reviews for the four disease/condition areas including evidence collected. Appendices A to D provide more detail on the evidence collected from the literature. Appendix E describes the methodology employed.

## Section 2: Respiratory Conditions

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### 2.1 OVERVIEW OF LITERATURE ON RESPIRATORY CONDITIONS

This section of the report examines the literature reviewed to develop and populate the model for the management of respiratory conditions and in particular chronic obstructive pulmonary disease (COPD). Appendix A gives the detail of the literature reviewed and data extracted.

21 studies were reviewed. Table 2.1 shows the summary of the study designs.

**Table 2.1: Summary of study designs**

Study design	Number of studies
Randomised control trials (RCTs)	8
Systematic reviews and meta analyses	6
Prospective studies	6
Audit	1

In seven of the RCTs, patient numbers were given: the largest trial included 200 patients, and the smallest 35. In five of the studies, the number of patients was less than 100, one had 135 patients and one had 200. In all six prospective studies, patient numbers were given: the largest trial included 256 patients, and the smallest 21. In four studies, the number of patients was between 100 and 200. Three of the studies examined the impact of different staff groups, and five of the studies explicitly calculated either the input of the staff and/or the costs. Ten of the studies considered the economics of the treatments including costs, cost effectiveness or cost savings.

The number of studies reviewed was recorded in all six of the systematic reviews and meta-analyses. In four, the number of studies included was less than ten, one review included 13 studies, and one 31 RCTs. The single audit collected data from 239 units in 180 acute trusts.

Our summary of the studies extracted data in seven areas as shown in Table 2.2. Additional comments from the reviewer were also recorded. Not all studies yielded data in all areas.

**Table 2.2 Data extracted from studies**

<b>Data extracted</b>	<b>No of studies yielding data</b>
Design of study	21
Methods, including patient and study numbers	21
Study summary	21
Clinical results	19
System results	17
Economic results	10
Staffing and costs	5

## **2.2 FOCUS OF STUDIES**

The majority of the studies examined management programmes for respiratory conditions (mostly COPD although one focused on asthma and a second on acute exacerbation of COPD). Management programmes were mostly described as pulmonary rehabilitation programmes. Some studies did not describe in detail the content of these programmes, whilst those that did mostly described a range of exercise programmes, breathing programmes and input from respiratory physiotherapists and nurses. Programmes were often self-tailored to meet individual patient needs and might include education or directed self management, which might be supplemented by between visit phone calls, or one-to-one visits to a health professional. Programmes could also include a range of breathing exercises and yoga. Location of programme was often studied, with outpatient, community based and self managed home-based programmes all studied. Length of programme was also considered, with programmes ranging from 8 weeks to longer than a year.

The role of different professionals in the delivery of (usually pulmonary rehabilitation) programmes was often considered, with respiratory physiotherapists playing a key role.

The review of the management of acute asthma examined the evidence on hospital at home compared to emergency department and hospital inpatient.

## **2.3 SUMMARY OF EVIDENCE**

There is evidence that:

- Pulmonary rehabilitation improves the health of COPD patients and reduces the number of deaths. Statistical estimates of the reduction in number of deaths are available. Improvement in health is supported by evidence from systematic reviews, especially in the early stages of disease - although one review states that evidence on effect of physiotherapy is often methodologically weak. Staffing levels of a rehabilitation team are likely to be available. However, it is not always clear which elements of a disease management programme have the greatest impact (refs 1,2,4);
- Rehabilitation can reduce hospitalisations in COPD patients with shorter lengths of stay and reduce general healthcare usage: estimates of impact are available (refs

5, 7, 8, 10, 11). However, it is not clear which elements of a programme are most important (ref 9);

- Home based rehabilitation is at least as effective as that offered via outpatients (refs 6 , 8);
- Repeated rehabilitation instead of 'one off' rehabilitation may further reduce risk of hospitalisation (ref 12, 19);
- Rehabilitation and specifically physiotherapy **following acute exacerbation** can reduce hospitalisation (refs 14, 15, 17);
- Rehabilitation in hospital **following acute exacerbation** can reduce the number of readmissions.



## Section 3: Stroke

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### 3.1 OVERVIEW OF STROKE LITERATURE

This section of the report examines the literature reviewed to develop and populate the model for the management of stroke. Appendix B gives the detail of the literature reviewed and data extracted.

38 studies were reviewed. Table 3.1 shows the summary of the study designs.

**Table 3.1 Summary of study designs**

Study design	Number of studies
Randomised control trials (RCTs)	17
Systematic reviews and meta analyses	10
Qualitative reviews and observational studies	5
Economic and costing	4
Literature reviews	1
Audit	1

In 20 of the RCTs and observational studies, patient numbers were given: the largest trial included 370 patients, and the smallest 16. In five of the studies, the number of patients was greater than 250, in six between 100 and 250, and in nine, the number was less than 100. Three studies focused on staff, one interviewing 20 physiotherapists, and a second interviewing seven neuro physiotherapists.

The number of studies reviewed was recorded in ten of the systematic reviews and meta-analyses. In two, the number of studies included was less than ten, in five reviews the number of studies was between 12- 32, and two reviews collected evidence from over 300. The single audit collected data from 8,200 patients.

Our summary of the studies extracted data in seven areas as shown in Table 3.2. Additional comments from the reviewer were also recorded. Not all studies yielded data in all areas.

**Table 3.2 Data extracted from studies**

Data extracted	No of studies yielding data
Design of study	38
Methods, including patient and study numbers	38
Study summary	37
Clinical results	31
System results	24
Economic results	14
Staffing and costs	14

### 3.2. FOCUS OF STUDIES

Three studies examined or laid out good practice guidelines, or were preliminary baseline studies

The majority of studies evaluated interventions and methods of management: studies broadly fell into one of three categories of interventions:

- **Models of delivery**
  - An assessment of the relative costs and cost effectiveness of three models of rehabilitation services:
    - stroke unit care versus care on another hospital ward;
    - early supported discharge services versus usual care;
    - community or home based rehabilitation versus usual care;
  - An assessment of the clinical and cost effectiveness of four stroke rehabilitation interventions:
    - Stroke unit care versus care on general medical/geriatric wards;
    - Varying duration of therapies;
    - Early discharge support versus usual care;
    - Rehabilitation in the community;
  - An assessment of the differing impact of day hospital attendance compared to home physiotherapy.
  
- **Duration, point in journey and intensity of intervention**
  - Whether additional early physiotherapy after stroke improved functional recovery;
  - Whether follow-up services for stroke survivors could improve functional outcome and reduce re-admission rate
  - Whether early supported discharge delivered normally by a multi disciplinary team (MDT) compared to delayed discharge or usual care to community based rehabilitation for stroke had beneficial clinical, functional and economic consequences (5 studies examining similar themes)
  
- **Strength building and mobility**
  - Effects of augmented physiotherapy input with normal input to assess impact on speed of recovery of mobility;
  - Whether strength training and strengthening interventions improve activity after stroke;
  - Whether constraint induced movement followed by receipt in group practice for chronic stroke patients and/or whether extended mitt use alone significantly improved arm and hand movement;
  - Whether additional practice of either upper limb or mobility task improved functional outcome during inpatient rehabilitation;
  - An assessment of the differing impact of differing levels of intensity of augmented exercise therapy time (AETT) on functional mobility, dexterity and activities of daily living (ADL);

- Whether there are differences in improvement and maintenance of motor function, grip strength and ADL due to different strategies of physical exercise, and how these are influenced by whether patients lived in their own home, used community services, or received help from relatives;
- Whether 30 or 60 minutes of therapy has differing impact;
- Whether early increased intensity upper limb therapy programme has an impact.

### **3.3 RESULTS AND OUTCOMES OF STUDIES**

- There is plenty of evidence on how models of early discharge following stroke using physiotherapy reduces the amount of time in hospital by between 8 and 10 days;
- There is some evidence that early discharge improves ‘activities of daily living’ (although also some evidence that says it makes no difference). However, we do not have information on how this potential improvement is linked to reduction in reliance on community health/social care services or on the ability of people to get back to work;
- There is some evidence that ongoing physiotherapy to one year reduces the number of days spent in hospital due to readmission in the year following a stroke by 4 days. However, there is also evidence that it makes no difference to readmission rates;
- There is weak evidence that ongoing community physiotherapy reduces deterioration in and/or improves ability to perform activities of daily living. The evidence is that any positive effects are only present up to 6 months after stroke at the most;
- Two studies that have tried to look at the overall cost effectiveness show that early discharge/community physiotherapy is cost effective;
- There is no evidence that either physiotherapy early discharge models or ongoing physiotherapy support produce worse outcomes than therapy delivered in acute hospital. There is some evidence it may result in better outcomes;
- We do not know explicitly the costs associated with early discharge models, nor do we have an explicit method of linking improvements in activities of daily living with health/social care needs.

## Section 4: Back pain

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### 4.1 OVERVIEW OF BACK PAIN LITERATURE

This section of the report examines the literature reviewed to develop and populate the model for the management of chronic back pain. Appendix C gives the detail of the literature reviewed and data extracted.

22 studies were reviewed. Table 4.1 shows the summary of the study designs.

**Table 4.1 Summary of study designs**

Study design	Number of studies
Randomised control trials (RCTs)	9
Prospective studies (not RCTs)	4
Systematic and literature reviews	5
Qualitative study	1
Guidelines	3

In eight of the RCTs, patient numbers were given: the largest trial included 1334 patients, and the smallest 75. In six of the studies, the number of patients was greater than 400, and in two less than 200. In the three prospective studies giving patient numbers, two had more than 500 patients and the third had 44. One study recruited 963 physicians.

Our summary of the studies extracted data in seven areas as shown in Table 4.2. Additional comments from the reviewer were also recorded. Not all studies yielded data in all areas.

**Table 4.2 Data extracted from studies**

Data extracted	No of studies yielding data
Design of study	22
Methods, including patient and study numbers	22, of which 12 gave patient numbers
Study summary	22
Clinical results	14
System results	22
Economic results	9
Staffing and costs	3

### 4.2. FOCUS OF STUDIES

Three studies examined or laid out good practice guidelines, or were preliminary baseline studies.

The majority of studies evaluated assessment, interventions and longer term methods of managing back pain: studies broadly fell into one of three categories:

- **Diagnosis and assessment**, including:
  - The role of radiography in diagnosis;
  - The onward referral of a patient to physiotherapy, osteopathy;
  - The giving of advice and information to the patient at an early stage;
  
- **Interventions**, including combinations of, with differing duration and intensity, and in different locations including primary care:
  - Back classes;
  - Exercise and manipulation;
  - Spine clinic;
  - Osteopathy;
  - Pain management;
  - Physical therapy;
  - Back pain clinics;
  - Pain management;
  - Education and advice;
  
- **Longer term education and advice**: focusing on:
  - Remaining active;
  - Receiving reassurance.

## 4.3 RESULTS AND OUTCOMES OF STUDIES

### 4.3.1 Diagnosis and assessment

Klaber Moffett (1998), utilising evidence to develop a guide for commissioning services in primary care for acute and chronic back pain, recommended that GPs should carry out a diagnostic triage in order to identify red flags, prior to any treatment or referral. They also believed the evidence indicated that large numbers of referrals to secondary care could be avoided. Kendrick et al (2001) also recommended that guidelines for primary care should be consistent in not recommending radiography for lumbar spine patients with back pain in the absence of indicators for serious spinal disease. Croft et al (1998) also demonstrated that 90% of patients with low back pain presenting in primary care have ceased consulting their GPs within 3 months, although they were concerned that many (between 75-80% of those interviewed) still had some residual pain after one year.

Moffett and McLean (2005), in their extensive literature review, found that physiotherapists have a wide ranging role at all stages of back and neck pain. In the beginning the physiotherapist can identify any serious spinal pathology and refer the patient to the most appropriate specialist. Physiotherapists are ideally placed to identify patients who are developing psychosocial barriers to recovery, provide reassuring advice, explanation and education, and encourage an early return to normal activities.

### 4.3.2 Interventions

Stanley et al (2000) examined the uptake of prompt access to physiotherapy services for acute back pain, and found that both GPs and patients made only selective use of the services. They calculated that around one-third of patients who could have been eligible for the services accessed them.

Many studies focus on the value of exercise, physicians either advising patients to maintain normal physical activity, or sending patients to exercise classes. A further group of studies have examined the impact of physical interventions such as physical therapy, osteopathy or chiropractic, and several compare the results across different interventions. However, the evidence across the various options for treatment and management of patients with acute back pain is not clear cut.

The UK BEAM trial (2004) compared the effect of adding exercise classes and spinal manipulation to best care in general practice, and found that all groups improved over time, but manipulation followed by exercise achieved a moderate benefit at three months, whilst exercise alone achieved only a small benefit, as measured by the Roland disability questionnaire.

Osteopathy as an addition to usual primary care was found to be more effective (Williams et al, 2004), but also resulted in higher health care costs, having a cost per quality-adjusted life year (QALY) of £3,560; although the finding that the primary care osteopathy clinic was cost effective was qualified as the results were subject to considerable random error.

The use of back pain classes was not found to be effective in a study by Underwood (1998), although some patients did report having less chronic disability after one year. However, Enthoven et al (2003) found that patients using physical exercises improved over time (although there appeared to be no control patient group). Molde Hagen et al (2000 and 2003) in two studies (the second being a follow up of the first) found early interventions for patients who receive early diagnosis, are given good information and undertake normal physical activity is cost effective in that they are more likely to return to work sooner. No additional costs or changes were observed after three years.

Early referral to physiotherapy is recommended for patients with non-specific low back pain for whom first line treatment by GPs has not been effective (Whitehurst et al, 2007). Their study found physical therapy to be a slightly more cost effective strategy in comparison to a back pain management programme (outcomes were measured using the Roland and Morris disability questionnaire): the physical therapy programme had marginally improved outcomes over one year but higher costs giving a cost per QALY of £2,262. The researchers believed however that back pain management programmes could provide an additional primary care approach, provided that patient and doctor sessions were taken into account. This is reinforced by the findings of Hay et al (2005), who found that brief pain management techniques delivered by an appropriately trained clinician offer an efficient and effective (outcomes measured by the Roland and Morris disability questionnaire) alternative

first line option to physiotherapy and manual therapy for patients with non specific sub acute low back pain.

There is also evidence (Klaber Moffett et al 1998) that early referral to physiotherapy may reduce referrals to secondary care, and improves patient satisfaction. Klaber Moffett *et al.* (1999) in an RCT of a progressive exercise programme led by a physiotherapist, found that the exercise class was more clinically and cost effective than traditional GP management. Pinnington et al (2004) also found that prompt access to primary care physiotherapy is lower cost and cost effective and acceptable to patients, although they raised questions about the infrastructure required, such as the availability of trained physiotherapists and the referral patterns of GPs. Such a service also appears to be cost effective, and a typical PCT should quickly recoup the costs of the additional physiotherapists.

On the other hand, Hay et al (2005) found that brief pain management techniques delivered by appropriately trained clinicians offered an alternative to physiotherapy with manual therapy, and could provide a more efficient first line approach for the management of non-specific sub-acute low back pain in primary care.

### **4.3.3 Education and advice**

Guidelines recommend, and many studies find, that advice to patients to remain active has a positive effect, for example in reducing long term sickness and ensuring that patients do indeed maintain reasonable levels of physical activity. The advice can be given in many settings and by a variety of staff. Self management in the longer term is encouraged.

## Section 5: Childhood Obesity

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### 5.1 OVERVIEW OF LITERATURE ON CHILDHOOD OBESITY

YHEC undertook an additional literature review for CSP on interventions to address childhood obesity and whether therefore there might be role for physiotherapists in the management of childhood obesity. We did not develop nor populate a model for childhood obesity as the purpose of this literature review was exploratory.

In total, 18 pieces of published literature relating to obesity have been analysed. Out of these, 15 are related to childhood obesity, one includes a mix of both child and adult obesity and one looks into the long term effects and economic consequences of treatments for obesity as a whole. A description of the types of literature analysed can be seen in Table 5.1. Within the systematic reviews, studies were included that were long term (>1 year) and short term (>3 months and <1 year). Studies were included that were diverse in study design, quality and target population. Table 5.1 shows the study designs.

**Table 5.1 Summary of study designs**

No	Types of Literature Analysed
1	Meta Analysis
5	Systematic Reviews
2	Literature Reviews
1	Bulletin based on a systematic review
1	Prospective study
1	National clinical guideline
1	NICE guideline
1	Public health programme guidance scope
1	Toolkit for developing local strategies
1	Community based information sheet
1	National heart forum overview of children and physical activity
1	Intervention study
1	Article

The majority of papers included in this literature review were from the UK, however, origin of literature also included papers from America, Scotland, Austria and Australia, as shown in Table 5.2 below.



**Table 5.2 Country of origin of literature reviewed**

No	Country of Origin
9	English
1	Scottish
5	American
1	Austria
1	Australian

## 5.2 INTERVENTIONS

### 5.2.1 Aim of interventions

From the literature analysed, the aim of the interventions can be seen in Table 5.3.

**Table 5.3 Summary of Aim of Interventions**

No	Aim of Intervention
13	Preventing Childhood Obesity
4	Effectiveness of Interventions to increase physical activity
1	Long term effects and economic consequences of treatments of obesity

Out of the 18 publications analysed, 13 are based on interventions preventing childhood obesity. Four focus on the effectiveness of interventions to increase physical activity, and one looks at the long term effects and economic consequences of treatments for obesity and implications for health improvement. The interventions highlighted throughout the literature range from dietary education to physical activity, family support, behavioural therapy, reducing sedentary lifestyles and school programmes. One systematic review discussed one programme that examined a behavioural choice intervention which targeted boys and girls in grade 6-8. This programme concentrated on the promotion of physical activity, modification of dietary intake and reduction of sedentary behaviours with strong emphasis on reducing TV viewing. Evaluation at two years post intervention showed that prevalence of obesity among girls in the intervention schools was reduced compared with controls, controlling for baseline obesity (odds ratio, 0.47;95% CI, 0.24-0.93; P=0.03). Obesity declined among boys in both control and intervention students; however, after controlling for covariates, there was no significant difference in the outcome (odds ratio, 0.85; 95% CI, 0.52-1.39; P=0.48). In another small random controlled trial, thrice weekly aerobic dance classes plus health education were found to have a greater impact on increasing aerobic capacity, maintaining or decreasing weight and improving attitudes towards fitness, than usual physical education.

A study that examined a multi disciplinary team program which addressed energy reduced mixed diet, behavioural therapy and increased physical activity for morbidly obese children,

found 81% of patients reduced their body mass index (BMI) by an average of -2 with the help of the team that consisted of physicians, clinical psychologists/ behaviour therapists, dietetic counsellors and physical therapists. Evidence obtained from the results of a Meta analysis of intervention studies found that all the studies incorporated some form of independent variables in weight loss intervention. These included dietary, physical activity, behavioural changes in reduction of sedentary lifestyles, and parental involvement. These interventions are repeatedly found in the evidence as key to successful weight loss and increased health. However, not enough data was found to support one variable as being more effective as a weight loss intervention than another. One systematic review that assessed effectiveness of interventions designed to prevent obesity in childhood through diet, physical activity and/or lifestyle and social support, found studies that focused on combining dietary and physical activity approaches did not significantly improve BMI, but some studies that focused on dietary or physical activity approaches showed small but positive impact on BMI status. However, the programmes in this review did use different strategies to prevent obesity so direct comparisons were difficult to obtain.

### **5.2.2 Location of Interventions**

Location of interventions was found to vary from Hospital outpatients to community settings, speciality clinics, primary care settings, preschool day care centres and schools. One example found of a community based intervention is a programme named MEND that is aimed at overweight and obese children aged between 7 – 13 and their families. Offering multi disciplinary programmes around the UK, placing equal emphasis on Mind, Exercise and Nutrition, the programme comprises 18 two hour sessions for the whole family and looks at ways of encouraging physical activity through play as rewards. To date, MEND receives support from numerous primary care trusts, local councils, sports facilities, Sure Start schemes and private companies in the UK, as well as research support from Great Ormond Street Hospital London and University College London Institute of Child Health.

### **5.2.3 Population Targets**

The population target of 16 of the 18 studies analysed, looks at children of different ages in relation to childhood obesity, as shown in Table 5.4. Two studies look at obesity in adults and one of these also addresses the economic consequences obesity has on health. It was felt that both papers that did not target childhood obesity specifically were still relevant and were therefore included.

**Table 5.4 Population targets**

<b>Target Population age</b>	<b>Target group / location</b>
9 or 15 year olds	Schools in Denmark, Estonia and Portugal
9 to 12 year old overweight children	
Mean age of 12	Children close to middle school, pre teen
8 – 12 year olds	
11 – 13 year olds	
10 – 13 year olds	
0 – 18 year olds	Preschool children and school children in the UK
7 – 13 year old	Over weight and obese children and their families
5.8 – 18.8 year old	Morbidly obese children and adolescents
Children up to 18 years with specific focus on 7 year olds and under 11 to 18 year old girls	Girls
School and preschool children	Non obese children of obese/ overweight parents

From obese or overweight children to school and preschool non obese children of overweight parents, the main aim throughout the literature is to look at the influencing factors of childhood obesity. In one systematic review, the mean age of children in 19 studies was between 6 and 10 years. One trial included only boys while eight trials included only girls. From dance classes designed to increase aerobic exercise in girls after school, to school activities that focus on education in nutrition and more compulsory physical activity, the studies vary in target population. The national tool kits and local guidance documents used within this review are targeted at health professionals in primary, secondary and tertiary care to whom children with obesity may be referred.

### **5.3 POTENTIAL ROLE OF PHYSIOTHERAPY**

The NHS Centre for Reviews and Dissemination Effective Health Care bulletin (2002) summarises the research evidence on the prevention and treatment of childhood obesity. It identifies that primary healthcare professionals can play an important role in the recognition and management of childhood obesity. Although physiotherapists were not mentioned in the list of professionals that could assist, potentially physiotherapists could be included. In the Department of Health Toolkit (2008), NICE recommendations identify healthcare professionals as playing an important and highly cost effective role in providing brief advice on physical activity in primary care. In the NICE guidance on promoting physical activity (Jan 2009), health practitioners and physical activity professionals are highlighted as professionals who should be the ones to help implement the recommendations. This could prove to be an opportunity for physiotherapists to assist in promoting physical activity in this particular client group. Another potential role for physiotherapists could be working within the MEND programmes. MEND requires organisations and individuals from the public, private and charitable sectors to work in partnership to provide solutions, and to date works alongside Great Ormond Street Children’s Hospital as well as some local councils and Primary Care Trusts. MEND invites partners to contact them should they wish to get involved.

## 5.4 SUMMARY OF EVIDENCE AND OUTCOMES

Evidence from the Meta analysis study describes how children who are less physically active are more likely to become overweight or obese. As described by the Third National Health & Nutrition Examination Survey on Public Health (NHANES III) data, children who spent four hours or more watching television every day had higher BMIs than children who watched less than two hours of television daily. Borra et al (2003) described how inclusion of the parents and family increases the effectiveness of weight loss programs with children. Sedentary lifestyles is a recurrent theme that is repeatedly highlighted throughout the literature as one of the key distribution factors of children who are less physically active and categorised as overweight/obese. All of the studies reviewed incorporated some form of independent variables in weight loss intervention which included dietary, physical activity, behavioural changes in reduction of sedentary lifestyles and parental involvement, but not enough data was found to support one variable as being more effective as a weight loss intervention than another. From the multi disciplinary study that included a physical therapist within the team to tackle childhood obesity, to the NICE guidance on increasing physical activity, physiotherapists could develop their roles in providing support, assisting in the recognition of children who are overweight or obese, and also in developing physical activity programmes that could be developed in the community and schools. By adopting a multi disciplinary approach that looks at nutrition, physical activity, behavioural changes in reduction of sedentary lifestyles and parental involvement, physiotherapists can assist in the delivery of the new NICE recommendations and therefore in the management of childhood obesity.

## **APPENDIX A**

### **Summary of Literature on Respiratory Conditions**

### Articles on Respiratory Conditions Reviewed

Article No	Authors	Date	Journal	Title
1	Griffiths TL, Phillips CJ, Davies S, Burr ML, Campbell IA	2001	Thorax, 56; pp779-84	Cost effectiveness of an outpatient multidisciplinary pulmonary rehabilitation programme
2	Garrod R, Lasserson T	2007	Respiratory Medicine 101, pp2429-2436	Role of physiotherapy in the management of chronic lung diseases: an overview of systematic reviews
3	Jenkins SJ, Cecins NM, Collins GB	2001	Physiotherapy Theory and Practice 17, pp67-76	Outcomes and direct costs of a pulmonary rehabilitation service
4	Chavannes NH, Vollenberg JJH, van Schayck CP, Wouters EFM	2002	British Journal of General Practice, July, pp 574-78	Effects of physical activity in mild to moderate COPD: a systematic review
5	Mikelsons C	2008	Respiratory Medicine: COPD update 4, pp2-7	The role of physiotherapy in the management of COPD
6	Brooks D, Krip B, Mangovs.ki-Alzmora S, Goldstein RS	2002	European Respiratory Journal, 20, pp 20-29	The effect of postrehabilitation programmes among individuals with chronic obstructive pulmonary disease
7	Bourbeau J, Julien M, Maltais F, Rouleau M et al	2003	Arch Intern Med 163: pp 585-591	Reduction in hospital utilisation in patients with chronic obstructive pulmonary disease
8	Boxall AM, Barclay L, Sayers A, Caplan GA	2005	Journal of Cardiopulmonary Rehabilitation, 25: pp 378-385	Managing chronic obstructive pulmonary disease in the community
9	Peytremann-Bridevaux I, Staeger P, Bridevaux PO, Ghali WA, Burnand B	2008	The American Journal of Medicine, 121, pp 433-443	Effectiveness of chronic pulmonary disease-management programmes: systematic review and meta-analysis
10	Rea H, McAuly S, Stewart A, Lamont C, Roseman P, Didsbury P	2004	Internal Medicine Journal, 34: pp 608-614	A chronic disease management programme can reduce days in hospital for patients with chronic obstructive pulmonary disease
11	Cecins N, Geelhoed E, Jenkins SC	2008	Australian Health Review, 32 (3) pp 415-22	Reduction in hospitalisation following pulmonary rehabilitation in patients with COPD
12	Romagnoli M, Dell'Orso D, Lorenzi C, Crisafulli E, Costi S, Lugli D, Clini EM	2006	Respiration, 73: pp769-776	Repeated pulmonary rehabilitation in severe and disabled COPD patients

Article No	Authors	Date	Journal	Title
13	Gallefosse F, Bakke PS	2002	Tidsskr Nor Laegeforen, 122 (28) pp2702-6	The effect of patient education in asthma, a randomised controlled trial
14	Puhan MA, Scharplatz M, Troosters T, Steurer J	2005	Respiratory Research 6, 54,	Respiratory rehabilitation after acute exacerbation of COPD may reduce risk for readmission and mortality – a systematic review
15	Pushparajah S, McLellan R, Henry A, Kuitert LME	2006	Chronic Respiratory Disease, 3, pp187-193	Use of a chronic disease management programme in COPD to reduce hospital admissions.
16	Ip SPS, Leung YF, Choy KL	2000	Hong Kong Med J, 10, pp 312-8	Short-stay inpatient rehabilitation of elderly patients with chronic obstructive pulmonary disease: prospective study
17	Man W D-C, Polkey MI, Donaldson N, Gray BJ, Moxham J	2004	British Medical Journal, 329; 1209-1213	Community pulmonary rehabilitation after hospitalisation for acute exacerbations of chronic obstructive pulmonary disease: randomised controlled study
18	Cockram J, Cecins N, Jenkins S	2006	Respirology, 11, pp 98-104	Maintaining exercise capacity and quality of life following pulmonary rehabilitation
19	Foglio K, Bianchi L, Ambrosino N	2001	Chest; 119, pp 1696-1704	Is it really useful to repeat outpatient pulmonary rehabilitation programmes in patients with chronic airway obstruction? A 2-year controlled study
20	Buckingham RJ, Lowe D, Pursey NA, Roberts CM, Stone RA.	2008	Report of Royal College of Physicians of London, British Thoracic Society and British Lung Foundation	Report of the national chronic obstructive pulmonary disease audit (2008): resources and organisation of care in acute NHS units across the UK
21	Ram FSF, Wedzicha JA, Wright, Greenstone M	2008	Cochrane Library, 4	Hospital at home for acute exacerbations of chronic obstructive pulmonary disease (review)

<b>N</b>	<b>Design of Study</b>	<b>Methods and Patients</b>	<b>Overview summary</b>	<b>Clinical Results</b>	<b>System Results</b>	<b>Economic Results</b>	<b>Staffing Costs</b>	<b>Comments</b>
1	A cost/utility analysis in conjunction with a randomised controlled clinical trial of pulmonary rehabilitation versus standard care.	200 patients mainly with chronic obstructive pulmonary disease (COPD), were randomly assigned to either an 18 visit, 6 week rehabilitation programme or standard medical management. The difference between the mean cost of 12 months of care for patients in the rehabilitation and control groups (incremental cost) and the difference between the two groups in quality adjusted life years (QALYs) gained (incremental utility) were determined. The ratio between incremental cost and utility (incremental cost/utility ratio) was calculated.	Pulmonary rehabilitation programmes improve the health of patients disabled by lung disease but their cost effectiveness is unproved. This study undertook a cost/utility analysis in conjunction with a randomised controlled clinical trial of pulmonary rehabilitation versus standard care.	The derived SF-6D utility scores before intervention and 6 weeks and 12 months after entering the study were 0.34 (0.08), 0.37 (0.09), and 0.4 (0.09) for the control group and 0.33 (0.08), 0.43 (0.10), and 0.4 (0.11) for the rehabilitated group. Six of the 99 patients in the rehabilitation group and 12 of the 101 subjects in the control group died during the study. From this data the number of QALYs generated per group during the 12 month period were determined. Significantly more QALYs were generated in the group whose treatment included rehabilitation.	This outpatient pulmonary rehabilitation programme produces cost per QALY ratios within bounds considered to be cost effective and is likely to result in financial benefits to the health service.	Each rehabilitation programme for up to 20 patients cost £12120. The mean incremental cost of adding rehabilitation to standard care was £-152 (95% CI-881 to 557) per patient, p=NS. The incremental utility of adding rehabilitation was 0.030 (95% CI 0.002 to 0.058) QALYs per patient, p=0.03. The bootstrapping technique was used to model the distribution of cost/utility estimates possible from the data.	The total amount of £12120 is composed mainly of staffing costs (64%).	The paper shows that the pulmonary rehabilitation program is likely to more than offset the cost outlay in providing such a service.
2	Evidence Based Review	Four Cochrane respiratory reviews of relevance to physiotherapeutic practice are discussed in the overview.	To consider the evidence from previous robust review documents, predominantly those of the Cochrane Respiratory Review	Systematic Review one, one study, peak expiratory flow rate significantly improved as a result of breathing exercises, although	Systematic review 3: pulmonary rehabilitation for COPD strongly supports the role of pulmonary rehabilitation in the			Research concerning the effect of physiotherapeutic interventions is often methodologically weak and insufficiently robust to



N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>Systematic Review 1 looks at Breathing exercises in Asthma. 7 random controlled trials were included, in with breathing retraining, lower abdominal breathing, Buteyko technique or yoga that included breathing exercises, were compared with asthma education or waiting lists controls. Systematic Review 2 looks at Bronchopulmonary hygiene physical therapy for chronic obstructive pulmonary disease and bronchiectasis. Systematic Review 3 looks at pulmonary rehabilitation for chronic obstructive pulmonary disease. Systematic Review 4 looks at the inspiratory muscle training for asthma.</p>	<p>Groups, and to try and illuminate some of the areas that physiotherapists are involved with in the management of respiratory disease.</p>	<p>in another there was no difference in evening or morning values. Effects of breathing re training on exacerbations of asthma were evaluated in 2 studies with contradictory results. One study showed a positive effect with a reduction of 1.27 attacks per week, whereas no difference was seen between groups in the other. Systematic Review two review shows that bronchopulmonary hygiene techniques in chronic obstructive pulmonary disease (COPD) and bronchiectasis increase sputum production. Frequent exacerbation is associated with increased sputum and high bacterial load, suggesting that there may be important therapeutic benefit of improved sputum</p>	<p>management of COPD. 31 random controlled trials met the inclusion criteria for this review and statistically significant improvements were seen for health related quality of life and functional exercise capacity.</p> <p>Systematic Review 4: inspiratory muscle training for asthma. The main outcome of this review is the IMT increases maximal inspiratory pressure compared with control group of no training or sham training only.</p>			<p>make clinical recommendations.</p> <p>Regarding Systematic Review 4: there remain significant methodological limitations of studies investigating IMT, including small sample size, mixed populations, difficulties with accurately describing intensity, duration and the frequency of training applied. Maximal inspiratory pressure is a volitional test and therefore open to criticism.</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
				<p>clearance. Two trials in bronchiectasis evaluated the effect of postural drainage plus percussion on sputum production and radioisotope clearance. In both studies, physiotherapy treatment improved pulmonary clearance compared with a control group. In chronic bronchitis, postural drainage, cough and exercise also improved airway clearance as measured by radioisotope, whereas postural drainage in isolation was ineffective.</p>				
3	<p>Analysis of referrals and direct costs to a physiotherapy department of an outpatient pulmonary rehabilitation service.</p>	<p>119 patients with chronic lung disease (CLD) were referred to the service during January 1 and December 31<sup>st</sup> 1998. Seventy two patients entered the eight week program and 57 completed (20.8% attrition).</p>	<p>The effects of an eight week exercise program on exercise capacity (incremental shuttle walking test and distance walked in 20 minutes) and quality of life (QOL, chronic respiratory disease questionnaire, and the SF-36) were evaluated.</p>	<p>Significant increases in exercise capacity and QOL occurred following the program (P&lt;0.05).</p>		<p>The cost of the program was \$A249 (Australian Dollars) per patient.</p>	<p>Total expenditure for salary and consumables during 1998 was \$A35,500 (\$1 Australian = \$0.55 United States). A total of 6.5 hours of physiotherapy was attributed to each patient who completed the eight week</p>	<p>The cost in terms of physiotherapy salaries and consumables of this eight week exercise program represents less than one third of the cost of a day in hospital. The cost analysis was limited to associated costs with physiotherapy salaries and consumables. No data was collected relating to participant</p>

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							exercise program.	<p>costs or capital costs. Additional costs would need to be considered when setting up a new service as well as additional costs for staff training to enable physiotherapists to acquire necessary skills to provide the service.</p> <p>There is some evidence of a decrease in hospitalization following pulmonary rehabilitation, however more data is needed.</p> <p>There have been few studies to determine the longer term benefits of pulmonary rehabilitation, however, there is some evidence of benefit (ie, improved exercise capacity and QOL) lasting for at least one year after cessation of a formal program.</p>
4	Systematic Review.	Literature search included Medline (1983 to 1999), Embase (1984 to 2000), and the Cochrane Library (2000). All hits were	A literature search on the effects of physical activity in patients with mild to moderate COPD on exercise tolerance, dyspnoea and quality of life	Physical exercise training (usually part of rehabilitation) can improve the fitness of patients with mild to moderate COPD, but it has not been				No studies addressed the number of hospitalization days or prednisolone courses as outcomes were included.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>screened for subject and language and abstracts were selected on the basis of a protocol that included disease severity, hypothesis, outcome parameters, and control group. Titles were selected on the basis of being English or Dutch language. The search generated 4968 articles and, after exclusion according to title and abstract, 35 original studies and 27 review articles were analysed. Of the five original studies fitted the criteria and none of the review articles were selected.</p>	(QOL).	<p>shown to significantly benefit QOL or dyspnoea, or long term disease progression.</p>				<p>Respiratory rehabilitation in the early stages of COPD could become a treatment of preference in the future. Rehabilitation in primary care or at home appears to be appropriate and effective. However, too little research has been done in this patient group to draw firm conclusions on this matter.</p>
5	Clinical Article	<p>An article that looks at the role of physiotherapy in the management of COPD. Evidence supporting the benefit of pulmonary rehabilitation for patients with COPD is robust (level 1) and has been reviewed in a Cochrane review, which included 31 randomised controlled trials.</p>	<p>Chronic obstructive pulmonary disease is characterized by intractable dyspnoea, reduced functional capacity and episodes of acute exacerbation. Physiotherapy plays a key role in multidisciplinary interventions. The evidence in reaction to airway clearance, pulmonary rehabilitation, inspiratory muscle</p>	<p>Large bodies of evidence now support the use of pulmonary rehabilitation in the treatment of patients with COPD, with many randomised controlled trials describing its potential benefits including: improved exercise capacity, increased quality of life, enhanced</p>	<p>Pulmonary rehabilitation is effective in both primary and secondary care settings. The benefit of pulmonary rehabilitation in the community is that patients may be seen closer to home. In the acute setting it may be easier to manage more severe patients who require oxygen to exercise.</p>	<p>An economic evaluation undertaken by Griffiths et al demonstrated that pulmonary rehabilitation was cost saving and increased quality of life and the challenge currently being faced is the provision of pulmonary rehabilitation</p>		<p>The challenge is to translate sound clinical evidence based practice into novel models of service with resultant improvements in care for patients with COPD.</p>

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			<p>training and non invasive ventilation is now robust whilst further evidence is required for other interventions in order to clarify where application, skills and training should be focused.</p>	<p>patients sense of control over their condition, improved emotional function, improved dyspnoea and fatigue, increased functional outcomes, reduced length of hospital stay and number of hospitalizations, reduction in primary care consultations and survival benefit.</p> <p>Both the NICE guideline and Cochrane review of pulmonary rehabilitation strongly support the inclusion of pulmonary rehabilitation for patients with COPD.</p>	<p>Recent research has identified the potential benefit of early rehabilitation following an exacerbation of COPD. In a meta analysis by Puhan et al, 6 trials were identified including a total of 230 patients: using pooled results from these studies, early pulmonary rehabilitation was identified as improving exercise capacity and improving the patients scores for quality of life questionnaires, reducing the risk of hospital admission and reducing mortality.</p>	<p>programmes equitably across the UK.</p>		
6	Prospective Review	<p>Patients from both inpatient and outpatient programmes were recruited. Subjects with COPD (n=109) were randomised to receive either enhanced follow up (EF, n=50) or conventional follow up (CF, n=59). There were 24 subjects who did not return the follow up</p>	<p>To examine the effects of two post rehabilitation programmes on functional exercises tolerance and health related quality of life in patients with chronic obstructive pulmonary disease (COPD).</p>	<p>Over the course of the study, there was no difference in distance walked in 6 min between the two groups but a significant difference for time and a group interaction. There was a clear deterioration in functional exercise capacity and health related quality of life</p>	<p>Continued benefits were noted 15 months later among the home based group compared with those who received an outpatient institutionally based programme, suggesting that a programme based facility may be better integrated into a patients daily routine</p>			<p>In a meta analysis of patient education, MAZZUCA concluded that although education was of value in altering compliance efforts to improve health through knowledge alone was rarely successful. Behaviorally orientated programmes, such as those in which</p>

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		<p>appointments after the baseline evaluation. Subjects in the EF group attended a monthly support group and received a telephone call from a staff member at the midpoint (two weeks) between their visits. Both groups had scheduled appointments with a physical therapist and physician at 3 monthly intervals after discharge.</p>		<p>after completion of respiratory rehabilitation but no difference between the groups.</p>				<p>exercises were practiced under supervision, were more consistently successful in improving the clinical course of a chronic disease.</p>
7	<p>A parallel group, randomized, multi center trial</p>	<p>A multi center, randomized clinical trial was carried out in 7 hospitals from three cities in Quebec from February 1998 to July 1999. All patients had advanced COPD with at least 1 hospitalization for exacerbation in the previous year. Patients were assigned to a self management program or to usual care. The intervention consisted of a comprehensive patient education</p>	<p>An evaluation of the effect of a continuum of self management, specific to COPD, on the use of hospital services and health status among patients with moderate to severe disease.</p>	<p>Greater improvements in the impact subscale and total quality of life scores were observed in the intervention group at 4 months, although some of the benefits were maintained only for the impact score at 12 months. A continuum of self management for COPD patients provided by a trained health professional can significantly reduce the utilization of health care services and improve health</p>	<p>Hospital admissions for exacerbation of COPD were reduced by 39.8% in the intervention group compared with the usual care group (P = .01), and admissions with the usual care group (P = .01), and admissions for other health problems were reduced by 57.1% (P=.01). Emergency department visits were reduced by 41.0% (P = .02) and unscheduled physician visits by 58.9% and total quality of life scores were observed in the</p>		<p>The program was supervised by experienced and trained health professionals (nurses in 4 centers, respiratory therapists in 2, and a physiotherapist in 1) who acted as case managers. Case managers were available only to the intervention group for advice and treatment</p>	<p>In the present study, blinding was not possible. People may question the validity of the results because physicians and patients knew which treatment was allocated.</p>

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		<p>program administered through weekly visits by trained health professionals over a 2 monthly period with monthly telephone follow up. Over 12 months data were collected regarding the primary outcome and number of hospitalizations; secondary outcomes included emergency visits and patient health status.</p>		<p>status. This approach of care can be implemented within normal practice.</p>	<p>intervention group at 4 months, although some of the benefits were maintained only for the impact score at 12 months.</p>		<p>supervision throughout the study period.</p>	
8	<p>Randomized Controlled Trial.</p>	<p>60 patients were recruited to participate in a trial of home based pulmonary rehabilitation at Prince of Wales Hospital in Sydney, Australia. Intervention patients received an individually tailored supervised walking and arm exercise program as well as individual multidisciplinary education sessions on COPD and its management. Outcomes were assessed using the 6 minute walk test, St George's respiratory</p>	<p>The trial assesses the effects of a 12 week home based pulmonary rehabilitation program for 60 housebound COPD patients older than 60 years.</p>	<p>Compared with the control group, intervention patients demonstrated a significant improvement in 6-minute walk test (P=.023), Borg score of perceived breathlessness (P=.024), St Georges respiratory questionnaire total score (P=.020), and impact subscore (P=.024). At 6 months, the intervention group had a significantly shorter average length of stay at readmission to hospital with exacerbation (P =</p>	<p>A 12 week home based pulmonary rehabilitation is effective in improving exercise tolerance, perception of breathlessness, and quality of life for housebound COPD patients. To manage COPD in the community more effectively, health services are advised to focus on expanding home based pulmonary rehabilitation.</p> <p>Analysis of hospital admission rates 3 months after randomization reveals that 5</p>			<p>Pulmonary rehabilitation can be offered safely and effectively in the home environment, bringing improvements in functional capacity and QOL for housebound COPD patients. There is some evidence of decreased healthcare utilization after home based pulmonary rehabilitation, although it states, larger studies are needed to confirm this.</p>

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		questionnaire, and Borg score of perceived breathlessness. Healthcare utilization was assessed using hospital admission rates with exacerbation of COPD and average length of stay at readmission.		0.35).	patients in each group were admitted to the hospital due to exacerbation. The trend toward lower average length of stay in the intervention group became significant after 6 months (3 months after pulmonary rehabilitation for intervention, end of pulmonary rehabilitation for control) (5.9 vs..9.3; P= .035).			
9	Systematic Review and Meta Analysis.	A computerized search of MEDLINE, EMBASE, CINAHL, PsychINFO, and the Cochrane Library (CENTRAL)from inception to December 2006, for studies evaluating interventions meeting operational definition of disease management: patient education, 2 or more different intervention components, 2 or more health care professionals actively involved in patients care and intervention lasting 12 months or more. Programs conducted in hospital	The aim of the systematic review was to assess the effectiveness of COPD disease management programs.	Only 1 of 7 studies found evidence of significant positive effect on lung function at 12 months. However, the statistically significant change in mean forced expiratory volume in 1 second (%) in favor of the intervention group was of limited clinical relevance (<12% improvement in forced expiratory volume in 1 second)  Results indicate that the disease management programs studied	A decreased risk of hospitalization, and moderately improved health related quality of life.			It remains unclear which specific components of the disease management programs contribute the most benefit to patients.



N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>only and those targeting patients receiving palliative care were excluded. Two reviewers evaluated 12,749 titles and fully reviewed 139 articles; among these, data from 13 studies were included and extracted. Clinical outcomes considered were all cause mortality, lung function, exercise capacity (walking distance), health related quality of life, symptoms, COPD exacerbations, and health care use. A meta analysis of exercise capacity and all cause mortality was performed using random effect models.</p>		<p>significantly improved exercise capacity (32.2m 95% confidence interval [CI], 4.1-60.3), decreased risk of hospitalization, and moderately improved health related quality of life. All cause mortality did not differ between groups (pooled odds ratio 0.84, 95% CI, 0.54-1.40).</p>				
10.	Prospective Randomised controlled trial	<p>135 patients with a clinical diagnosis of moderate to severe COPD were identified from hospital admission data and general practice records. General practices were randomized to wither conventional</p>	<p>To compare the effect of a disease management programme, including a COPD management guideline, a patient-specific care plan and collaboration between patients, general practitioners, practice nurses, hospital</p>	<p>Respiratory conditions results found that the mean hospital bed days per patient per year for the INT group were reduced from 2.8 to 1.1, whereas those for the CON group increased from 3.5 to 4.0</p>	<p>This study showed that a disease management programme with a patient specific care plan, action plan and regular primary care visits resulted in significantly fewer respiratory related admissions, fewer</p>		<p>Pulmonary rehabilitation assisted discharge planning and home visits by a respiratory nurse specialist.</p>	

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		care (CON), or the intervention (INT). Pre and post study assessment included spirometry, shuttle walk test, short form-36, and the Chronic Respiratory Questionnaire (CRQ). Admission data were compared for 12 months prior to and during the trial.	physicians and nurse specialists with conventional care, on hospital admissions and quality of life.	(group difference, P = 0.030). The INT group also showed an improvement for two dimensions of the CRQ, fatigue (P=0.010) and mastery (P=0.007)	days in hospital, improved pulmonary function and increased walking distances.			
11.	Prospective Review	Patients with chronic obstructive pulmonary disease who entered an 8 week outpatient PR program from 1998 to 2003 in the Sir Charles Gairdner Hospital, Western Australia were included. Functional exercise capacity (6 minute walk distance [6MWD] and HRQoL (Chronic Respiratory Disease Questionnaire) were measured before and following PR. The number of hospital admissions and total bed days due to a COPD exacerbation in the 12 months before and following PR were recorded.	The objectives for this study are that pulmonary rehabilitation (PR) improves exercise capacity and health related quality of life (HRQoL), and reduces health care utilization. The study quantifies the outcomes of a PR program over a 6 year period and determined effects of PR on hospitalization.	187 (73%) of the 256 patients who entered PR completed the program. Improvements in 6MWD (404.2 [+ or -] 114.6 m to 4.9 ?0.0 points per item, P< 0.001) occurred following PR. There was a 46% reduction in the number of patients admitted to hospital (71 to 38) with a COPD exacerbation and a 62% reduction in total beds (1131 to 432) following PR.	Pulmonary rehabilitation is an effective management strategy for patients with chronic obstructive pulmonary disease and has been shown to reduce symptoms and increase exercise capacity and health related quality of life. The savings outweighed the costs of providing the program.	The reduction in hospitalization related to COPD exacerbations following the PR program would result in significant savings to the health care system. The cost of our PR program was A\$292 (2003) per patient based on previously reported data (31) and corrected using a health index deflator. The inclusion of equipment and overhead costs (an additional 25% consistent with Griffiths et al gives rise to an	There was a continuous rolling program with each patient attending two exercise classes (75 minutes duration) each week for a period of 8 weeks. Exercise classes consisted of six to 10 patients supervised by a physiotherapist.	Patients who experienced difficulties completing the program due to physical separation (140m of the walking track that were offered home based rehabilitation were not included in the study. Patients who had undergone lung volume reduction surgery or work up for lung transplantation were also excluded from this study.

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						<p>overall program cost of A\$93 440 for 256 patients. The reduction in hospitalization in the 12 months following PR resulted in a net saving of A\$397 032. Hence the cost of providing PR at SCGH to the 256 patients who entered over the 6 year period represents only 23% of the total savings from the subsequent reduction in bed days.</p>		
12.	Randomised Controlled Trial	<p>35 disabled COPD patients (FEV<sub>1</sub> below 50% predicted, MRC score 3) in a stable state were studied in a randomized controlled trial. After completing an initial inpatient PR program, they were randomly assigned to either group 1 (performing a second and a third PR after 6 and 12 months) or group 2 (performing only a second PR after 12 months).</p>	<p>To investigate whether more frequently repeated PR in patients with COPD (a) leads to a similar short and long term physiological gains, and (b) decreases the burden due to hospitalization.</p>	<p>Lung functions, exercise capacity (by means of a timed walk test – 6MWT), peak effort dyspnea and leg fatigue, and health related quality of life means of SGRQ (St Georges Respiratory Questionnaire) were assessed prior to T1, T3, T5) and after (T2, T4, T6) each PR program: the same measures were taken on an outpatient basis at T3 in group 2. The</p>	<p>In severe and disabled COPD, a more frequently repeated in patient PR may lead to some additional physiological and clinical benefits over 1 year.</p> <p>This study shows that repeated interventions of pulmonary rehabilitation over 1 year lead to some additional long term physiological gains (symptoms and HRQoL) and to a</p>	<p>Whether the reported benefits would better enable physicians to extend the present experience on a generalized basis, or not, must be carefully evaluated while also taking the individual cost benefit ration into account.</p>		<p>The increased level of usual physical activity may reduce to half the risk of hospital readmissions in these patients.</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
				<p>number of hospital admissions (HA) and days spent in the hospital (DH) were also recorded over the year. The two groups did not differ in any parameter at baseline. 6MWD, D, F and SGRQ improved to the same level (p = 0.05) after each PR in both groups. However, the baseline level of D, F and SGRQ symptoms and impact scores progressively improved over time in group 1 but not in group 2. After 12 months, a larger amount of patients in Group 1, as compared to Group 2, reported H10 DH/year (p &lt; 0.0001).</p>	<p>reduced individual hospital care burden in severe and disabled COPD.</p>			
13.	Randomized Controlled Trial	78 asthmatics in Norway were randomly allocated to a control or intervention group after having received ordinary outpatient care. Intervention consisted of two two-hour group sessions	To evaluate costs and consequences of patient education in asthmatics in a twelve month follow up.	Patient education improved lung function (FEV1) by 6% and it improved quality of life.	In a twelve month follow up, patient education resulted in approximately a 70% reduction in GP visits and days off work due to asthma as well as roughly a doubling of proportions with satisfactory steroid	The control and intervention groups had mean total costs of NOK 16,000 and 10,500 per patient respectively. A 5% improvement in FEV1 in the		Patient education in asthmatics in a twelve month follow up improved patient outcomes and reduced costs.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		followed by one or two individual sessions administered by a nurse and a physiotherapist. Visits to the doctor, prescribed drugs, hospital admissions, travel costs, time costs, and educational costs were recorded.			inhaler compliance compared to no education.	intervention group was associated with savings of NOK 4,500 compared with the controlled group. The number needed to educate (NNE) to make one person symptom free was associated with savings of NOK 12,200.		
14.	Systematic Review of Randomized controlled trials	Systematic review of randomized controlled trials identified by searches in six electronic databases, contacts with experts, hand searches of bibliographies of included studies and conference proceedings. Randomized trials comparing the effect of respiratory rehabilitation and usual care on hospital admissions, health related quality of life (HRQL), exercise capacity and mortality in COPD patients after acute exacerbation. Two reviewers	To study whether respiratory rehabilitation after acute exacerbation improves prognosis and health status compared to usual care.	Respiratory rehabilitation reduced the risk for hospital admissions (pooled relative risk 0.26 [0.12 – 0.54] and mortality (0.45 [0.22-0.91]). Weighted mean differences on the Chronic Respiratory Questionnaire total score, impacts and activities domains were – 11.1 (95% CI -17.1 to -5.2), - 17.1 (95% CI -23.6 to 10.7) and -9.9 (95% CI -18.0 to - 1.7). In all trials, rehabilitation improved exercise capacity (64-215 meters in six minute walk tests and weighted mean	Evidence from 6 trials suggests that respiratory rehabilitation is effective in COPD patients after acute exacerbation and its potential to reduce costs caused by COPD.	The present data show that the respiratory rehabilitation has the potential to reduce the large COPD related costs due to hospital admissions. The significant reduction in hospital readmissions is suggestive of a beneficial cost benefit balance.		Strengths of this systematic review included the extensive literature search, rigorous adherence to a predefined protocol. A limitation is the small number of patients included in the trials and methodological shortcomings that limit the conclusions.

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		independently selected relevant studies, extracted the data and evaluated the study quality Results were pooled using fixed effects models which were statistically significant heterogeneity ( $p \leq 0.1$ ) was absent. Six trials including 230 patients were identified.		difference for shuttle walk test 81 meter, 95% CI 48-115)				
15.	Prospective Study	One hundred twenty five patients (median age 73) referred with COPD exacerbations met the criteria for the service; 95 received the intervention and data were available for 80. Median FEV <sub>1</sub>	This paper describes the implementation of a community based COPD management programme led by a respiratory physiotherapist to improve home management of COPD and its effect on reducing readmissions and/or length of stay in hospital.	In those who had had previous admissions (mean FEV <sub>1</sub> 0.58L, total hospitalization days fell by 27%, length of stay fell by 58% despite an increase in admission frequency from one year to two per year, and there was no change in median time interval to next hospitalized exacerbations.	The implementation of a Chronic Disease Management programme increased the time to next hospitalized exacerbation. Benefit was seen in the more severe patients, however, with a significant reduction in both length of stay and total hospitalization days.			Outreach physiotherapy led service for patients discharged from hospital following an admission for an acute exacerbation of COPD, is beneficial.  One of the strengths of the report is the long follow up period of a year. The physiotherapist used extended skills in that they were taught on the medications used in the management of COPD, and could advise patients on medication changes. The physiotherapist also addressed other needs to optimize the patient's ability to manage their chronic

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
								<p>disease at home.</p> <p>The report does have some limitations such as the programme was not designed as a randomized controlled clinical trial, so therefore there are no controls to account for confounding factors such as modifications in drug treatment over the one year period following the intervention.</p>
16.	Prospective case control cohort study	<p>One hundred and thirty symptomatic elderly patients with chronic obstructive pulmonary disease who had been treated for an acute respiratory illness in 1998 at a regional medical centre in Hong Kong. They were divided into two groups: the conventional treatment group, which received no rehabilitation (n=65), and the rehabilitation group (n=65). A short stay in patient rehabilitation programme was implemented, which included assessment, patient</p>	<p>To evaluate the effectiveness of a short stay in patient rehabilitation programme.</p>	<p>The mean length of stay in the rehabilitation ward was 6.2 days. The rate of hospital re admission was significantly higher in the conventional treatment group than in the rehabilitation group, both within 28 days of discharge home (relative risk = 3.33; 95% confidence interval, 2.32-4.56; P=0.019) and at 100 days after discharge (relative risk=2.47; 95% confidence interval, 1.78-3.48; P&lt;0.001). The admission free interval was</p>				

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		and caregiver education, an exercise regimen, physiotherapy, occupational therapy and case conference.		significantly longer in the rehabilitation group than in the conventional treatment group (1.13 years vs.. 0.86 years; P<0.001).				
17.	Randomised controlled Study	A single centre, randomised controlled trial set in an inner city, secondary and tertiary care hospital in London. Patients were given a choice of three locations around the London boroughs of Lambeth and Southwark, but the classes were run by the same team with the same equipment. Respiratory physiotherapists and nurses supervised the exercise component, as did the health centre based fitness instructors. 42 patients were admitted with an acute exacerbation of COPD. An eight week, pulmonary rehabilitation programme for outpatients, started within 10 days of	To evaluate the effects of an early community based pulmonary rehabilitation programme after hospitalization for acute exacerbations of chronic obstructive pulmonary disease (COPD).	Early pulmonary rehabilitation, compare with usual care, led to significant improvements in median incremental shuttle walk distance (60 metres, 95% confidence interval 26.6 metres to 93.4 metres, P= 0.0002), mean SGRQ total score (-12.7, -5.0 to -20.3, P=0.002), all four domains of the CRQ (dyspnoea 5.5, 2.0 to 9.0, P = 0.003; fatigue 5.3, 1.9 to 8.8, P=0.004; emotion 8.7, 2.4 to 15.0, P= 0.008; and mastery 7.5, 4.2 to 10.7, P< 0.001) and the mental component score of the SF-36 (20.1, 3.3 to 36.8, P =0.02). Improvements in the physical component score of the SF-36 did not reach	Early pulmonary rehabilitation after admission to hospital for acute exacerbation of COPD is safe and leads to statistically and clinically significant improvements in exercise capacity and health status at 3 months.	Patients in the treated group were readmitted 30% less often than patients in the control group, and there was a trend towards fewer hospital inpatient days. The results therefore imply that early pulmonary rehabilitation may reduce usage of healthcare resources and bring improvements in exercise capacity and health status.		The study did not explore the mechanisms by which early pulmonary rehabilitation achieves its effects. A limitation of this study is that it was not possible to blind patients to the intervention.



N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		hospital discharge, or usual care.		significance (10.6, -0.3 to 21.6, P=0.057)				
18.	Prospective Study	<p>Entry and Exit data were mapped for all patients referred to the PR service over the review period. All eligible patients were offered a community based maintenance exercise programme, upon completion of PR. A total of 21 patients underwent follow up assessment of functional exercise capacity, quality of life (QOL) and health care utilization. Over a 4 year period, 467 patients (80% with COPD) were referred to the programme, of whom 230 entered PR. In total 172 patients completed PR, with attrition (25%) being mostly due to medical problems. Of the 84 patients who elected for the community based programme, 46 were still attending at follow up and 21 patients with moderate to severe</p>	<p>A description of the 4 year referral and uptake patterns to a hospital based outpatient PR programme, and the sustained benefits of PR in patients with COPD attending a community based maintenance exercise programme.</p>	<p>Significant improvements (mean change (95% confidence interval) persisted in 6-min walk distance (41.1m ± (15.7 – 66.5), distance walked in 20 min (195.1m (82.3 – 308) and in QOL improvements exceeded the minimum clinically important difference. A trend towards a reduction in COPD related hospital admissions, bed days and emergency department presentations was observed in the 12 months following PR.</p>	<p>For patients with moderate to severe COPD, a weekly community based maintenance exercise class, supervised by a physiotherapist, combined with a home exercise programme is an effective intervention for maintaining improvements following PR.</p>			<p>Key components of successful maintenance post PR appear to include regular, ongoing contact with a health professional providing low cost, supervised exercise classes in community locations in conjunction with simple home exercise programmes. The promotion of positive self management behaviours and assistance with overcoming health related barriers to exercise also seem to facilitate long term adherence to exercise in a population who have a progressive, chronic condition.</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		COPD were reassessed at 18.4 ± 11.9 months post PR.						
19.	Randomized controlled clinical study	61 chronic airway obstruction patients studied 1 year after completing an initial 8 week outpatient pulmonary rehabilitation (PRP 1). Patients were randomly classified into two groups. A second PRP (PRP 2) was completed by the first group (group 1) but not by the second group (group 2). One year later, a third PRP (PRP 3) was performed by both groups. Lung function, cycloergometry, walking test, dyspnea, and health related quality of life (HRQL) were assessed before and after (PRP2), and before and after PRP3. The numbers of hospitalization and exacerbations over the year were also recorded.	To identify if it is useful to repeat outpatient pulmonary rehabilitation programs in patients with chronic airway obstruction.	After PRP 2, exercise tolerance dyspnea, and HRQL improved in group 1.	Yearly hospitalizations and exacerbations per patient significantly decreased in both groups in the 2 years following PRP1, when compared to the 2 years prior.			<p>The study shows that successive, yearly interventions of pulmonary rehabilitation lead to similar short term gains but do not result in additive long term benefits in dyspnea, exercise tolerance, or HRQL. Nevertheless, additional PRP is associated with reduction in exacerbations not requiring hospitalizations.</p> <p>The study is limited by the small sample size.</p>
20.	Report of National COPD Audit 2008	239 units from 180 Acute NHS Trusts contributed to this resources and	This report describes the results of the resources and organisation of care			The recommendations state that there needs to be		

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		organisation of care audit, equating to a participation rate of 98% of Acute NHS Trusts across the UK.	audit in acute UK NHS units.			further investment to achieve recommended levels in staffing and to provide comprehensive high quality COPD services for patients.		
21.	Systematic Review	The Cochrane Central Register of controlled Trials; electronically available databases eg. MEDLINE (1966-current), EMBASE (1980-current), PubMed, Clinical Trials, Science Citation Index and on line individual respiratory journals bibliographies of included trials were all searched and contact with authors was made to obtain studies. The most recent searches were carried out in August 2003. Only randomised controlled trials were considered where patients presented to the emergency department with an exacerbation of their chronic obstructive	To evaluate the efficacy of hospital at home compared to hospital inpatient care in acute exacerbations of chronic obstructive pulmonary disease		Both the patients and the carers preferred hospital at home schemes to inpatient care (RR 1.53; 95% CI 1.23 to 1.90).  The review has shown that one in four carefully selected patients presenting to hospital emergency departments with acute exacerbations of COPD can be safely and successfully treated at home with support from respiratory nurses. One study, allied health interventions were also done with home care patients.	Two studies included mean cost analysis. The overall results showed significant cost saving of approximately £540 per patient with hospital at home service when compared to inpatient care.		Future trials should incorporate an economic evaluation of both in direct and direct costs, to describe the resources required of both in direct and direct costs, to describe the resources required to establish hospital at home services and the cost savings from early discharge.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>pulmonary disease. Two reviewers independently selected articles for inclusion, evaluated methodological quality of the studies and abstracted data. Seven studies with 754 patients were included in the review.</p>						

## **APPENDIX B**

### **Summary of Literature on Stroke Management**

### Articles on the management of stroke reviewed

Article No	Authors	Date	Journal	Title
1	Glasgow Augmented Physiotherapy Study (GAPS) Group	2004	Clinical Rehabilitation; 18, pp 529-37	Can augmented physiotherapy input enhance recovery of mobility after stroke? A randomised controlled trial
2	Ada L, Dorsch S, Canning CG	2006	Australian Journal of Physiotherapy, 52, pp 241-248	Strengthening interventions increase strength and improve activity after stroke: a systematic review
3	Alberts MJ, Hademenos G, Latchaw RE et al	2000	JAMA, 283 (23), pp 3102-3109	Recommendations for the Establishment of Primary Stroke Centers
4	Andersen HE, Eriksen K, Brown A, Schultz-Larsen K, Forchhammer BH	2002	Clinical Rehabilitation, 16 (6) pp 593-603	Follow-up services for stroke survivors after hospital discharge – a randomised control study
5	Beech R, Rudd AG, Tilling K, Wolfe CDA	1999	Stroke, 30, pp 729-735	Economic consequences of early inpatient discharge to community-based rehabilitation for stroke in an Inner-London teaching hospital
6	Bernhardt J, Chan J, Nicola I, Collier JM	2007	Journal Rehabilitation Medicine, 39 (1) pp 43-8	Little therapy, little physical activity: rehabilitation within the first 14 days of organised stroke unit care
7	Brogardh C, Sjolund BH	2006	Clinical Rehabilitation, 20, pp 218-27	Constraint-induced movement therapy in patients with stroke: a pilot study on effects of small group training and of extended mitt use
8	Blennerhassett J, Dite W	2004	Australian Journal of Physiotherapy, 50, pp 219-224	Additional task-related practice improves mobility and upper limb function early after stroke: a randomised controlled trial
9	Brady BK, McGahan L, Skidmore B	2005	International Journal of Technology Assessment in Health Care, 21:1 pp 15-21	Systematic review of economic evidence on stroke rehabilitation services
10	De Weerd W, Nuyens G, Feys H, Vangronsveld P et al	2001	Australian Journal of Physiotherapy 47, pp 53-61	Group physiotherapy improves time use by patients with stroke in rehabilitation
11	De Wit L, Putman K, Lincoln N, Baert I, Berman P et al	2006	Stroke 37, pp 1483-1489	Stroke rehabilitation in Europe: what do physiotherapists and occupational therapists actually do?
12	Dodel RC, Haacke C, Zamzow K, Pawelzik S et al	2004	Value in Health 7, 2, pp 144-152	Resource utilisation and costs of stroke unit care in Germany
13	Fang Y, Chen X, Li H, Lin J, Huang R, Zeng I	2003	Clinical Rehabilitation, 17, pp 608-617	A study on additional early physiotherapy after stroke and factors affecting functional recovery

Article No	Authors	Date	Journal	Title
14	Green J, Forster A, Bogle S, Young J	2002	The Lancet, 359, pp 199-203	Physiotherapy for patients with mobility problems more than 1 year after stroke: a randomised controlled trial
15	Green J, Young J, Forster A, Collen F, Wade D	2004	Clinical Rehabilitation 18, pp249-252	Combined analysis of two randomised trials of community physiotherapy for patients more than one year post stroke
16	Hale LA, Piggot J	2005	Arch Phys Med Rehabilitation, 86, pp 1933-40	Exploring the content of physiotherapeutic home-based stroke rehabilitation in New Zealand
17	Hammond R, Lennon S, Walker MF, Hoffman A, Irwin P, Lowe D	2005	Clinical Rehabilitation, 19 (4) pp 365-371	Changing occupational therapy and physiotherapy practice through guidelines and audit in the UK
18	Hunter SM, Crome P, Sim J, Donaldson C, Pomeroy VM	2006	Physiotherapy 92 (4) pp 195-207	Development of treatment schedules for research: a structured review to identify methodologies used and a worked example of mobilisation and tactile stimulation for stroke patients
19	Kwakkel G, van Peppen R, Wagenaar RC, Wood Dauphinee S, Richards C, et al	2004	Stroke 35 (11), pp 2529-39	Effects of augmented exercise therapy time after stroke: a meta analysis
20	Langhammer B, Lindmark B, Stanghelle JK.	2007	Clinical Rehabilitation 21(6) pp 495-510	Stroke patients and long-term training: is it worthwhile? A randomised comparison of two different training strategies after rehabilitation
21	Langhorne P, Widen-Holmqvist L, Taylor G, Murray G et al	2007	Journal of Rehabilitation Medicine, 39 (2), pp 103-108	Early supported discharge after stroke
22	Larsen T, Olsen TS, Sorensen J.	2006	International Journal of Technology Assessment in Health Care, 22 (3) pp 313-320	Early home-supported discharge of stroke patients: a health technology assessment
23	Legg L, Langhorne P	2004	The Lancet 363 (9406), pp 352-6	Rehabilitation therapy services for stroke patients living at home: systematic review of randomised trials
24	Miller P, Gladman JRF, Cunliffe AL, Husbands SL, Dewey ME, Harwood RH	2005	Age and Ageing 34, pp 274-80	Economic analysis of an early discharge rehabilitation service for older people
25	Mudge S, Stott NS	2007	Physiotherapy 93 (3), pp 189-200	Outcome measures to assess walking ability following stroke: a systematic review of the literature
26	Noorani HZ, Brady B, McGahan L, Teasell R, Skidmore B, Doherty TJ.	2003	Canadian Coordinating Office for Health Technology Assessment 10, pp 1-19	A clinical and economic review of stroke rehabilitation services
27	Noorani HZ, Brady B, McGahan L, Teasell R, Skidmore B, Doherty TJ.	2003	Canadian Coordinating Office for Health Technology Assessment	Stroke rehabilitation services: systematic reviews of the clinical and economic evidence

Article No	Authors	Date	Journal	Title
28	Partridge C, Mackenzie M, Edwards S, Reid, Jayawardena S, Guck N, Potter J	2000	Physiotherapy Research International 5 (4) pp 230-40	Is dosage of physiotherapy a critical factor in deciding patterns of recovery from stroke: a pragmatic randomised controlled trial
29	Galvin P, Cusack T, Stokes E	2008	BMC Neurology 8:22	A randomised controlled trial evaluating family mediated exercise (FAME) therapy following stroke
30	Rodgers H, Mackintosh J, Price C, Wood R, McNamee P et al	2003	Clinical Rehabilitation 17 (6) pp 579-89	Does an early increased-intensity interdisciplinary upper limb therapy programme following acute stroke improve outcome?
31	Teng J, Mayo NE, Latimer E, Hanley J, Wood Dauphinee S et al	2003	Stroke 34, pp 528-536	Costs and caregiver consequences of early supported discharge for stroke patients
32	Van Peppen RP, Kwakkel G, Wood Duaphinee S, Hendricks HJ et al	2004	Clinical Rehabilitation 18 (8) pp 833-862	The impact of physical therapy on functional outcomes after stroke: what's the evidence?
33	Von Koch L, de Pedro-Cuesta J, Kostulas V, Almazan J, Holmqvist LW	2001	Cerebrovascular Diseases, 12 pp 131-138	Randomised controlled trial of rehabilitation at home after stroke: One year follow-up of patient outcome, resource use and cost
34	Wolfe CDA, Tilling K, Rudd AG	2000	Clinical Rehabilitation 14, pp 563-569	The effectiveness of community-based rehabilitation for stroke patients who remain at home: a pilot randomised trial
35	Young J, Forster A	1993	Journal of the Royal College of Physicians, 27, 3 pp 252-258	Day hospital and home physiotherapy for stroke patients: a comparative cost-effectiveness study
36	Foley, NC, Teasell RW, Bhogal SK, Doherty T, Speechley MR	2003	Topics in Stroke Rehabilitation; 10 (2) pp 1-18	The efficacy of stroke rehabilitation: a qualitative review
37	Stroke Team, Department of Health	2007	Report, Department of Health	Impact Assessment: a new ambition for stroke
38	Fjaertoft H, Indredavik B, Magnussen J, Johnsen R	2005	Cerebrovascular Diseases, 19 (6) pp 376-383	Early supported discharge for stroke patients improves clinical outcomes. Does it also reduce use of health services and costs



<b>N</b>	<b>Design of Study</b>	<b>Methods and Patients</b>	<b>Overview summary</b>	<b>Clinical Results</b>	<b>System Results</b>	<b>Economic Results</b>	<b>Staffing Costs</b>	<b>Comments</b>
1.	A Multi site single blind randomised controlled trial.	70 patients were recruited from 3 stroke rehabilitation units who had a clinical diagnosis of stroke within the previous six weeks who were able to tolerate and benefit from mobility rehabilitation. After giving informed consent, patients were randomly assigned to one of two groups: a) conventional inpatient stroke services including conventional physiotherapy input (30 -40 minutes direct physiotherapy contact per day, five days per week), or b) conventional stroke services plus additional physiotherapy input (aiming to double the total daily physiotherapy time to 60 -80 minutes per day, five days a week.)	Comparing the effects of augmented physiotherapy input with normal input to discover if the provision of additional inpatient physiotherapy after stroke speeds the recovery of mobility.	The augmented therapy group received more direct contact with a physiotherapist (62 versus 35 minutes per weekday) and were more active (8.0% versus 4.8% time standing or walking) than normal therapy controls. The augmented group tended to achieve independent walking earlier (hazard ratio 1.48, 95% confidence interval 0.90 – 2.43; $p=0.12$ ) and had higher Rivermead Mobility Index (RMI) scores at three months (mean difference 1.6; -0.1 to 3.3; $p=0.068$ ) but these differences did not reach statistical significance.	A modest augmented physiotherapy programme resulted in patients having more direct physiotherapy time and being more active.	Even a modest gain from speeding up recovery after a stroke could be economically attractive if a small increase in therapy input could reduce nursing and 'hotel' costs in hospital.	Two half time study therapists were employed to provide 'back fill' time support for physiotherapists delivering the extra therapy while a third half time therapist carried out blinded assessments of outcome.	The intervention did not produce statistically significant changes in measures of mobility, activities of daily living, patient quality of life, or length of hospital stay.
2.	Systematic Review with meta analysis	Stroke patients were categorized as 1) acute, very weak,	The primary question of this systematic review	Across all stroke participants, strengthening	The findings suggest that strengthening			Even though data from only about half of the

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
	of randomised trials.	<p>2) acute, weak 3) chronic, very weak or 4) chronic, weak</p> <p>21 trials were identified and 15 had data that could be included in a meta analysis.</p> <p>Strengthening interventions were defined as interventions that involved attempts at repetitive, effortful muscle contractions and included biofeedback, electrical stimulation, muscle re-education, progressive resistance exercise, and mental practice.</p> <p>Strength was measured as continuous measures of force or torque or ordinal measures such as manual muscle tests. Spasticity was measured using the modified Ashworth Scale, a custom made scale, or the Pendulum Test. Activity was measured directly,</p>	<p>was</p> <p>Is strength training effective? i.e., do strengthening interventions increase spasticity after stroke, and Is strength training worthwhile? i.e., do strengthening interventions improve activity after stroke.</p>	<p>interventions had a small positive effect on both strength (SMD -0.13, 95% CI 0.13 to 0.54) and activity (SMD 0.32, 95% CI 0.11 to 0.53). There was very little effect on spasticity (SMD - 0.13, 95% CI -0.75 to 0.50).</p>	<p>programs should be part of rehabilitation after stroke.</p>			<p>participants in the 21 trials were available for inclusion in the meta analysis, 476 participants were included in the pooled estimate for spasticity, and 359 in the pooled estimate for activity. Taken together, this suggests that the findings are credible and can be generalized cautiously.</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		e.g., 10-m Walk Test, or the box block test, or with scales that measured dependence such as the Barthel Index.						
3	Literature Review	<p>A review of literature published from 1966 to March 2000 was performed using MEDLINE. More than 600 English – Language articles that had evidence from randomised clinical trials, meta analyses, care guidelines, or other appropriate methods supporting specific care recommendations for patients with acute stroke that could be incorporated into a stroke center model were selected.</p> <p>Members of the Brain Attack Coalition (BAC), a multidisciplinary group of representatives from major professional organisations involved with delivering stroke care participated. Supplemental input was obtained from</p>	The objective of the review was to develop recommendations for the establishment and operation of primary stroke centers as an approach to improve the medical care of patients with stroke.		The formation of an acute team is an important step for organizing and delivering care to patients with acute stroke.	The cost of forming and operating a stroke unit will vary greatly depending on its size, staffing and location. At one end of the spectrum a stroke unit could be part of an existing ICU, using its equipment and staff. This arrangement would incur a minimum additional cost. The cost of building and staffing a new stroke unit could cost \$50,000 to \$500,000, depending on its structure and operations. Once a stroke unit is built, the annual operating costs would depend on its size and staffing level.	The cost of building and staffing a new stroke unit could cost \$50,000 to \$500,000, depending on its structure and operations. In one study the average annual cost for an acute stroke team ranged from \$5000 to \$10000.	Considering the high incidence of stroke and the high costs of this disease, more efficient and effective care will be beneficial for patients with stroke.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		other experts involved in acute stroke care.				By reducing complications and improving patient status at discharge, the savings to the health care system could be substantial.		
4	Randomized controlled trial	<p>155 stroke patients with persisting impairment and disability who, after completing inpatient rehabilitation, were discharged to their homes were allocated to one of three different types of aftercare (1) follow-up home visits by a physician, (2) physiotherapist instruction in the patient's home, or (3) standard aftercare.</p> <p>Out of the 155 stroke patients, 54 received follow up home visits by the physician, 53 were given instructions by a physiotherapist in their own home and 48 received standard aftercare only.</p>	An evaluation to see whether follow up services for stroke survivors could improve functional outcome and reduce readmission rate.	<p>Six months after discharge, functional outcome was assessed with Functional Quality of Movement, Bartel Index, Frenchay Activity Index and Index of Extended Activities of Daily Living.</p> <p>The results of the functional outcome assessment for the 3 randomization groups at 6 months after discharge. No statistically significant differences were demonstrated. However all used measurements showed a tendency towards higher scores, indicating better function, in both intervention groups compared with the control group. This</p>	Follow up services after stroke may be a way of improving functional outcome.			More research in this field is needed. As this study is a small study the risk of type 2 error is considerable, and therefore these results should not be used to dismiss supportive follow up interventions as effective means of maintenance and improvement of various dimensions of functional ability.

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				<p>tendency was most notable for functional quality of movement (p=0.111)            And for basic activities of daily living measured by Barthel Index (p=0.165)</p>				
5	Randomized trial	167 patients received the early discharge package, and 164 received conventional care. Patient utilization of health and social services was recorded over a 12 month period, and cost was determined using data from provider departments and other published sources.	Economic consequences of early inpatient discharge to community based rehabilitation for stroke in an inner London teaching hospital.	<p>In patient stay after randomization was 12 days (intervention group) versus 18 days (controls) (p=0.0001). Average units of therapy per patient were as follows:            physiotherapy, 22.4 (early discharge) versus 15.0 (conventional) (p=0.0006);            occupational therapy, 29.0 versus 23.8 (p=0.002);            speech therapy, 13.7 versus 5.8 (p=0.0001). The early discharge group had more annual hospital physician contacts (p=0.015) and general practitioner clinic visits (p=0.019) but fewer incidences of day hospital attendance (p=0.04).</p>	<p>Opportunity costs are created by the release of inpatient bed capacity. Given the predicted rise of 30% during 1983-2023 in the level of resources needed for stroke, it was assumed that the beds released by the early discharge policy would be needed for an expansion in inpatient caseload for stroke. An annual eligible caseload of 167 strokes was assumed. It was also assumed that the average inpatient stay for these strokes would be 34 days, the average for the early discharge cohort of trial patients.</p>	<p>Average annual costs per patient were £6800 (early discharge) and £7432 (conventional). The early discharge group had lower inpatient costs per patient (£4862 [71% of total cost] versus £6343 [85%] for controls) but higher non-inpatient costs (£1938 [29%] versus £1089 [15%]). Further analysis demonstrated that early discharge is unlikely to lead to financial savings; its main benefit is to release capacity for an expansion in stroke caseload.</p>	<p>Early discharge team consisted of a full time senior grade – 1 physiotherapist and therapy aide who jointly provided a unit of physiotherapy, a senior grade 1 occupational therapist, and a half time grade 2 speech and language therapist.</p> <p>The average staffing establishment per unit of inpatient physiotherapy was 0.17 whole time equivalent senior grade – 1 therapist ).39 whole time equivalent senior grade – 2 therapists, and</p>	<p>Although crude, this analysis suggests that early discharge should not be perceived as a means of generating financial savings. Its major benefit would be to release beds to increase caseload. The overall results indicate that early discharge to community rehabilitation for stroke is both feasible and cost effective. Although this release of resources is unlikely to result in financial savings, it does release capacity to treat more patients.</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
					<p>Given these assumptions, the 3 beds released by the early discharge policy would create capacity for an extra 29 strokes per year, a 17% rise in activity levels. A release of 9 beds (a reduced stay of 18 days, leading to an average overall stay of 22 days) would create capacity for an extra 134 strokes per year, an 80% rise in activity levels.</p> <p>Overall results of this trial indicate that early discharge to community rehabilitation for stroke is cost effective. It may provide a means of addressing the predicted increase in need for stroke care within existing hospital capacity.</p>		0.44 basic therapists.	
6	An open observational behavioral	A total of 64 patients consented and 58 participants	To examine rehabilitation interventions and	Patients were most active when with a physiotherapist,	Stroke units with proven effectiveness in		12 physiotherapists participated in	While evidence in support of stroke rehabilitation is

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
	mapping study	completed both days of observation. Patients less than 14 days post stroke from 5 metropolitan stroke units were observed over 2 consecutive week days at 10 minute intervals between 08.00h and 17.00 h. Physical activity, location and person(s) present were ascertained at each observation. Therapists completed treatment records. Senior staff completed stroke unit surveys. 25 therapists participated in this study. This comprised of 12 physiotherapists, 8 Occupational therapists, and 5 speech therapists.	resulting physical activity patterns of patients managed in acute stroke units to help inform development of a randomised controlled trial of very early rehabilitation.	occupational therapist or nurse. Early intervention by the multidisciplinary team may help prevent secondary complications, such as pneumonia and deep vein thrombosis, commonly seen within the first week following stroke and promote brain recognition and recovery.	reducing death and disability report a median intensity of 45 mins of physiotherapy per patient per week day and occupational therapy of 40 minutes per patient per week day. All of the 11 units included in this survey provided with acute plus rehabilitation care, or sub acute rehabilitation care. The stroke units studied were found to provide substantially less physiotherapy and occupational therapy per day.		this study. Clinical experience ranged from 6 months to 15 years.	strong, research seeking to establish the optimal timing, intensity and frequency of therapy is sparse. Given that research from animal studies has led to concern that intense exercise commenced early after stroke may do more harm than good, safety studies of very early interventions are required.
7	A combined case-control and randomized controlled study with pre and post treatment measures by blinded observers.	16 stroke patients (mean age 56.7 years) participated in this study in a university hospital rehabilitation department to a) evaluate constraint induced movement therapy for chronic stroke patients modified into group practice to limit the	Two weeks of 6hour constraint induced therapy, modified into group practice, significantly improved arm/hand function, as well as the amount and quality of use of the more affected arm.	After 2 weeks of training of the more affected arm for 6h per day in small groups, 11/16 patients improved their performance on the Motor Assessment Scale. The mean difference was 1.44 points (95%) CI 0.59 – 2.28) and the	By changing only one parameter from the original protocol according to Taub, the study have been able to show that an adaptation of constraint induced therapy into several patients per therapist (1 therapist per 2 to 3			A limitation of this study is the small sample size of patients due to difficulties in recruiting due to not meeting the inclusion criteria.

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		demand on therapist resources and b) explore whether extended mitt use alone may enhance outcome.	Extending the mitt use seemed difficult for patients to comply with and not associated with any benefit.	improvement in arm motor performance was significant (P=0.003). Similarly, most patients (12/16) improved their hand function on the Sollerman Hand Function Test and the mean difference was 3.81 points (95% CI 0.26 -7.36; P=0.037). There was no significant difference (P = 0.283) in sensory discrimination measured by the two point Discrimination Test and the mean difference before and after the constraint induced therapy was -1.50 points (95% CI - 4.70 to + 1.70). The changes in self reported use of the more affected arm on Motor Activity Log scores, both in terms of amount of use and quality of movement, were also significant (P<0.001; Friedman's Test).	patients) might be a realistic clinical alternative for treating patients with upper extremity paresis after stroke.			
8	Prospective, randomised, single blind clinical controlled trial	30 stroke subjects were recruited into either an upper limb or a mobility group. All subjects received their usual	To investigate whether additional practice of either upper limb or mobility task improved	Both groups improved significantly between pre and post tests on all of the mobility measures, however	These findings support the use of additional task related practice during inpatient stroke	The trend towards a shorter length of rehabilitation stay for the Mobility group subjects has potential		Caution is necessary when interpreting the economic cost finding because length of



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		rehabilitation and an additional session of task related practice using a circuit class format. Independent assessors, blinded to group allocation, tested all subjects. Outcome measures used were three items of the Jebsen Taylor Hand Function Test (JTHFT), two arm items of the Motor Assessment Scale (MAS), and three mobility measures, the Timed Up and Go Test (TUGT), step test, and six minute walk test (6MWT).	functional outcome during inpatient stroke rehabilitation.	only the upper limb group made a significant improvement on the JTHFT and MAS upper arm items. Following 4 weeks training, the mobility group had better loco motor ability than the upper limb group (between differences in the 6MWT of 116.4m, 95% CI 31.4 to 211.3m, Step test 2.6 repetitions, 95% CI -1.0 to 6.2 repetitions, and TUGT -7.6 sec, 95% CI -15.5 to 0.2 sec). The JTHFT dexterity scores in the Upper limb group were 6.5 sec (95% CI – 7.4 to 20.4 sec) faster than the Mobility group.	rehabilitation.  The larger gains in standing balance measured in the mobility group may also reduce risks of falls.	implications for rehabilitation costs.		rehabilitation was considered a secondary outcome, and would have been influenced by extraneous variables.
9	Systematic Literature Review	A systematic literature review of cost analyses or economic evaluations was performed. Study characteristics and results (including mean total cost per patient) were summarized. The level of evidence concerning relative cost or cost effectiveness for each service type was	The objective of the review was to assess the evidence on the relative cost or cost effectiveness of 3 rehabilitation services after stroke: stroke unit care versus care on another hospital ward, early supported discharge services versus usual care			The available evidence suggests that early supported discharge services were modestly lower than usual care, ranging from 2 to 30 %. The difference in costs was statistically significant in only one study by Teng et al.		Several methodological problems were encountered when analyzing the economic evidence.  The Young and Foster study was small, dated and of short duration.

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		determined qualitatively. 15 studies met the inclusion criteria: 3 on stroke unit care, 8 on early supported discharge services, and 4 on community based rehabilitation compared with usual care.	and community or home based rehabilitation versus usual care.			Four of the higher quality studies reported that lower early supported discharge costs were robust in sensitivity analysis.  Young and Foster Study, focused on physiotherapy in the UK. This study reported that the median direct cost of home therapy was 38% lower than rehabilitation in a day hospital. Sensitivity analysis showed the cost results were robust.		
10	Observational Study	Observation was made of the time use by 22 patients with stroke in a specialised rehabilitation unit, feedback was given to the staff, and another observation on 16 patients was made one year later.	Feedback about patients time use can substantially influence management and consequently patients behaviour in rehabilitation.		As a result of the first observation, the physiotherapy staff were urged to organise group sessions for patients with similar levels of disability, allowing practice with a higher patient to staff ratio. The introduction of group sessions into the working programs brought		The study was performed in a stroke rehabilitation unit of the University Hospital of Leuven in Belgium. The staff of the unit comprised of nurses (0.64 full time equivalents per patient (FTE-PP), physiotherapists	No distinction was made with regard to the severity of stroke or the stage of recovery. More research is needed to assess the effect of group interventions on functional recovery in patients with stroke.

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					<p>about a substantial increase in the time spent in physiotherapy (8.1% or 42 minutes per day).</p> <p>During the 2<sup>nd</sup> observation, the time spent on non therapeutic activities, which had decreased to 72.7% of the day in favour of the time used for therapeutic activities, which had increased to 27.3%. Both changes were statistically significant (p=0.001). At the 2<sup>nd</sup> observation, patients were observed 20.2% of the time (105 minutes per day per patient) involved in physiotherapy.</p>		<p>(0.25 FTE –PP), occupational therapists (0.06 FTE-PP), speech therapists (0.04 FTE –PP) and a person responsible for sports related activities (0.03 FTE-PP). Between the 2 observational periods, no staff changes occurred in terms of number or positions of therapists in the different disciplines.</p>	
11	Observational	Part of Collaborative Evaluation of Rehabilitation in Stroke across Europe (CERISE). The complete package of stroke rehabilitation was compared	To compare the content of physiotherapy and occupational therapy for sub acute stroke patients between 4 European	Ambulatory exercises, transfers, exercises and balance in standing and lying occurred significantly more often in physiotherapy				

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		<p>between 4 European rehabilitation centers. The study was conducted in the University Hospital Leuven, Belgium; City Hospital and Queens Medical Centre, Nottingham; RehaClinic, Bad Zurzach, Switzerland; and Fachklinik, Herzogenaurach, Germany.</p> <p>Patients inclusion criteria for the CERISE project were</p> <ol style="list-style-type: none"> <li>1) 1<sup>st</sup> ever stroke as defined by WHO</li> <li>2) 40 – 85 years of age</li> <li>3) Score on Gross motor Function of the Rivermead Motor Assessment (RMA-GF) <math>\leq 11</math>, a score on leg and trunk function <math>\leq 8</math>, or a score on Arm function <math>\leq 12</math> on admission to the rehabilitation center. <p>The exclusion criteria were</p> <ol style="list-style-type: none"> <li>1) other neurological impairments with permanent damage;</li> <li>2) stroke-like symptoms attributable to subdural hematoma, tumour,</li> </ol> </li></ol>	rehabilitation settings.	<p>sessions. Activity of daily living, domestic activities, leisure activities, and sensory, perceptual training, and cognition occurred significantly more often in OT sessions.</p>				

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		encephalitis, or trauma; 3) prestroke Barthel index ,50; 4) admitted to the rehabilitation center > 6 weeks after stroke; and 5) no informed consent. The study was approved by the ethics committee for each center.						
12	Costing Study using a bottom up approach	340 patients who were consecutively admitted to the department of Neurology, with the diagnosis of stroke or transient ischemic attack between January 1 and June 30, 2000. Clinical status and course were evaluated by using the Barthel Index and Modified Rankin scale. Employing a bottom up approach, they calculated the costs from the perspective of the hospital and the third party payer.	An evaluation of the costs of acute care of the different cerebrovascular insults in a stroke unit.	Across all diagnostic groups, a mean clinical improvement was observed at the time of discharge.		Inpatient costs were €3020 (US \$3290) for TIA, €3480 (US \$3790) for ischemic stroke (IS), and €5080 (US \$5540) for intra cerebral hemorrhage (ICH) and differed significantly among these subgroups ( $p < .05$ ).  The costs of physiotherapy and speech therapy were based on the hourly wage of a physiotherapist or logopedist in the department.		The study only addresses direct medical costs.  The expenses owing to the postacute inpatient stay are biased because they were not able to calculate costs for the patients discharged to home.
13	Prospective, Randomized, controlled study.	In one stroke ward and an acute stroke unit in a large teaching hospital in southern china, 156	An investigation whether additional early physiotherapy after stroke	Patients from the AEP group had a high dropout rate (n=28), but those remaining made				The study is weakened by the large loss of patients in the group receiving

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		patients were recruited. One group (n=78) received additional early physiotherapy (AEP) for 45 minutes, five days a week for four weeks starting within the first week since stroke onset; the routine therapy (TT) group (n=78) received no professional rehabilitation therapy.	improved functional recovery in stroke patients.	relatively better functional recovery at 30 days than those from the RT group if measured by the Modified Barthel Index. Multiple linear regression analysis revealed that cognitive disturbance, aphasia, double incontinence, site of lesion and sensory impairment might affect functional recovery after stroke.  Early rehabilitation after stroke may be difficult to give due to patient choice or stroke severity. Additional early physiotherapy did not show major benefits except in independence in activities of daily living.				additional therapy.  Further clinical observation is needed to clarify the effect of early additional rehabilitation therapy on functional recovery of stroke patients.
14	Randomised controlled trial	359 patients older than 50 years were screened for a single masked, randomised controlled trial to assess the effects of community physiotherapy. Assessments were made at baseline 3, 6, and 9 months in	An assessment of the effectiveness of this treatment in patients who had mobility problems 1 year after stroke.	Follow up was available for 146 patients (86%). Changes in scores in the Rivermead mobility index (score range 0 – 15) differed significantly between treatment and control groups at 3 months ( $p=0.018$ ),	Routine physiotherapy causes small and transitory improvement in the mobility of patients with persisting difficulties 1 year after stroke.		Physiotherapy treatment was done by an established community physiotherapy service (13 staff) as part of their usual work. Initially, all patients were	

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		<p>170 eligible patients assigned treatment or no intervention. The primary outcome was mobility measured by the Rivermead mobility index. Secondary outcome measures were gait speed, number of falls, daily activity (Barthel index scores), social activity (Frenchay activities index), hospital anxiety and depression scale, and emotional stress of carers (general health questionnaire 28). Analyses were by intention to treat.</p>		<p>but only by a median or 1 point (95% CI 0-1) with an interpolated value of 0.55 (0.08 -1.04). Gait speed was 2.6 m/min (0.30-4.95) higher in the treatment group and 3 months. Neither treatment effect persisted at 6 months and 9 months follow up. Treatment had no effect on patients' daily activity, social activity, anxiety, depression, and number of falls, or on emotional stress of carers.</p>			<p>assessed by a physiotherapist and then treated with a problem solving approach at home or in outpatient rehabilitation centres. A standard maximum contact period of 13 weeks with a minimum of 3 contacts per patient was agreed with the physiotherapist before the start of the trial.</p>	
15	<p>Combined analysis of two randomized trials</p>	<p>The Oxford study used a cross-over design with 3 month blocks in which patients were randomized to early or delayed community physiotherapy intervention. The Bradford study used a single blinded, parallel group trial in which patients were randomized to receive, or not receive, community physiotherapy treatment.</p>	<p>Two single centre, randomized controlled trials of physiotherapy for patients more than one year post stroke have been undertaken in Oxford and Bradford in the UK and the results from these two trials have been combined to give a more precise estimate of effectiveness.</p>	<p>There was a significant but clinically small improvement in mobility at 3 months in the combined treatment group measured by the Rivermead Mobility Index (median of the differences = 0(95% confidence interval (CI) 0, 1): interpolated values = 0.43 (95% CI 0.08, 0.80)) and gait speed (treatment effect 2.7m/min (95% CI 0.94, 4.46)).</p>	<p>More effective physiotherapy intervention is required for stroke patients with persisting mobility problems after stroke.</p>			<p>Future studies need to determine if a sub group of patient responders can be identified for service targeting or if a more focused therapy intervention should be used.</p>

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		<p>Ninety four patients were recruited in the Oxford study and one hundred and seventy patients into the Bradford study so there were 264 patients available for the combined analysis: 134 patients randomized to physiotherapy and 130 patients to control. Both studies excluded patients if there was a cause other than stroke for mobility problems.</p> <p>The Bradford and Oxford patients and the combined treatment and control groups were compared at baseline using t-tests for continuous data and Mann-Whitney U test for the Barthel Index, Rivermead mobility index, Frenchay activities index, and the Hospital Anxiety and Depression Scale.</p>						
16	Qualitative research methodology comprising a series of semi structured	A purposeful sampling strategy recruited 20 physiotherapists working in home based stroke	To address the paucity of information on the content of home interventions for people with stroke	Participants described patients as being fatigued, frustrated, depressed, and scared once	This study presents a conceptual model or framework for physiotherapy practice for people		20 physiotherapists were interviewed. Participants had been qualified in	



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	interviews.	rehabilitation in New Zealand.	by reporting on the practice of physiotherapeutic home based stroke rehabilitation in New Zealand.	discharged home and said that the primary aim of rehabilitation in the home is preparation for life after stroke.	with stroke living in the community.		the profession for 3 – 40 years. 18 participants worked in the public health care system and 2 participants worked in the private sector. Participants had varying degree of community stroke experience: 4 – 12 months (n=4), 1 to 3 years (n=5), 3 to 10 years (n=6), and over 10 years (n=5) of experience.	
17	Retrospective case-note audit	Over 95% of hospitals/sites who manage stroke in England, Wales and Northern Ireland took part in the most recent round of the Sentinel Audit. The clinical audit took place from 1 April to 30 June 2001 and incorporated 235 hospitals/sites submitting data on 8200 patients. The organizational audit took place in January 2002 and incorporated 240 hospitals/sites. Data	To compare the results of the occupational therapy and physiotherapy elements of the most recent National Sentinel Audit with the occupational therapy and physiotherapy-specific recommendations of the National Clinical Guidelines for Stroke (NCGS).	Over 40% of patients are not assessed on admission to hospital by physiotherapists or occupational therapists within the agreed time frame of 72h and seven days respectively and therefore not complying with the national standards for stroke care.				The implementation of profession-specific stroke audit will identify areas where further effort and resources should be targeted.  It must be acknowledged that there are several limitations in the interpretation of the results of the National Sentinel Audit of Stroke. Hospitals and sites taking part will have varied in size,

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		are presented from 235 with both clinical and organizational data, under the headings of approached to rehabilitation; carers/families; rehabilitation interventions; and transfer to the community.						ranging from large teaching hospitals to small community hospitals.  There is a need for both multi professional and profession-specific audit.
18	Systematic Review and semi structured interviews.	The study was conducted in two major parts. Part 1 was a systematic review of 15 studies developing descriptions of current physical therapies. Studies were identified by an electronic search of MEDLINE, EMBASE and CINHAI and by searching the reference lists of studies fulfilling the review's inclusion criteria. Three reviewers extracted data independently on methodologies used. In part 2, seven experienced neurophysiotherapists completed individual semi structured interviews.	To identify methodologies used to describe the content of current physical therapy and to formulate a treatment schedule for 'mobilisation and tactile stimulation' (MTS) for the paretic upper limb after stroke as a precursor to evaluate research.	Identified treatment aims included reduction of hypersensitivity, increased sensory awareness and improved alignment of structures.	Doses ranged from 1 to 45 minutes with a frequency of once per week to two to three times per day. A maximum of 2 weeks treatment was suggested if no progress.		Participants' inclusion criteria for part 2 included chartered physiotherapists at senior grade with a minimum of 1 year's experience working with patients with stroke.	All participants made reference to insufficient time and opportunity to treat the hand during a normal day on a busy acute or rehabilitation ward. The dose given was said to be governed by the resources available and not based on evidence.

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19	Meta Analysis	<p>A database of articles published from 1966 to November 2003 was compiled from MEDLINE, CINAHL, Cochrane Central Register of Controlled Trials, PEDro, DARE, and PiCarta using combinations of keywords. Twenty of the 31 candidate studies, involving 2686 stroke patients, were included in the synthesis.</p> <p>On average, the experimental group received twice as much physical therapy (44.5 minutes; standard deviation, 30.8) and occupational therapy (13.9 minutes; standard deviation, 16.8, respectively). The additional time that exercise therapy was provided to the experimental group ranged from 132 minutes to 6816 minutes, with a weighted average of 959 minutes or ≈hours of additional therapy time per patient.</p>	<p>A systematic review of studies that addresses the effects of intensity of augmented exercise therapy time (AETT) on activities of daily living (ADL), walking, and dexterity in patients with stroke.</p> <p>The meta analysis resulted in a small but statistically significant summary effect size with regard to activities of daily living measured at the intervention phase.</p>	<p>Increasing the number of hours of therapy per week given to adults recovering from brain injury accelerated the rate of recovery of personal independence. Cumulative meta analysis strongly suggests that at least a 16 hour difference in treatment time between experimental and control groups provided in the first 6 months after stroke is needed to obtain significant differences in Activities in Daily Living.</p>	<p>The augmented time of exercise therapy ranged from a minimum of 132 to a maximum of 6816 minutes. Cumulative meta analysis of studies showed a positive trend in favor of those studies that applied to larger treatment contrast between experimental and control therapies.</p>			<p>Future studies should focus on the effects of larger treatment contrasts in stroke, either by increasing the intensity of exercise time in the experimental group and/or by restricting the therapy in the control group.</p> <p>This review demonstrated the lack of data to define the treatment contrast needed to optimize effects of rehabilitation. At least it suggests that treatment contrasts between control and experimental groups should be extended in future high quality Random Controlled Trials.</p>

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20	A longitudinal randomized controlled stratified trial	<p>This study was a longitudinal randomized controlled stratified trial conducted on male and female patients with first ever stroke during the first year after onset. Seventy five patients fulfilled the inclusion criteria and were randomized to one of the two groups after the first test occasion 3-5 days after admission: 35 in an intensive exercise group and 40 in a regular exercise group.</p> <p>During the acute phase of rehabilitation at the hospital both groups received functional task oriented training tailored to their specific needs. The amount of training was equal in the two groups, with two periods per day, the two periods comprising a total of 1 hour of physiotherapy in combination with other specialized therapies according to the patients' needs.</p>	<p>To find out if there were any differences in improvement and maintenance of motor function, activity of daily living and grip strength between patients with first ever stroke receiving two different strategies of physical exercise during the first year after stroke.</p> <p>A further aim was to determine whether there were any differences in the numbers of patients who lived in their own homes after one year, who used community services, or received help from relatives between the groups, receiving the two different types of training regimes.</p>	<p>After initial rehabilitation following stroke, planned regular exercise continued over one year leads to a greater improvement in motor function than treatment 'as required'.</p> <p>Both groups improved significantly in motor function (Motor Assessment Scale), activities of daily living (Barthel Index of Activities of Daily Living) and grip strength (vigorimeter) from admission to three months. Between the three month and six month follow up this improvement had stabilized and there were no significant further improvements in either groups. At one year of follow up there was a tendency to a reduction of performance in the Motor Assessment Scale and Barthel Index of Activities of</p>	<p>The mean stay of the patients in the intensive exercise group was 22 days, as compared to 16 days in the regular exercise group (P=0.03). The patients of the intensive exercise group were receiving more help from relatives and the community on all test occasions. These differences were significant only at one year of follow up (P=0.04).</p> <p>The benefit of treating a group of patients with first time stroke for a longer period, such as one year, is that secondary complications in connection with inactivity are minimized. The improvement and maintenance of function can be then attributable to the spontaneous recovery and rehabilitation.</p>			<p>One of the weaknesses of the study is the fact that for different reasons the two groups were equally active in doing physical exercises. Another weakness is the fact that the intensive exercise group did not comply 100% with the proposed interventions.</p>

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		<p>At discharge the patients were randomized into the two separate groups of intensive exercise and regular exercise group.</p> <p>Arrangements were made for patients allocated to the intensive exercise group to have physiotherapy during four periods, with a minimum of 20 hours every third month, in the first year of stroke.</p> <p>If the patients in the regular exercise group were considered to be in need of follow up treatment or rehabilitation they were assigned to that, but not on a regular basis.</p> <p>The intervention sessions started immediately after discharge, two or three times a week if the patient was at home or attending a private physiotherapy practice, and daily if he or she was in a</p>		<p>Daily Living in both groups whereas grip strength still seemed to be improving.</p> <p>The difference of improvement from admission to discharge was significant in favour of the intensive exercise group, in the Motor Assessment Scale total score (intensive exercise group, in the Motor Assessment Scale total score (intensive exercise group 7.5; regular exercise group 1.7, P=0.01), and in Barthel Index of Activities of Daily Living total score (17.4 versus 8.9, P=0.04).</p>				

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		rehabilitation ward. This intervention was repeated after 3 months, 6 months and 1 year.						
21	Systematic review	This report sets out a systematic review of all randomized trials of early supported discharge that includes a total of 12 randomized clinical trials (n=1659 participants). The analysis was done using Cochrane Review methodology. In order to avoid publication bias, comprehensive searching and inclusion of published and unpublished data was carried out.	A systematic review of all randomized trials of early supported discharge	There was a reduced odds of death or dependency equivalent to 5 fewer adverse outcomes (95% confidence interval 1 -10) for every 100 patients receiving an early supported discharge service (p=0.04)  Patients who received ESD services were significantly	The length of stay for those receiving Early Supported Discharge services was on average, reduced by 8 days (95% confidence interval (CI) 5-11; p< 0.001) while hospital readmission rates during follow up were similar between the 2 groups (27% vs. 25%).	Economic analyses have been reported. The underlying assumptions and costs were generally different for each analysis, all concluded that the potential savings (from hospital bed days released) was greater than the cost of the community components of ESD service.		
22	Systematic Literature Review	A systematic literature search for randomized trials (RCTs) on "early supported discharge" (EHSD) was closed in April 2005. RCTs on EHSD without information on i) death or institution at follow up, ii) change in Barthel Index, iii) length of hospital stay, iv) intensity of home rehabilitation, or (v) baseline data are excluded. Seven	A comprehensive and systematic assessment of early home supported discharge by a multidisciplinary team that plans, coordinates, and delivers care at home was undertaken and the results were compared with that of conventional rehabilitation at	The odds ratio (OR) for "Death or institution" is reduced significantly by EHSD: OR= .75 (confidence interval [CI], 46-.95) and NNT =20. The reduction of the rate of death is not significant. Length of stay is significantly reduced by 10 days (CI, 2.6-18 days).		The costs for an average home rehabilitation patient amounts to 1,340 USD (April 2005).  The calculated costs of the intervention have to be compared with the savings in bed days and nursing homes. The value of saved beds within a perspective of	This cost level is in line with an estimated use of 3.07 whole time staff per 100 patients in a multidisciplinary EHSD team.	

<b>N</b>	<b>Design of Study</b>	<b>Methods and Patients</b>	<b>Overview summary</b>	<b>Clinical Results</b>	<b>System Results</b>	<b>Economic Results</b>	<b>Staffing Costs</b>	<b>Comments</b>
		RCTs on EHSD with 1,108 patients followed 3-12 months after discharge are selected for statistical meta analysis of outcomes. The costs are calculated as a function of the average number of home training sessions.	stroke units.			12 months might cautiously be priced as a variable saving corresponding to an alternative use as simple nursing days.		
23	Systematic Review	<p>A systematic review of randomised trials of outpatient services, including physiotherapy, occupational therapy and multidisciplinary teams. The Cochrane collaboration methodology was used.</p> <p>14 trials were identified (1617 patients). Mean age of patients in the 14 studies ranged from 55 to 15.5 years. Baseline Barthel index scores were available for 8 trials and these suggested that patients were of mild to moderate disability.</p>	This review aimed to assess the effects of therapy based rehabilitation services targeted at stroke patients resident in the community within 1 year of stroke onset or discharge from hospital.	Therapy based rehabilitation services for stroke patients living at home reduced the odds of deteriorating in personal activities of daily living (odds ratio 0.72 [95% CI 0.57-0.92], p=0.009) and increased ability of patients to do personal activities of daily living (standardized mean difference 0.14 [95% CI 0.02-0.25], p=0.02). For every 100 stroke patients resident in the community receiving therapy based rehabilitation services, seven (95% CI 2-11) would not deteriorate.				Rehabilitation trials can have methodological limitations, such as difficulty in masking patients and therapists, and potential for contamination between groups. In this analysis these risks were reduced by patients being treated in relative isolation at home.
24	Economic evaluation alongside a	To measure the cost effectiveness of an early discharge and	The random control reported that at 3 months	The EDRS reduced the mean length of hospital stay by 9			At 12 months the mean untransformed	An adequately resourced, skilled and managed early

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	randomised controlled trial (RCT)	<p>rehabilitation service (EDRS) in Nottingham, UK.</p> <p>Cost and cost effectiveness analyses were conducted from the perspective of service providers (health and social admission (from randomization), readmission to hospital, hospital outpatient visits, stays in nursing and residential homes, general practitioner contact, community health services and social services. The effectiveness measure was the EuroQol EQ-5D score, from which quality adjusted life years (QALY) were calculated. Cost effectiveness was calculated as cost per QALY gained.</p> <p>370 patients were recruited aged 65 or above who were medically fit for discharge, had social and rehabilitation needs that could be met at home and could manage without</p>	the EDRS patients performed better in personal activities of daily living, kitchen and domestic activities of daily living, and had a greater psychological well being.	days, using an average of 22 home visits.			total cost for the EDRS was £8,361 compared to £10,088 for usual care, a saving of £1,727 (P=0.05). Cost effectiveness acceptability curves showed a high probability that the EDRS was cost effective across a range of monetary values for a QALY.	supported discharge scheme is cost effective.



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		24 hour care.						
25	Systematic Review	Searches were conducted of MEDLINE, CINAHL, EMBASE and PsycINFO databases for the time period January 1990-Dec 2005 using appropriate keywords. 357 studies met the selection criteria. 61 different outcome measures were used a total of 848 times to measure walking ability. Six of the outcome measures reflected impairment and 52 reflected limitations of activity and participation.	To identify all outcome measures used in the stroke research literature that included an evaluation of walking ability and evaluate the concepts contained in these measures with reference to the International Classification of Functioning Disability and Health (ICF) framework.	A wide range of outcome measures is available for the assessment of walking ability. Self paced gait speed, spatiotemporal parameters and fast gait speed are the most frequently used measures in the research literature, but represent only one aspect of walking ability. The Rivermead Mobility Index and the Adapted Patient Evaluation Conference System had the greatest breadth of content to assess walking ability, but are used relatively infrequently. Mobility tasks related to function in the community, like walking long distances, around obstacles and over uneven ground, and moving around outside or in buildings other than the home were not well represented by the outcome				Only one author was responsible for study selection and data extraction.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
				measures used in most studies.				
26	Clinical and Economic Review of Stroke Rehabilitation Services	A systematic review of the literature found 22 randomized controlled clinical trials and 14 primary economic studies. The study population included men and women of all ages in hospital based and community based settings who fulfilled a clinical definition of stroke. Only trials with a follow up period of six months or longer were selected for the clinical review. The trials used various outcome measures.	<p>To examine the clinical effectiveness, cost and cost effectiveness of four stroke rehabilitation interventions:</p> <p>*Stroke unit care interdisciplinary teams of physicians and other professional staff caring exclusively for stroke patients) versus care on general medical/geriatric wards.</p> <p>*Impact of different intensities of therapies (varying duration of therapies)</p> <p>*Early support discharge (releasing patients from hospital earlier than usual, using organized interdisciplinary teams to essentially support patients at home) versus usual care;</p>	Stroke patients who receive organized in patient care in a Stroke unit are more likely to be alive, independent and living at home after a stroke.	Early Supported Discharge (ESD) patients showed significant reductions in the length of hospital stay equivalent to approximately 10 days.	<p>There is some evidence that the total cost of Stroke unit rehabilitation is comparable to care provided in another type of hospital ward.</p> <p>There is moderate evidence that ESD services can provide care at modestly lower total costs (versus usual care) for stroke patients with mild or moderate disability. No significant differences were observed in primary outcomes between home based rehabilitation and usual care, and no firm conclusions can be drawn regarding its relative total cost.</p>		<p>Several notable methodological problems were encountered when analyzing the clinical and economic evidence.</p> <p>To allow stronger conclusions about the clinical effectiveness, the quality of life and the relative cost or cost effectiveness of rehabilitation interventions after stroke, further research would be required, particularly in a Canadian setting.</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
			and  *Rehabilitation in the community (hospital base outpatient therapy clinics or home based therapy) versus usual care.					
27	Systematic Reviews of the Clinical and Economic Evidence	Published literature between January 1995 and July 2002 was identified by searching various data bases using DIALOG and other bibliographic systems. Randomized controlled trials (RCTs) with a follow up period of 6 months or longer post randomization were sought. Outcome measures included death, physical dependency as primary assessed by the Barthel Index (BI), the number of patients in institutions or at home at the end of scheduled follow up, health related quality of life (HRQoL) and length of hospital stay following randomization. Trial quality was assessed	To evaluate the clinical effectiveness and cost effectiveness of rehabilitation interventions after stroke through systematic reviews of clinical and economic studies.	Langhorne et al (1996) in a meta-analysis of 7 Random controlled trials (n=597 patients) looking at the effects of differing intensities of physiotherapy showed a non significant reduction in death (OR 0.60, 95% CI 0.33;1.09) and a significant reduction in the combined outcome of death or dependency (OR 0.54, 95% CI 0.34; 0.85), with higher intensities of treatment provided within four months post stroke.	Overall, no statistically significant differences were observed regarding outcomes of home rehabilitation versus hospital based alternatives.	6 higher quality studies reported a trend toward modestly lower costs for Early Supported Discharge services compared to usual care. This finding was statistically significant in only one Canadian study which demonstrated the greatest cost savings (30%) of all the ESD studies, amounting to about C\$3300 over the three months of the study.		There is a need for better reporting in published studies including a fuller and clearer description of the elements of stroke rehabilitation services.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>in terms of the method of randomization, concealment of treatment allocation, blinding of outcome assessment and handling of patient attrition in the analysis. Binary data for each trial were expressed as odds ratios (OR) and 95% confidence intervals (CI) and continuous data as weighted mean difference (WMD). Sensitivity analysis was done to assess the impact of follow up and trial quality on mortality rates between the intervention and control groups.</p>						
28	Randomized Controlled Trial	<p>A pragmatic, randomized, single blind, controlled trial comparing recovery from disability in subjects receiving the current standard amount of 30 minutes physiotherapy with those receiving double that amount (60 minutes). The study included measures of physical performance and function,</p>	<p>A pragmatic, randomized, single blind, controlled trial comparing recovery from disability in subjects receiving the current standard amount of 30 minutes physiotherapy with those receiving double that amount (60 minutes).</p>	<p>There was a small cluster of variables where differences were apparent in the sub groups-first age then impairment, in terms of problems of communication and spatial awareness, and also the psychological variables of mood and perceived control over recovery.</p>				<p>Additional physiotherapy is expensive and unlikely to be funded routinely by the NHS.</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>psychological aspects of anxiety and depression, and perceived control over recovery. 114 subjects were recruited to the study; full six week data are available for 104 subjects and six month data for 93 subjects.</p> <p>The study population comprised all patients with a diagnosis of stroke, according to WHO (1989) criteria, admitted over a two year period to the Canterbury Stroke Unit.</p>		<p>Comparison of initial to six week difference scores in the control and intervention groups of the whole sample did not show a significant difference.</p>				
29	Randomized Controlled Trial	<p>Prospective, single blind, randomized, controlled intervention trial. Intervention was community based. Data collection was performed in a research laboratory located in a rehabilitation hospital. 63 older individuals (aged ≥50) with chronic stroke (post stroke duration ≥ 1 year ) who were living in the community. Participants were randomized into intervention group (n=32) or control</p>	<p>To examine the effects of a community based exercise program for older individuals with chronic stroke.</p>	<p>The Intervention group had significantly more gains in cardio respiratory fitness, mobility, and paretic leg muscle strength than controls. Femoral neck bone mineral density of the paretic leg was maintained in the intervention group, whereas a significant decline of the same occurred in controls.</p> <p>Decreased ambulatory capacity and osteoporosis are</p>	<p>The FAME program is feasible and beneficial for improving some of the secondary complications resulting from physical inactivity in older adults living with stroke.</p>			<p>It may serve as a good model of a community based fitness program for preventing secondary diseases. The study has several limitations. The results generalize to a selected group of community dwelling individuals with chronic stroke only. A larger sample size and long term follow up would be required to determine the long term benefits</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		(n=31). The intervention group underwent a fitness and mobility exercise (FAME) program designed to improve cardio respiratory fitness, mobility, leg muscle strength, balance, and hip bone mineral density (BMD) (1-hour sessions, 3 sessions/week, for 19 weeks).		major concerns for this group, increasing muscle strength may also have important implications.  This study provides evidence that regular exercise is beneficial for hipbone health in the chronic stroke population.				and adherence to an ongoing exercise program.
30	Randomized Controlled Trial	123 patients who had had a stroke causing upper limb impairment within the previous 10 days. The intervention group received stroke unit care plus enhanced upper limb rehabilitation provided jointly by a physiotherapist and occupational therapist, commencing within 10 days of stroke, and available up to 30 minutes/day, five days/week for six weeks. The control group received stroke unit care. The primary outcome measure was the Action Research Arm Test (ARAT) three	To determine whether an early increased intensity upper limb therapy programme following acute stroke improves outcome.	No differences in upper limb impairment; upper limb function; upper limb pain; or disability were seen between control and intervention groups. Enhanced upper limb therapy did not result in reduced length of inpatient stay or less in put from health and social services following discharge.		There were no significant differences between groups in total health and social care costs within the six months after stroke. Control group costs were a median of £5435 per patient compared with £5575 for the intervention group.	Patients in the intervention group received more combined therapy (29 minutes versus 4 minutes, p=0.006) and inpatient total therapy (52 minutes versus 38 minutes, p = 0.001) than control subjects. Although the intervention and control groups should have received similar amounts of therapy outwith joint upper limb therapy sessions, the control group received	

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>months after stroke. Secondary outcome measures: Motricity Index; Frenchay Arm Test; upper limb pain; Barthel ADL Index; Nottingham E-ADL Scale; and costs to health and social services at three and six months after stroke.</p>					<p>significantly more inpatient physiotherapy than the intervention group (21 versus 12 minutes per working day, <math>p &lt; 0.001</math>). The total amount of inpatient physiotherapy and occupational therapy (including assistant time) received by the intervention period was 52 minutes per working day for the intervention group and 38 minutes for the control group (<math>p = 0.001</math>). There was no difference in the total amount of therapy received as an outpatient.</p>	
31	Randomized controlled Trial	<p>A randomized controlled trial of stroke patients who required rehabilitation services and who had a caregiver at home.</p>	<p>To estimate the costs associated with an Early supported discharge program compared with those of usual care.</p>		<p>One advantage of having a stroke team in the home is that health issues can be identified and managed early before leading to hospitalization or</p>	<p>Acute care costs incurred before randomization when patients were medically ready for discharge averaged \$3251 per person. The</p>		<p>Results suggest that prompt discharge combined with home rehabilitation appears to lead to better physical health.</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
					emergency visits.	<p>costs for the balance of the acute care stay, from randomization to discharge, were \$1383 for the home group and \$2220 for the usual care group. The average cost of providing the 4 week home intervention service was \$3943 per person. The total cost generated by persons assigned to the home group averaged \$7784 per person, significantly lower than the \$11065 per person for those assigned to usual care. A large proportion of the cost differential between the 2 groups arose from readmissions, for which the usual care group generated costs more than quadruple those of the home intervention group.</p>		



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						Home intervention proved to be more effective than usual care, reduced caregiver burden, and had lower costs, it is more cost effective than usual care.		
32	Systematic Review	MEDLINE, CINAHL, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, DARE, PEDro, EMBASE and DocOnline were searched for controlled studies. Physical therapy was divided into 10 intervention categories, which were analysed separately. If statistically pooling was not possible due to lack of comparability between interventions, patient characteristics and measures of outcome, a best research synthesis was performed. The best research synthesis was based	To determine the evidence for physical therapy interventions aimed at improving functional outcome after stroke.	Based on high quality RCTs strong evidence was found in favour of task oriented exercise training to restore balance and gait, and for strengthening the lower paretic limb. Summary effect sizes (SES) for functional outcomes ranged from 0.13 (95% CI 0.03-0.23) for effects of high intensity of exercise training to 0.92 (95% CI 0.54 – 1.29) for improving symmetry when moving from sitting to standing. Strong evidence was also found for therapies that were focused on functional training of the upper limb such as constraint induced movement therapy (SES 0.46, 95% CI	The review showed small but statistically significant SESs supporting the intensity of exercise training. This represented a mean improvement of 5% on Activities of Daily Living.		Exercises for upper limb, therapy time ranged from 30 – 90 min per day, 3 – 5 days a week for 5 – 20 weeks.	Most studies exhibited methodological flaws such as lack of randomization or intention to treat analyses and the use of un blinded observers. This plus the disregard for systematic drop outs tend to suggest that bias exists.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>on methodological quality (PEDro score). In total 151 studies were included in this systematic review; 123 were randomized controlled trials (RCTs) and 28 controlled clinical trials (CCTs).</p>		<p>0.07-0.91), treadmill training with or without body weight support, respectively 0.70 (95% CI 0.29-1.10) and 1.09 (95% CI 0.56 – 1.61), aerobics (SES 0.46, 95% CI 0.05-0.74), external auditory rhythms during gait (SES 0.91; 95% CI 0.40-1.42) and neuromuscular stimulation for glenohumeral subluxation (SES 1.41; 95% CI 0.76 - 2.06).</p>				
33	Randomized Controlled Trial	<p>Patients admitted to Huddinge University Hospital, Stockholm, Sweden, from September 1993 to April 1996, diagnosed with first or recurrent stroke according to the World Health Organization were screened for inclusion in a randomized controlled trial of early supported discharge and continued rehabilitation at home.</p> <p>Eighty three patients, moderately impaired 5-7 days after acute stroke, were included</p>	<p>To evaluate early supported discharge and continued rehabilitation at home after stroke, at a minimum of 6 months after the intervention, in terms of patient outcome, resource use and health care cost.</p>	<p>Multivariate regression analysis showed that intervention had a significant effect on independence in activities in daily living.</p> <p>At 1 year after stroke onset, adverse outcome in terms of number of deaths or dependencies was 10 (25%) in the Intervention group (HRG) versus 18 (44%) in the Control group (RRG) (p=0.074).</p>	<p>A significant difference in inpatient hospital care, initial and recurrent, was observed, with a mean of 18 (intervention) versus 33 days (control) (p=0.002). Further significant differences were that the control group registered more outpatient visits to hospital occupational therapists (p=0.02), private physical therapists (p=0.03)</p>	<p>A significant difference in use of bed days occurred during the initial hospitalization. Readmissions added 4 days to the mean length of hospital stay during the first year in both groups. Total number of bed days in the first year was 709 for the HRG (mean = 18) versus 1,244 for the RRG (mean = 33), thus amounting to a significant</p>		<p>Caution should, however, be exercised since health care cost figures were used for comparative purposes only and do not represent an economic health care analysis or the true total cost of home or routine rehabilitation.</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>in a randomized controlled trial, 42 being allocated to the intervention and 41 to routine rehabilitation. One year follow up of patient outcome included mortality, motor capacity, dysphasia, activities of daily living, social activities, perceived dysfunction, self reported falls.</p>			<p>In Sweden, early supported discharge with continued rehabilitation at home proved no less beneficial as a rehabilitation service, and provided care and rehabilitation for 5 moderately disabled stroke patients over 12 months after stroke onset for the cost of 4 in routine rehabilitation.</p>	<p>difference (<math>p = 0.002</math>).</p> <p>Comparison of estimated cost of health care and rehabilitation during the first year after stroke onset revealed a difference in cost of SEK 19,494 (approximately Euros 2,300) per patient in favour of home rehabilitation.</p> <p>The average cost of health care per HRG patient was 78% of that per average RRG patient. Cost of health care and rehabilitation over 12 months for 5 patients in the HRG was similar to that for 4 in the RRG.</p>		
34	Randomized Controlled Trial	<p>A community based register using multiple sources of notification was maintained in South London for all strokes occurring between January 1993 and July 1995. Patients were randomized to</p>	<p>To assess the effectiveness of community based rehabilitation for stroke patients who were not admitted to hospital in South London.</p>				<p>The community rehabilitation team comprised a senior physiotherapist grade 1 with neurological training, a senior occupational therapist grade</p>	<p>The weakness of the study reported here is that it involved only 43 patients, although this represents all the community cases notified to the stroke register over a two and a</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		receive either usual community care or home treatment by a rehabilitation team.					1, a half time speech and language therapist with adult neurological training and a full time therapy aide.	half year period that did not die soon after their stroke.
35	Comparative Cost effective study	<p>A cost effectiveness analysis involves comparing the costs of a particular health care programme with the outputs. The healthcare benefits are reflected by the measurements of the Bradford community stroke trial. The costs include direct monetary costs of a service as well as indirect costs such as patient and carer distress.</p> <p>95 patients were residents in the Bradford Health Authority; 43 were randomly allocated to attend day hospital group and 52 to receive home physiotherapy.</p>	A randomized trial comparing day hospital attendance with home physiotherapy for elderly stroke patients leaving hospital.	Home physiotherapy should be the treatment of choice for stroke aftercare.		The median cost for the day hospital patients over the first eight weeks was £620.00 (interquartile range £555.00 - £730.00) and £385.00 for the home physiotherapy group (interquartile range £240.00 - £510.00). These costs were significantly different (median difference £265.00, 95% confidence interval £190.00 - £340.00; p < 0.01). There were no significant differences between the two groups for the indirect costs.	The home treated patients received a median of 11 visits from the home physiotherapists during 8 weeks study.	A cost analysis study is limited by the assumptions and estimated that need to be made. In costing the day hospitals and home physiotherapy service, the study calculated costs incurred in operating the whole service rather than costs associated with individual courses of treatment received by patients.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
						<p>Home rehabilitation is more cost effective alternative to day hospital care for stroke patients leaving hospital. Day hospital stroke after care cost 61% more than home treatment.</p> <p>It would be possible to treat 16 patients by home physiotherapy for the same cost as 10 patients at the day hospital.</p>		
36	Qualitative Review	The review was limited to Randomized controlled trials (RCTs) that evaluated inpatient stroke rehabilitation as an intervention and assessed at least one of the following outcomes: functional outcome, mortality, length of hospital stay, and/or rate of institutionalization. A comprehensive search of five electronic data bases (MEDLINE, EMBASE,		There is evidence that patients with mild, moderate, and severe stroke may benefit from stroke rehabilitation in variable and divergent ways. Functional outcome and length of hospital stays were positively impacted by stroke unit for patients with moderately severe stroke, whereas mortality and length of stay were significantly reduced				The inclusion of a large number of patients with mild strokes may have masked or diluted the benefit of treatment through a ceiling effect.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>MANTIS, PASCAL, and Sci Search) identified papers published between 1995 and 2002. To assess the methodological quality of the articles, the PEDro scoring system was used. 21 individual articles, representing 12 RCTs involving 2,813 patients, were identified.</p>		<p>for patients with severe stroke. Functional recovery was significantly improved at a faster rate for patients in the stroke rehabilitation group, when the same amount of therapy was delivered within a shorter period of time.</p>				
37	<p>Impact Assessment (Costs and Benefits of the National Stroke Strategy)</p>	<p>This impact assessment sets out the major costs and benefits that may be associated with the National Stroke Strategy.</p> <p>All costs and Benefits are for England only and based on 2007 prices.</p>		<p>Approximately 1,100-1,600 strokes will be prevented, and there will be 4,700-6,700 more independent survivors of stroke. The estimated QALY gain per annum associated with these benefits, assuming a value per QALY of £38,800, is £422m to £650m. In addition, there are significant savings to social services, estimated at £95m per annum.</p>	<p>Stroke units are known to save lives and reduce disability and the paper recommends the use of Acute Stroke Units.</p> <p>For life after stroke, rehabilitation stroke units are recommended.</p> <p>Coordinated early supported discharge would bring savings in terms of length of stay, on average 9 days per patient, and improved long term outcomes.</p> <p>Specialist</p>	<p>The average annual cost, when all recommendations are fully implemented, is £189m and the average annual saving is £60m to the NHS. The net annual cost to the NHS is estimated at £129m (range £78m-£180m).</p> <p>Coordinated early supported discharge at full implementation would bring a saving of approximately £33 million per annum.</p> <p>At full implementation</p>	<p>The staffing Assumptions made for the acute stroke centre's includes one whole time equivalent physiotherapist and 0.5 physiotherapist assistant.</p> <p>For rehabilitation stroke units, staffing assumptions made for physiotherapists are 1.2 physiotherapists and 0.4 physiotherapists assistant.</p> <p>Staffing assumption 1</p>	

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
					community stroke teams helps to improve outcome for stroke survivors in terms of reduced dependence and also helps to reduce the burden on carers. At full implementation around 1,500 more stroke survivors would be independent each year and as a result this would bring a saving of £38 million per annum.	approximately 200 strokes would be prevented each year and 300 stroke survivors would retain their independence. This would result in a saving of an estimated £12 million.	physiotherapist, 1 occupational therapist, 1 speech and language therapist, 1 nurse and 1 clerical support. (Therapists provide 2 sessions per week at a clinic).	
38	Long term follow up of a Randomized Controlled Trial.	A randomized controlled trial in which 320 acute stroke patients from the city of Trondheim were admitted to the stroke study during a period of 24 months from March 1995. They were allocated to either ordinary stroke unit service (OSUS) (160 patients) or stroke unit care with early supported discharge (160 patients, in the extended stroke unit service (ESUS). The ESUS consists of a mobile team that	To evaluate the long term effects of an extended stroke unit service (ESUS), characterized by early supported discharge.	56.3% of the patients in the ESUS versus 45.0% in the OSUS were independent (RS ≤ 2) (P=0.045). The number needed to treat to achieve 1 independent patient in ESUS versus OSUS was 9. The odds ratio for independence was 1.56 (95% CI. 1.01 to 2.44). There were no significant differences in BI score and final residence. Stroke service based on treatment in a stroke unit combined with	A mobile team coordinating the rehabilitation in familiar surroundings may allow for an enriched environment for the patients and their relatives. In contrast it appears that early discharge from the hospital without enhanced stroke services may lead to an increase in morbidity.			Community rehabilitation may offer a significant advantage concerning the long term consequences of stroke. Continuity in the chain of care is of great importance for the efficacy of the rehabilitation process.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>coordinates early supported discharge and further rehabilitation. Primary outcome was the proportion of patients who were independent as assessed by modified Rankin Scale (RS) (RS <math>\leq</math> 2=global independence.) Secondary independence measured at 52 weeks were performance on the Barthel Index (BI) (BI <math>\geq</math>95= independent in activities of daily living), differences in final residence, and analyses to identify patients who benefited most from an early supported discharge service. All assessments were blinded.</p>		<p>early supported discharge appears to improve the long term clinical outcome compared with ordinary stroke unit care. Patients with moderate to severe stroke benefit most.</p>				



## **APPENDIX C**

### **Summary of Literature on Back Pain**

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
1.	United Kingdom back pain exercise and manipulation (UK BEAM) randomised trial: effectiveness of physical treatments for back pain in primary care	2004	BMJ	UK BEAM Trial Team	Pragmatic randomised trial with factorial design	1334 patients consulting their GP about low back pain. The mean age at randomization was 43 (11).	The study aims to estimate the effect of adding exercise classes, spinal manipulation delivered in the NHS or private premises, or manipulation followed by exercise to "best care" in general practice for patients consulting with low back pain.	All groups improved over time. Relative to best care, in general practice, manipulation followed by exercise achieved a moderate benefit at 3 months and a small benefit at 3 months and a small benefit at 12 months; and exercise achieved a small benefit at 3 months but not at 12 months.
2.	Does Early Intervention With a Light Mobilization Program Reduce Long-Term Sick Leave for Low Back Pain?	2000	Spine	Eli Molde Hagen et al	Prospective Study	457 patients sick listed 8 – 12 weeks for low back pain were randomised into 2 groups: an intervention group (n=237) and a control group (n=220). The intervention group was examined to a spine clinic and given information and advice to stay active. The control group was not examined at the clinic, but was treated with conventional primary health care.	Early intervention with information, diagnostics, and light mobilization may be a cost effective method of returning patients quickly to normal activity.	At 12 month follow up assessment, 68.4% in the intervention group had returned to full duty work, as compared with 56.4% in the control group.  Compared with results from treatments offered by conventional primary health care, patients with sub acute low back pain return to work sooner if they are referred to a spine clinic offering consultation with examination, information, reassurance, and encouragement to engage in physical activity as normally as possible.  It seems that the general GP approach to treatment of Low back pain is still cautious.
3.	Does Early Intervention With a Light Mobilization	2003	Spine	Eli Molde Hagen et al	Prospective Study	457 patients sick listed 8 – 12 weeks for low back pain	Patients were followed up after 3 years of the previous study to	Over 3 years observation, the intervention group had significantly fewer days of

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
	Program Reduce Long-Term Sick Leave for Low Back Pain: A 3 year Follow up study					were randomised into 2 groups: an intervention group (n=237) and a control group (n=220). The intervention group was examined t a spine clinic and given information and advice to stay active. The control group was not examined at the clinic, but was treated with conventional primary health care.	investigate the possible long term effects.	sickness compensation (average 125.7 d/person) than the control group (169.6 d/person). There was no significant difference for the 2 <sup>nd</sup> or 3 <sup>rd</sup> year. The initial gain obtained during the first year does not lead to any increased costs.
4.	Evaluating and Managing Acute Low Back Pain in the Primary Care Setting	2001	Journal of General Intern Medicine	Steven J Atlas	Review	A review that looks into evaluating and managing acute low back pain in the primary care setting.	Acute low back pain is a common reason for patient calls or visits to a primary care clinician. History and physical examinations usually provide clues to the rare but potentially serious causes of low back pain.	For patients with acute, non specific low back pain, the primary emphasis of treatment should be conservative care, time, reassurance, and education.  Patients with acute low back pain in primary care, 75% to 90% report an improvement within a month.  Symptoms resolve in most individuals with acute low back pain within 2 to 4 weeks, and higher costs and similar long term outcomes are associated with physical treatments, so therapy should be reserved for patients not responding adequately to initial conservative treatment.

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
5.	General Practitioners willingness to request plain lumbar spine radiographic examinations	2001	European Journal of Radiology	Olli Pekka Rynnanen et al	Prospective study using vignettes of hypothetical patients	<p>A postal questionnaire was sent out to 1000 GPs in March 1996. The willingness of the GPs to request plain lumbar radiography was examined in 8 vignettes describing fictitious patient cases, in which the respondents were asked whether they would request plain lumbar radiography.</p> <p>Due to physicians no longer practising or changing their specialties, the final target group consisted of 963 physicians.</p>	<p>615 physicians returned sufficiently completed questionnaires, giving a response rate of 64%</p> <p>The vignettes revealed that the use of plain lumbar radiographic examination varied between 26 and 88%. Patients' age and radiation protection were the most prominent factors influencing doctors' decisions to request lumbar radiographies.</p> <p>Doctors' willingness to request lumbar radiographies increased with the patient's age in most vignettes.</p>	General Practitioners commonly use plain lumbar spine radiographic examinations, despite its limited value in the diagnosis of low back pain.
6.	Cost-utility analysis of osteopathy in primary care: results from a pragmatic randomised controlled trial.	2004	Family Practice	Nefyn H Williams et al	Prospective Study	<p>A cost utility analysis was performed alongside a pragmatic single centre randomized controlled trial in primary care osteopathy clinic accepting referrals from 14 neighbouring practices in North West Wales.</p> <p>Patients with back pain of 2 – 12 weeks duration were randomly allocated to treatment with</p>	<p>Osteopathy plus usual GP care was more effective but resulted in more health care costs than usual GP care alone. The point estimate of the incremental cost per QALY ration was £3560 (80% C1 £542-£77 100).</p> <p>Sensitivity analysis examining spine related costs alone and total costs excluding outliers resulted in lower cost per QALY ratios.</p>	A primary care osteopathy clinic may be a cost effective addition to usual GP care, but this conclusion was subject to considerable random error.

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
						osteopathy plus usual GP care or usual GP care alone.		
7.	The use of a back class teaching extension exercises in the treatment of acute low back pain in primary care	1998	Family Practice	Martin R Underwood	Prospective Study	<p>Patients with acute simple low back pain of less than 28 days duration, presenting to a GP, were randomized either to attend a back class or to receive conventional management.</p> <p>Outcome was measured using changes in the Oswestry disability score and visual analogue pain scale (VAS) on 6 occasions during 1 year and also a VAS and patient assessment of degree of disability during 6 months at 1 year.</p> <p>75 patients were recruited.</p>	The principal outcome measures showed no difference between the 2 groups. The treatment group reported less chronic disability at 1 year (50% versus 14%, $P < 0.007$ ).zg	There is no difference between the two groups but some patients who would otherwise have reported mild pain were pain free after 1 year. This approach to treating back pain has not been shown to be effective.
8.	A Brief Pain Management Program Compared with Physical Therapy for Low Back Pain: Results from Economic Analysis Alongside a Randomized Clinical Trial	2007	Arthritis & Rheumatism	D.G.T Whitehurst et al	Prospective Study	<p>402 Patients were randomly assigned to the Back Pain Management Program (BPM) or Physical Therapy (PT).</p> <p>Outcome measures were quality adjusted life years (QALYS)</p>	No statistically significant differences were found in the mean health care costs or outcomes between treatments. Physical therapy had marginally greater effectiveness at 12 months follow up but greater health care costs (BPM £142, PT £195).	Early referral to physiotherapy is recommended for patients with non specific low back pain in whom first line treatment by General Practitioners has not been effective. Physical Therapy is a cost effective primary care management strategy for low back pain. BPM

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
						and 12 month change scores on the Roland and Morris disability questionnaire. Resource use data related to back pain were collected at 12 month follow up.  Cost effectiveness was expressed as incremental ratios with uncertainty assessed using cost effectiveness planes and acceptability.	The incremental cost per QALY ration was £2,362. If the UK NHS were willing to pay £10,000 per additional QALY, there is only a 17% chance that the BPM provides the best value for money.	could provide an additional primary care approach, administered in fewer sessions, allowing patient and doctor preferences to be considered.
9.	Uptake of prompt access physiotherapy for new episodes of back pain presenting in primary care.	2000	Physiotherapy	Ian Stanley et al	Prospective Study	Back pain clinics, staffed by a physiotherapist, were provided in general practices of varying size with catchment populations amounting to 10% of a typical health district in England. GPs were invited to refer new episodes of Low Back Pain in adults	During the course of 1 year, 522 patients attended the practice based clinics, on average within 4 days of referral. This represents a third (35%) of the total number of adult patients thought to be consulting their GPs with a new episode of low back pain.	When provided with prompt access to physiotherapy for new episodes of Low back pain, GPs and their patients made selective use of the service.
10.	Long term prognosis of acute low back pain in patients seen in general practice: a 1 year prospective follow up study	1999	Family Practice	Berit Schiottz Christensen et al	Prospective cohort Follow up study	A prospective cohort study was conducted in general practice in Denmark with patients aged 18 – 60 years consulting their GP with an episode of Low back pain lasting less than 2 weeks 503 (96%) patients were followed during	50% of patients on sick leave returned to work within 8 days; after 1 year, only 2% remained on sick leave. At the 1 year follow up, 45% of the patients continued to complain of low back pain. Logistic regression analyses showed that the factors most significantly	LBP in general practice has good prognosis with regard to sick leave, but a high proportion of patients continue to complain of LBP. The overall assessment by the GPs seems to be the most important predictor associated with long term outcome.

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
						the study period.	associated with poor long term low back pain outcome were (1) severity of LBP at inclusion (2) Assessments by the GP of susceptibility to develop chronic LBP (3) A history of LBP having caused previous sick leave.	
11.	A short guide to purchasers on the state of the evidence for primary care management of acute and chronic pain	1998	A report by the Yorkshire Collaborating Centre for Health Services Research	Jennifer A Klaber Moffett et al	A guide	A report using the available evidence to guide management of acute and chronic back pain.	A guide of evidence to aid the management of back pain.	It is recommended that the GP should carry out a diagnostic triage in order to identify any red flags which could represent a potentially serious pathology and need particular investigations, referral or urgent treatment.  There is some evidence that early referral to physiotherapy may cut down on hospital referrals and certainly improves patient satisfaction.  A large number of referrals to hospital specialists could probably be avoided.
12.	An evaluation of prompt access to physiotherapy in the management of low back pain	2004	Family Practice	Mark A Pinnington et al	Prospective Study	Back pain clinics staffed by a physiotherapist were established in a group of demographically representative practices in a typical UK health authority. Adult patients with a new episode of LBP	The study examines the feasibility, acceptability and component costs of providing a prompt access physiotherapy service for new episodes of low back pain in primary care; to describe outcomes and compare them with other	For primary care patients with a new episode of low back pain referred by their GP, prompt access to a dedicated physiotherapy service is both feasible and acceptable. Comparison with other published interventions suggests that it is also cost effective and

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
						referred by their GPs were managed in accordance with recent recommendations. Data on Pain, disability and well being were collected at recruitment and some 12 weeks later. Patient diaries and interviews with GPs before and after study provided qualitative data. Comparative costings were derived from national and local sources.	published interventions; and to explore the influence of the service on GPs approach to low back pain.  614 patients, representing 3.2% of the adult population, were referred, of whom 522 (85%) were seen at the back pain clinics within 3-4 days, the majority within 72 hours. More than 70% of patients required only a single clinic visit and <5% were referred on to a specialist orthopaedic or back pain rehabilitation services. At follow up, levels of improvement were comparable with and time taken off work superior to those seen in other intervention studies of low back pain in primary care. Prompt access to physiotherapy in primary care costs less per episode of low back pain than conventional management	that a typical primary care trust would rapidly recoup the cost of additional physiotherapists. However, questions remain about the availability of sufficient physiotherapists to make such a service available nationally. The influence of this service upon GPs' own approach to the management of low back pain is likely to be gradual and to come about largely through positive feedback from patients.
13.	Comparison of physical treatments versus a brief pain management programme for back pain in primary care: a randomised clinical trial in physiotherapy	2005	Lancet	E M Hay et al	Randomised clinical trial	Eligible participants consulted primary care with non specific low back pain of less than 12 weeks duration. They were randomly assigned either a programme	Of 544 patients assessed for eligibility, 402 were recruited (mean age 40.6 years) and 329 (82%) reached 12 month follow up. Mean disability scores were 13.8 (SD 4.8) for the pain	Brief pain management techniques delivered by appropriately trained clinicians offer an alternative to physiotherapy incorporating manual therapy and could provide a more efficient first line



No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
	practice					of pain management (n=201) or manual therapy (n=201). The primary outcome was change in the score on the Roland and Morris disability questionnaire at 12 months. Analysis was by intention to treat.	management group and 13.3 (4.9) for the manual therapy group. The mean decreases in disability scores were 8.8 (6.4) and 8.8 (6.1) at 12 months (difference 0 [95% CI -1.3 to 1.4], p=0.99), and median numbers of physiotherapy visits per patient were three (IQR one to five) and four (two to five), respectively (p=0.001). One adverse reaction (an exacerbation of pain after the initial assessment) was recorded.	approach for management of non specific sub acute low back pain in primary care.
14.	Course of Back pain in Primary Care: A prospective study of physical measures	2003	Journal of Rehabilitation Medicine	Paul Enthoven et al	Prospective study	44 Patients underwent a physical examination at baseline and at 4 weeks. Follow up was carried out using questionnaires until 12 months. Linear regression was used to identify predictors.	The study aims to describe physical measures used in patients with back pain when no specific treatment is given and also examine change over time in these measure and changes in pain and back related disability, and study the value of physical measures at baseline and at a 4 week follow up to predict outcome at 12 months.	Physical measures assessed at the 4 week follow up, but not at baseline, could provide important additional information for identifying those patients at risk for worse outcome in pain or back related disability at 12 months.
15.	Radiography of the lumbar spine in primary care patients with low back pain: randomised controlled trial	2001	BMJ	Denise Kendrick et al	Randomised unblinded controlled trial	421 patients with low back pain of a median duration of 10 weeks	The study tests the hypothesis that radiography of the lumbar spine in patients with low back pain is not associated with improved	Radiography of the lumbar spine in primary care patients with low back pain of at least 6 weeks duration is not associated with improved patient

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
							<p>clinical outcomes or satisfaction with care.</p> <p>Overall, 80% of participants in both groups at 3 and 9 months would have radiography if the choice was available. An abnormal finding on radiography made no difference to the outcome, as measured by the Roland Score.</p>	<p>functioning, severity of pain, or overall health status but is associated with an increase in doctor work load.</p> <p>Guidelines on the management of low back pain in primary care should be consistent about not recommending radiography of the lumbar spine inpatients with low back pain in the absence of indicators for serious spinal disease, even if it has persisted for at least 6 weeks.</p> <p>Patients receiving radiography are more satisfied with the care they received. The challenge for primary care is to increase satisfaction without recourse to radiography.</p>
16.	Systematic reviews of bed rest and advice to stay active for acute low back pain.	1997	British Journal of General Practice	Gordon Waddell et al	Systematic Review	A systematic Review based on a search of MEDLINE and EMBASE from 1996 to April 1996 with complete citation tracking for randomised controlled trials of bed rest or medical advice to stay active and continue ordinary daily activities.	10 trials of bed rest and 8 trials of advice to stay active were identified. Consistent findings showed that bed rest is not effective treatment for acute low back pain but may delay recovery.	A change from prescribing bed rest to positive advice about staying active could improve clinical outcomes and reduce personal and social impact of back pain.

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
17.	Randomised controlled trial of exercise for low back pain: clinical outcomes, costs, and preferences	1999	BMJ	Jennifer Klaber Moffett et al	Randomised controlled trial of progressive exercise programme compared with usual primary care management	187 patients aged 18 – 60 years with mechanical low back pain of 4 weeks to 6 months duration.  Assessments of debilitating effects of back pain before and after intervention and at 6 months and 1 year later. Were included. The measures included Roland disability questionnaire, Aberdeen back pain scale, pain diaries and use of healthcare services.	An evaluation of the effectiveness of an exercise programme in a community setting for patients with low back pain to encourage a return to normal activities.  Exercise classes led by a physiotherapist that included strengthening exercises for all main muscle groups, stretching exercises, relaxation session, and brief education on back care was the interventions used.  A cognitive behavioural approach was used.	The intervention group used fewer healthcare resources. Outcome was not influenced by patients' preferences.
18.	Diagnosis and Treatment of Low Back Pain: A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society	2007	Annals of Internal Medicine	Roger Chou et al	Clinical Guidelines	The literature search for this guideline included studies from MEDLINE (1966 through November 2006), the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials, and EMBASE. This guideline grades its recommendations by using the American College of Physicians clinical practice guidelines grading system. The evidence was	Seven recommendations are given in relation to diagnosis and treatment of low back pain.	Recommendation 1: Clinicians should conduct a focused history and physical examination to help place patients with low back pain into 1 of 3 broad categories: non specific low back pain, back pain potentially associated with radiculopathy low back pain or spinal stenosis, or back pain potentially associated with another specific spinal cause. The history should include assessment for chronic disabling back pain. (strong recommendation, moderate-quality evidence)

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
						independently reviewed.		<p>Recommendation 2: Clinicians should not routinely obtain imaging of other diagnostic tests in patients with non specific low back pain (strong recommendation, moderate- quality evidence)</p> <p>Recommendation 3: Clinicians should perform diagnostic imaging or other diagnostic tests for patients with low back pain when severe or progressive neurologic deficits are present or when serious underlying conditions are suspected in the basis of history and physical examination. (strong recommendation, moderate quality of evidence)</p> <p>Recommendation 4: Clinicians should evaluate patients with persistent low back pain and signs and symptoms or radiculopathy or computed tomography only if they are potential candidates for surgery or epidural steroid injection (for suspected radiculopathy) (Strong recommendation, moderate quality evidence).</p> <p>Recommendation 5: Clinicians should provide</p>

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
								<p>patients with evidence based information on low back pain with regard to their expected course, advise patients to remain active, and provide information about effective self care options (strong recommendations, moderate quality evidence)</p> <p>Recommendation 6: For patients with low back pain, clinicians should consider the use of medications with proven benefits in conjunction with back care information and self care. Clinicians should assess severity of baseline pain and functional deficits, potential benefits, risks, and relative lack of long term efficacy and safety data before initiating therapy (Strong recommendation, moderate quality evidence.) For most patients, first line medication options are acetaminophen or non steroidal anti inflammatory drugs.</p> <p>Recommendation 7: For patients who do not improve with self care options, clinicians should consider the addition of non pharmacologic therapy with proven benefits- for acute</p>

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
								low back pain, spinal manipulation, yoga, cognitive-behavioral therapy, or progressive relaxation (weak recommendation, moderate quality evidence).
19.	Outcome of non-invasive treatment modalities on back pain: an evidence-based review	2006	European Spine Journal	Mauritis W. van Tulder Bart Koes Antti Malmivaara	Review	Data were gathered from the latest Cochrane Database of Systematic reviews 2005 to determine the effectiveness of non invasive interventions compared to placebo or other treatments for acute, sub acute, and chronic non specific low back pain.	This paper summarizes the best available evidence from systematic reviews conducted within the framework of the Cochrane Back Review Group on non – invasive treatments for non specific low back pain.	In part of the non pharmaceutical interventions, one high quality study showed that advice to stay active for acute low back pain significantly improved functional status and reduced leave after 3 weeks compared with advice to rest in bed for 2 days. A significant reduction in sick leave in favour of the stay active group was also reported at long term follow up.
20.	Low back pain (acute)	2007	BMJ	Greg McIntosh and Hamilton Hall	Systematic Review	34 systematic reviews, random controlled trials or observational studies that met the inclusion criteria were found following a search of Medline, Embase and the Cochrane Library up to May 2007.	A systematic review aimed at answering the following questions: What are the effects of low back pain? What are the effects of injections for low back pain? What are the non drug treatments for low back pain?	The review found that advice to stay active significantly reduced sick leave.
21.	The role of physiotherapy in the management of non specific back pain and neck pain.	2005	Rheumatology	J. Moffett and S. McLean	Literature Review	Searches were made in Cochrane, Medline, Health Star, Embase, Pascal, PsycINFO, Biosis, Lilacs and IME (Indice Medico Espanol). Keywords included low back	Self management is emphasized and a return to normal activities is encouraged. For the patient who is not recovering after a few weeks, a short course of physiotherapy may be	Physiotherapists have a wide ranging role at all stages of back and neck pain. In the beginning the physiotherapist can identify any serious spinal pathology and refer the patient to the most

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
						pain, back pain, and systematic. Quality assessments were made using the Cochrane library checklists.	offered. This is based on an active management approach, such as exercise therapy. One large study (n=1334) carried out in the UK recently found that primary care patients randomized to a spinal manipulation package, in addition to best care GP management, reported modest but significant benefits compared with patients who only received best care GP management. These differences were demonstrated at 6 and 12 months after a short course of treatment.	appropriate specialist. They are ideally placed to identify patients who are developing psychosocial barriers to recovery, provide reassuring advice, explanation and education, and encourage an early return to normal activities.
22.	Philadelphia Panel Evidence-Based Clinical Practice Guidelines on selected Rehabilitation Interventions for Low Back Pain.	2001	Physical Therapy	The Philadelphia Panel (John Albright et al)	Clinical Practice Guideline using evidence from Random Controlled Trials and observational studies. Meta Analysis was conducted where possible.	Evidence from randomised controlled trials (RCTs) and observational studies were identified and synthesized using methods defined by the Cochrane Collaboration that minimize bias by using a systematic approach to literature search, study selection, data extraction, and data synthesis. The search was conducted in the electronic databases	To describe the evidence based clinical practice guidelines developed by the panel about rehabilitation interventions for low back pain. The aim of developing the guidelines was to improve appropriate use of rehabilitation interventions for low back pain. The target users for these guidelines are physical therapists, orthopaedic surgeons, rheumatologists, family physicians and neurologists.	This methodology of developing evidence based clinical practice guidelines provides a structured approach to assessing the literature and developing guidelines that incorporates clinicians feedback and is widely acceptable to practicing clinicians.

No	Name of Article	Year	Publication	Author/s	Type of Study	Methods and Patients	Overview summary	System Results
						of MEDLINE, EMBASE, current contents CINAHL, and the Cochrane Controlled Trials Register up to July 1, 2000. Two independent reviewers appraised the titles and abstracts of the literature search using a checklist and defined selection criteria.		



### Additional information by reference number for specified studies

Reference No	Clinical Results	Economic Results	Staffing Costs	Comments
1.	<p>The spinal manipulation package improves back function by a small to moderate margin at 3 months and by a smaller but still statistically significant margin at one year, irrespective of location.</p> <p>The exercise program improves back function by a small but significant margin at 3 months but not at one year.</p> <p>Manipulation followed by exercise improves back function by a moderate margin at 3 months and by a smaller but still significant margin at one year.</p>			
2.	<p>Of the 237 patients in the intervention group, 58 patients (24.5%) contacted the spine clinic for one or more follow up evaluations by the physiotherapist. 13 patients (5.5 %) were referred to other specialists (10 patients to an orthopaedic surgeon, 2 patients to rheumatologist, and 1 patient to neurologist.) At 3 month follow up assessment, 51.9% of the patients in the intervention group had returned to full duty work, as compared with 35.9% in the control group (RR=1.45; 95% CI= 1.17 to 1.79). At the 6 month follow up assessment, 61.2% of the patients in the intervention group had returned to full duty work, as compared with 45% in the control group.</p>	<p>At 12 months, 14 patients in each group were on disability pension.</p> <p>The women in the intervention group had slightly, but not significantly, fewer days of sickness compensation (mean = 100.3; 95% CI =80.2 to 120.4) than the women in the control group (mean= 128.9; 95% CI = 107.4 to 150.5).</p>		
3.	<p>At 6 month follow up, 95.3% of the patients in the intervention group and 93.1% of the patients in the control group still reported low back pain.</p>	<p>During the 3 year follow up the average difference in days on sick leave between treated and controls accumulated to 43.9 calendar days per person in favour of the</p>		

Reference No	Clinical Results	Economic Results	Staffing Costs	Comments
	<p>However 60% of the patients in the intervention group and 51% of the patients in the control group reported that their lower back pain had improved. At 1 year follow up 88.7% of the patients in the intervention group and 93.2% of the patients in the control group still reported low back pain. At 1 year follow up, 46.8% of the patients in the intervention group and 51.7% of the patients in the control group reported that their low back pain had improved during the past year.</p>	<p>treatment group. Taking into account that sickness compensation from the national social insurance system amounts to 31.4 days per person in favour of the early intervention program. Calculation of economic returns for society on the assumption that treatment reduces the number of days with sickness compensation for a worker by 31.4 days, and took into consideration that most of this effect (27.3 d) appears during the first year after treatment. Based on this, the total discounted benefit accumulated over 3 years of treating 237 patients in the early intervention programme is approximately \$3,800 per patient. Subtracting cost of treatment from benefits gives an estimate of the net present social value for society amounting to approximately \$828,719; this is approximately \$3,497 per patient.</p>		
4.		<p>The costs associated with low back pain include the direct costs of medical care and the indirect costs of time lost from work, disability payments, and diminished productivity. In the work place low back pain is the most costly ailment, with an average cost of \$8,000 per claim, and accounts for one third of workers' compensation costs. The estimated annual national bill for the care of low back problems is \$38 to \$50 billion.</p>		
5.				
6.		<p>Osteopathy plus usual GP care was more effective but resulted in more health care costs than usual GP care alone. The point estimate of the incremental cost per QALY ratio was £3560 (80% CI £542-£77 100). Sensitivity analysis examining spine related costs alone and total costs excluding outliers resulted in lower cost per QALY ratios.</p>		

Reference No	Clinical Results	Economic Results	Staffing Costs	Comments
		Additional, high quality economic evaluations		
7.	The principal outcome measures showed no difference between the two groups. The treatment group reported less chronic disability at 1 year (50% versus 14%, P< 0.007).			
8.	Clinical outcomes were utility and change in back related disability. Disability was measured on the Roland and Morris disability questionnaire (RMDQ), a 24 item back pain specific disability scale with scores ranging from 0 (best health) to 24 (worst health). These utility values range from 1.00 to -0.59.	Evidence from this economic evaluation has demonstrated that if the UK NHS values an additional QALY in excess of £5,000, physical therapy provides the best value for money.	Six physiotherapists administered the interventions. Three worked exclusively within the physical therapy arm and 3 worked in the brief pain management program. The interventions consisted of one 40 minute assessment/treatment session, plus up to 6 subsequent 20 minute treatment sessions.	
9.			For each 2000 patients, about 1.5 hours of physiotherapists time per week. Based on local data, it is estimated additional physiotherapy time is required to offer prompt access to physiotherapy for adults with new episodes and is half to one hour per week per GP principal. This equates to 1.0 to 1.7 WTE physiotherapists per year.	
10.	Low back pain patients in general practice have a relatively good prognosis with respect to sick leave, but about 15% of the subjects in the study had been on sick leave because of recurrent complaints and 50% continued to complain of low back pain after 1 year.			
11.				
12.	Of the 522 patients recruited, 90 (17%) were lost to follow up at 3 months. However, in terms of age, sex,	Average component costs per episode of low back pain equates to £74.06. This is broken down into £8.34 prescribed	The physiotherapist spent 47 minutes per patient episode.	With practice based clinics, it proved feasible to provide access to physiotherapy within 3-

Reference No	Clinical Results	Economic Results	Staffing Costs	Comments
	employment status, function (RMDQ), pain or general health (SF36) at presentation, the group lost to follow up were not significantly different from those who were followed up (n=432). Mean pain scores from presentation and follow up were compared using a paired t-test. The decrease in reported pain is highly significant (P=0.0001).	medication, £4.46 in patient care, £20.67 GP consultations, £10.35 other hospital and community services, £30.24 physiotherapy intervention.	Low back pain clinics would require ~ 1.5 h of physiotherapist time per week per GP principal with a list of 1800 – 2000 patients. For a PCT of average size (150 000), this amounts to 3-3.5 WTE physiotherapists.	4 days, and for the majority within 72 h of GP referral. Since the majority (72%) were seen only once, confidence in managing the condition engendered in patients by modifying their interpretation of the meaning of pain and how to react to, manage, and cope with it appears to be an important benefit of early contact.
13.	Clinical outcome was the same at 3 months and 12 months for participants randomised to either a brief pain management programme or to a package of physiotherapy incorporating spinal manual therapy techniques.			The median number of physiotherapy visits was significantly lower in the brief pain management group than in the manual physiotherapy group for both the intention to treat analysis (p=0.001) and for the protocol analysis (p=0.006). 77% of the participants assigned pain management techniques and 93% of attended were recorded as having received the techniques and 93% of those who actually attended were recorded as having received the techniques defined a priori as relevant to this intervention. Interventions did not differ with respect to outcomes for back pain or function and psychological measures. There were significantly fewer contacts with secondary care in participants in the pain management group than in the manual physiotherapy group.
14.	Most measures had improved significantly at the 4 weeks follow up. Thoracolumbar rotation, isometric endurance back extensors, and			

Reference No	Clinical Results	Economic Results	Staffing Costs	Comments
	<p> fingertip to floor distance at 4 weeks significant predictors for pain intensity and back related disability at the 12 month follow up. 18 out of 44 patients reported an increase in pain after the assessment of the physical measures at baseline.</p>			
15.				
16.	<p> Advice to stay active and to continue ordinary activities results in a faster return to work, less chronic disability, and fewer recurrent problems.</p>			
17.	<p> At 6 weeks after randomization, the intervention group improved marginally more than the control group on the disability questionnaire and reported less distressing pain. At 6 months and 1 year, the intervention group showed significantly greater improvement in the disability questionnaire score (mean differences in changes 1.35, 95% confidence interval 0.13 to 2.57). At 1 year, the intervention group also showed significantly greater improvement in the Aberdeen back pain scale (4.44, 1.01 to 7.87) and reported only 378 days off work compared with 607 in the control group.</p>	<p> The exercise class was more clinically effective than traditional GP management, regardless of patient preference, and was cost effective.</p> <p> Patients in the intervention group tended to use fewer healthcare and other resources compared with those in the control group. However, the mean difference, totalling £148 per patient, was not significant: the 95% confidence interval suggests there could have been a saving of as much as £442 per patient in the intervention group or an additional cost of up to £146. Patients in the control group took a total of 607 days off work during the 12 months after randomization compared with 378 days taken off by the intervention group.</p>		
18.				
19.	<p> Patients receiving treatment that included spinal manipulation had statistically significant and clinically important short term improvements in pain (10-mm difference; 95% CI 2-17mm) compared with Sham therapy. There were no differences in short and long term effectiveness compared with other conventionally advocated therapies such as general practice,</p>	<p> One high quality study showed that advice to stay active significantly improved functional status and reduced sick leave after 3 weeks compared with advice to rest in bed for 2 days. It also found a significant reduction of pain intensity in favour of the stay active group intermediate follow up (more than 3 weeks). Advice to stay active significantly reduced sick leave in favour of the stay</p>		

Reference No	Clinical Results	Economic Results	Staffing Costs	Comments
	physical or exercise therapy, and back school.	active. A significant reduction in sick leave in favour of the stay active group was also reported at long term follow up.		
20.		Multidisciplinary rehabilitation programmes are typically expensive and may not be necessary for uncomplicated acute low back problems.		Compared with usual care Multidisciplinary treatment, including a workplace visit, may be more effective at reducing sick leave in people with sub acute low back pain.
21.	One large trial of sub acute and chronic back pain patients (n=260) found that the McKenzie approach, when compared with intensive dynamic strengthening exercises, was slightly more effective at 2 months in improving function but the difference was not maintained in the longer term.			Physiotherapists might increase their effectiveness, with additional training to enhance communication skills and incorporate cognitive-behavioural strategies in their usual practice.
22.	Clinically important benefit was shown for therapeutic exercise across sub acute, chronic, and post operative low back pain as well as for the continuation of normal activities. Clinically important benefit was found for return to work. Continuation of normal activities resulted in 49% fewer sick days after 3 weeks relative to the enforced bed rest group, with an absolute difference of 3.4 sick days (95% CI =1.6 – 5.2 days). After 3 months, the normal activities group had 51% fewer sick days (4.5 days less, 95% CI =3-6 days), better function by 10% on the Oswestry scale, and 5% less pain on a 10-cm visual analog scale (VAS).			Further well designed random controlled trials are warranted regarding the use of several interventions for patients with low back pain where evidence was insufficient to make recommendations.

## **APPENDIX D**

### **Summary of Literature on Childhood Obesity**

### Articles on the management of childhood obesity

Article No	Authors	Date	Journal	Title
1	Connelly JB, Duaso MJ, Butler G	2007	Public Health, 121, pp 510-517	A systematic review of controlled trials of interventions to prevent childhood obesity and overweight: a realistic synthesis of the evidence
2	Campbell K, Waters E, O'Meara S, Summerbell C	2001	Obesity Reviews, 2, pp 149-157	Interventions for preventing obesity in childhood. A systematic review
3	Avenell A, Broom J, Brown TJ, Poobalan A, Aucott L et al	2004	Health Technology Assessment, 8, 21	Systematic review of the long-term effects and economic consequences of treatments for obesity and implications for health improvement
4	Fox KR, Hillsdon M	2006	Obesity Reviews 8, suppl 1, pp 115-121	Physical activity and obesity
5	Anonymous	undated	MEND website	MEND (Mind Exercise Nutrition Do-it)
6	Dietrich S, Widhalm K	2004	International Pediatrics 19, 2, pp 83-89	A multi-disciplinary therapy programme for morbidly obese children and teenagers: results after 7 months
7	De Mattia L, Lemont L, Meurer L	2006	Obesity Reviews, 8, pp 69-81	Do interventions to limit sedentary behaviours change behaviour and reduce childhood obesity? A critical review of the literature
8	NICE	2007	NICE Public Health Programme Guidance	Promoting physical activity, play and sport for pre-school and school-age children in family, pre-school and community settings
9	Sumerbell CD, Waters E, Edmunds LD, Kelly S, Brown T, Campbell KJ	2005	Cochrane Database of systematic reviews, issue 3	Interventions for preventing obesity in children
10	Anonymous	2006	Heart Forum website	Children and physical activity
11	Woo KS, Chook P, Yu CW, Sung RYT, Qiao M, Leung SSF, Lam CWK et al	2004	Circulation, 109, pp 1981-1986	Effects of diet and exercise on obesity-related vascular dysfunction in children
12	Snethen JA, Broome ME, Cashin SE	2006	Journal of Pediatric Nursing, 21 (1) pp 45-55	Effective weight loss for overweight children: a meta analysis of intervention studies
13	NHS Centre for Reviews and Dissemination	2002	Effective Health Care 7, 6,	The prevention and treatment of childhood obesity
14	Kahn EB, Ramsey LT, Brownson RC, Heath GW et al	2002	American Journal of Preventive Medicine 22 (4s) pp 73-107	The effectiveness of interventions to increase physical activity: a systematic review
15	Scottish Intercollegiate Guidelines Network	2003	SIGN Guidelines, 69	Management of obesity in children and young people



16	Swanton K for National Heart Forum	2008	Department of Health Report	Healthy Weight, Healthy Lives: a toolkit for developing local strategies
17	DeMattia L, Denney SL	2008	Annals of the American Academy of Political and Social Science, 615, pp83-99	Childhood obesity prevention: successful community-based efforts
18	NICE	2009	NICE	Promoting physical activity for children and young people

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
1	Systematic Review of Controlled Trials of interventions to prevent childhood obesity and overweight: A realistic synthesis of the evidence.	The Review searched electronic databases: Medline, Embase, Cinhal, PsyclNFO up to April 2006. Trials had to include an outcome that measures an index of adiposity. The ages included were 0 – 18 years and the follow up was at least 12 weeks. Twenty eight eligible trials were identified to the 30 April 2006. Eleven trials were effective and 17 were ineffective in reducing adiposity.	To present practice relevant guidance because of the generally low quality of research and the heterogeneity of reported effectiveness.	Nutritional education, nutritional skills training and physical education do not distinguish effective from ineffective interventions regarding reducing childhood adiposity. However, compulsory rather than voluntary aerobic physical activity does distinguish and, from a realist approach may be rationally understood as casually related to a decrease in adiposity in children.				
2	A systematic Review	The search strategy developed by Glenny et al from the NHS Centre for Reviews and Dissemination was employed. The following databases were searched from January 1985 to October 1999: MEDLINE, Ovid CD-ROM, Psychlit	To assess the effectiveness of interventions, other than drug or surgical interventions, designed to prevent obesity in childhood. Specific objectives included:  * Evaluation of the effect of dietary education inventions vs. control. * Evaluation of the effect of physical	One programme, 'Planet Health' , conducted by Gortmaker and co workers examined a behavioural choice intervention which targeted boys and girls in grade 6-8. This programme concentrated on the promotion of physical activity, modification of dietary intake and reduction of sedentary behaviours (with a strong emphasis on reducing television	Two of the long term studies (one focused on dietary education and physical activity vs. control, and the other only on dietary education vs. control.) resulted in a reduction in the prevalence of obesity, but the third, which			No long term studies were found that compared physical activity interventions vs. control or dietary education vs. physical activity interventions.  Most studies were conducted in the US with children aged 7 – 12 years.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		Silverplatter CD-ROM, Embase (Ovid Via Bids), Bids information service including Science citation Index, Social Science Citation Index, CINHALL, ARC Service (Winspurs online). CENTRAL/CCTR. Copies of the full search strategies are given in the Cochrane Review. Finally experts in the field of obesity prevention were contacted. In all, seven studies were identified, three long term studies plus a further four short term studies. Most studies were school based, did not target individuals and focused on healthy eating and/or physical activity.	activity interventions vs. control * Evaluation of the effect of dietary education interventions vs. physical activity interventions * Evaluation of combined effects of dietary education interventions and physical activity interventions vs. control.	viewing). Evaluation at 2 years post intervention showed that the prevalence of obesity among girls in the intervention schools was reduced compared with controls, controlling for baseline obesity (odds ratio, 0.47: 95% CI, 0.24-0.93; P=0.03). Obesity declined among boys in both control and intervention students however, after controlling for covariates, there were no significant difference in outcome (odds ratio, 0.85; 95% CI, 0.52-1.39; P=0.48.)	focused on dietary education physical activity, found no effect. Of the four short term studies, three focused simply on physical activity/reduction of sedentary behaviours vs. control. Two of these studies resulted in a reduction in the prevalence of obesity in intervention groups compared with control groups, and another study focused on dietary education and physical activity, and did not find an effect on obesity, but did report a reduction in fat intake.			There is limited quality data on the effectiveness of obesity prevention programmes and such no generalizable conclusions can be drawn.
3	Systematic review of the long term effects and economic consequences	The methods of the Cochrane Collaboration were adopted, in which the randomised	1. To review systematically obesity treatments in adults to identify therapies that impact by achieving weight reduction, risk	Studies combining low fat diets and exercise, with or without behaviour therapy, suggested improved control of hypertension and type 2 diabetes.		Economic modelling of diet and exercise over 6 years for people with		Limitations in the evidence available for the reviews, particularly inadequate sample size and reporting,

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	of treatments for obesity and implications for health improvement	<p>controlled trials (RCTs) with a follow up of at least 1 year were evaluated.</p> <p>For the systematic epidemiological review, studies were sought on long term (at least 2 years, or 5 years for surgery) effects of weight loss on morbidity and/or mortality, and examined through epidemiological modelling.</p> <p>A Markov model was adopted to examine the cost effectiveness of a low fat diet and exercise intervention in adults with obesity and impaired glucose tolerance.</p>	<p>factor modification or improved clinical outcomes.</p> <p>2. Based on a systematic review of epidemiological data, to model the impact of moderate weight reduction on reducing the burden of obesity associated disease.</p> <p>3. To review systematically health economic evaluations of obesity treatments and assess costs to the NHS of these treatments.</p>	Family therapy was associated with improved weight loss for up to 2 years compared with individual therapy.		<p>impaired glucose tolerance was associated with a high initial cost per additional QALY but by the sixth year the cost per QALY was £13,389.</p> <p>Results were sensitive to the quality of life weights, for which there were very limited data.</p>		lack of long term follow up and few quality of life data mean that most results should be interpreted with caution.
4	Obesity review		To review physical activity and obesity.	It's critical that physical activity becomes part of more comprehensive solutions to the obesity problem, rather than being viewed in isolation.		Economically, the costs of inactivity have been estimated at £8.2 billion per year. Even in the		

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						case of serious overweight and obesity, physical activity substantially reduces disease risk with a potential saving of lives and health care costs.		
5	Community based programme information sheet	MEND is a community based programme for overweight and obese children aged between 7 – 13 and their families. The multi disciplinary programme places equal emphasis on (M)ind, (E)xercise, (N)utrition. The programme comprises 18 two hour sessions. Run in the early evening hours across a nine week period during the school term.	An overview of a community based programme for overweight and obese children.	The treatment of obesity is a long term process. Physical Activity is one of the key aims by starting to reduce time spent in inactive pursuits by making this goal for the whole family and not just the child. Encouraging more physical activity through play with other children, walking as rewards are ways of improving physical activity.				There are few studies which report on the long term effects of interventions to control weight in children. The Cochrane Review on interventions for preventing obesity in children concluded that there was a need for much greater number of well designed studies, which examine a range of interventions for childhood obesity (Campbell et al 2001)
6	?Prospective Study	From January 2000 to May	The multi disciplinary team (physician,	In total 42, morbid obese children/teenagers at the	Physical therapy is scheduled			The results show that ambulant

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>2002, 59 (average Body Mass Index (BMI) 34 morbidly obese children and adolescents (BMI &gt; 99<sup>th</sup> centile) between the ages of 5.8 and 18.8 years were enrolled in a multi-disciplinary therapy program for morbidly obese children and teenagers. The multi disciplinary team (pediatrician, psychologist, dietician and physical therapist) set up an objective to achieve a change in the morbid obese subjects handling of food by means of individual care. The patients are exclusively referred to this program by a physician.</p>	<p>psychologist, dietician counsellor and physical therapist) set for the objective to achieve a change in a morbid obese persons handling of food and eating by a means of an individual care connected to slow weight reduction, a rearrangement of living and nutritional habits in the direction of a diverse low fat, and carbohydrate rich diet. Three approaches have been achieved:</p> <ol style="list-style-type: none"> <li>1. energy reduced mixed diet</li> <li>2. behavioural therapy elements</li> <li>3. increased physical activity.</li> </ol>	<p>ages between 5.8 and 18.7 years (24 girls and 18 boys, average age 13.5 + 2.4 years) took part in the program during January 2000 to May 2002. At the beginning these patients showed a body weight of 90.99 + 19.73 Kg, an average height of 162.81 + 11.56 cm and a BMI between 24.96 and 45.99 (average BMI 33.79 + 4.95). During the outpatient program, the patients reduce their BMI on average by -1.5, success/failure fluctuates between (-8.43 and + 1.28 BMI).</p> <p>During the MO Program, 81% of the patients could reduce their BMI by an average of -2 with the help of the multi disciplinary team consisting of physicians, clinical psychologists/behaviour therapists, dietetic counsellors/assistants and physical therapists.</p>	<p>twice a week in the internal gym.</p> <p>After an intensive program from the multi disciplinary team, treatment over years would be necessary.</p>			<p>therapy of obesity on morbid obese children and teenagers can lead over the medium term to success.</p>
7	Literature Review	A Medline search from 1966 to June 2004 was conducted with Ovid, using the terms: Obesity,	To determine whether interventions that emphasize decreasing sedentary behaviours in children and adolescents result in	4 Studies came from specialty clinics where a multidisciplinary approach to weight control was part of the intervention. One of these studies included a	The school based programme results are encouraging and support the			As with any systematic review, this study is limited by the quality of the studies available. The majority of the

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		<p>Child-Preschool, Child, Adolescent, Television, Video Games, Sedentary Behaviours, and Inactivity. Included were randomized controlled trials, comparative studies and multicentre studies. Purely observational cross sectional and cohort studies were excluded to obtain interventional studies only. The search was repeated using Psych Info and Health Star databases. Subsequently, an updated search was performed from 1966 to February of 2005 in Psych Info and Health Star, Cochrane Database of systematic Reviews, and Cumulative Index of Nursing and Allied Health</p>	<p>behaviour among children, alone or in combination with other health messages.</p>	<p>family centered weight loss programme aimed to improve diet, increase exercises and reduce sedentary behaviour. All participants attended 16 weekly treatment meetings followed by 2 monthly meetings and follow up at one year. Investigators found that the group reinforced to reduce sedentary behaviour had a significant decrease in per cent overweight from baseline , at 4 months (-19.9%; P=0.026) compared with the increased Physical Activity group (13.2%). The effect was best sustained for the sedentary behaviour group at 1 year follow up (-18.7 vs. -10.3 vs., -8.7; P&lt; 0.5). Echoing the change in per cent overweight the participants reinforced to reduce Sedentary behaviour reduced their body fat significantly compared with exercise only at 1 year (P&lt;0.05). Boys responded better to combining reinforcements to reduce TV and increasing physical activity, while girls responded less well to this combined approach.</p>	<p>public health approach.</p>			<p>studies looked at interventions in the USA which could limit the generalizability to other countries where patterns of physical Activity and media use are different.</p> <p>Most of the studies involved limiting TV watching, playing video games or watching videos. Some studies involved bringing interventions into the school curriculum such as focusing on diet, TV reduction and increasing physical activity which was provided in one study in 13 core lessons which was integrated into regular lessons. Home activities were also included to involve families.</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		Literature. This search process yielded 222 potentially relevant articles. After careful review, 29 relevant articles were reviewed in entirety for eligibility by two independent investigators. Eligible studies include six clinic based studies targeting at risk and obese children or teens at the onset and six population based prevention studies, targeting all children regardless of the presence of obesity at baseline.						
8	Public Health Programme Guidance	Children up to the age of 18, with specific focus on those aged 7 years and under 11 to 18 year old girls.	Promoting physical activity, play and sport for preschool and school age children in family, preschool, school and community settings.	Up to a third of children aged 7 years and under are not active enough on a daily basis to meet the recommended levels of physical activity (DH 2003). Improving younger children's motor skills and general ability to partake in physical activity may help reduce their activity levels throughout childhood and into		Physical inactivity in England is estimated to cost £8.2 billion a year and this predicted to rise. It includes the direct costs of treating major lifestyle		



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				adulthood, by making physical activity more enjoyable. Girls are less likely than boys to achieve the recommended physical activity levels.		related diseases and the indirect costs of sickness absence (DH 2004c). Physical inactivity is also estimated to cause 54,000 premature deaths a year.		
9	?Systematic Review	MEDLINE, PysclINFO, EMBASE, CINHAL and CENTRAL were searched from 1990 to February 2005. Randomised controlled trials and controlled clinical trials with minimum duration twelve weeks. Twenty two studies were included; ten long term (at least 12 months) and twelve short term (12 weeks to 12 months). 19 were school/preschool-based interventions; one was a community	To assess the effectiveness of interventions designed to prevent obesity in childhood through diet, physical activity and/or lifestyle and social support.	Studies that focused on combining dietary and physical activity approaches did not significantly improve BMI, but some studies that focused on dietary or physical activity approaches showed a small but positive impact on BMI status. Nearly all studies included resulted in some improvement in diet or physical activity.				The programmes in this review used different strategies to prevent obesity so direct comparisons were difficult.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		based intervention targeting non obese children of obese or overweight parents. Six of the ten long term studies combined dietary education and physical activity interventions. Four of the twelve short term studies focused on interventions to increase physical activity levels.						
10.	? Article	Authors of the European Youth Heart Study looked at over 1,730 children aged nine or 15 years from schools in Denmark, Estonia, and Portugal.	The National Heart Forum gives a brief overview of children and physical activity.	It is recommended that children and young people should achieve a total of at least 60 minutes of at least moderate intensity physical activity each day.	The government has set targets to increase participation in sport by 5 to 16 year olds. They hope that the % of school children in England who spend a minimum of two hours per week on PE and sport increases from 25% in 2002, to 75% by 2006 and to 85% by 2008.  They also hope to see, through			Children should do at least 90 minutes exercise each day according to the European Youth Heart Study published July 2006.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
					the County Sports Partnerships, 2008 an increase of 3% who participate in sport at least 12 times per year, and a 3% increase in the number who engage in at least 30 minutes of moderate intensity sport, at least 3 times per week.			
11.	Intervention study	82 overweight children (body mass index, $25 \pm 3$ ), 9 to 12 years of age, were randomly assigned to dietary modification only or diet plus a supervised structured exercise program for 6 weeks and subsequently for 1 year.	To evaluate the reversibility of obesity related arterial dysfunction and carotid intima-media thickening by dietary and/or exercise intervention programs.	At six weeks, both interventions were associated with decreased waist-hip ratio ( $P < 0.02$ ) and cholesterol level ( $P < 0.05$ ) as well as improved arterial endothelial function. Diet and exercise together were associated with a significantly greater improvement in endothelial function than diet alone ( $P = 0.01$ ). At 1 year, there was significantly less thickening of the carotid wall ( $P < 0.001$ ) as well as persistent improvements in body fat content and lipid profiles in the group continuing an exercise program. Vascular function was significantly				Vascular dysfunction associated with obesity in children is partially reversible by even a short program of dietary modification. The addition of an individualized exercise training program for children enhanced the beneficial arterial effects, which could be sustained when training continued for one year.  After six week intervention, significant

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				<p>better in those children continuing exercise (n=22) compared with children who withdrew from the exercise program (n=19) (P&lt;0.05).</p>				<p>improvements in endothelium-dependent dilation were evident. The improvement in arterial endothelial function was greater in the diet and exercise group compared with the diet alone group, and multivariate regression analysis confirmed the independent effect training on improved arterial function.</p> <p>Improving obesity related arterial dysfunction in children by diet and exercise should be regarded as an important strategy for modifying vascular risk in this population.</p>
12	A meta Analysis of Intervention Studies	A meta analysis of intervention studies designed to reduce an overweight or obese child's weight and improve activity and nutrition patterns. A literature search was conducted to	To systematically examine the effectiveness of weight loss interventions for overweight children.	<p>Children who are less physically active are more likely to become overweight/obese.</p> <p>Epstein and Goldfield (1999) examined the literature to identify the effectiveness of physical activity. They reported that exercise appears to enhance the effectiveness</p>				<p>Maintenance programs to provide ongoing treatment and support with children after they have reached their weight loss goal were not found in the literature.</p> <p>A combination of</p>

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		<p>identify possible studies for inclusion in the meta analysis. The studies included in this analysis were identified using several computerized literature searches using the key words: obesity, children, intervention, weight loss, exercise, nutrition, and dietary. The computer literature searches included CINAHL, MEDLINE, ProQuest Nursing Journal, PsycINFO, Social Sciences, Sociology abstracts, Health STAR, Health Source: Nursing/Academic Edition, ERIC, and Dissertation Abstracts. In addition manual searches were conducted at three health science libraries as well as</p>		<p>of diet alterations in weight loss. However insufficient research available to determine the effectiveness of exercise alone in treating childhood overweight/obesity.</p> <p>Borra et al 2003, found that there is no one treatment for childhood obesity that is more effective than other interventions.</p> <p>Israel et al (1985) conducted a weight reduction intervention program with children aged 8 – 12 years and their parents. At 1 year follow up children who were more successful in maintaining their weight loss than the children in the weight reduction only treatment group, although not statistically significant. Across the seven studies, there were 14 interventions with an average effect size of <math>d=0.95</math>, and the 95% confidence interval for <math>d</math> ranged from 0.79 to 1.11. In four of the studies, there were seven interventions found to have statistically significant effect sizes for weight loss. These</p>				<p>variables such as dietary, physical activity, behavioural change, and parental involvement can be effective in assisting children to effectively lose weight. However there is not enough data to support one variable as being more effective as a weight loss intervention than another variable.</p> <p>One of the limitations of the meta analysis was the clinical interventions that were not effective in weight loss might not have been reported.</p> <p>Another limitation was the inability to differentiate whether particular interventions were more effective with a specific age group of children than other interventions.</p> <p>Further research is</p>

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		retrieval using the ancestry method. The focus on this meta analysis was on the studies of children as close to middle school/preteen years as possible, so the mean age of 12 years was selected to ensure that the majority of participants met the criteria. Seven weight loss intervention studies for school age children, published between 1980 and 2002. The seven studies included a total of 356 participants in 14 different interventions and 144 children in 7 different control groups.		ranged from 0.74 to 3.33, with an average effect size $d= 1.70$ . All of the studies incorporated some form of independent variables in the weight loss intervention: a) dietary, b) physical activity, c) behavioural changes, and d) parental involvement.				needed to identify the most effective methods to treat overweight/obese children.
13	Bulletin	A bulletin that summarizes the research evidence from the NHS Centre for Reviews and Dissemination on the prevention and treatment of childhood obesity.	A summary of the research evidence on the prevention and treatment of childhood obesity.	Some evidence specifically targeting schools and school based programmes that promote physical activity. Family based programmes that involve parents, increase physical activity, and provide dietary education and target reductions in	Primary and community health professionals, including GPs, practice nurses, dieticians, health visitors and school nurses can play an			Many of the included RCTs have methodological problems such as small sample sizes and high rates of drop outs, leading to low statistical power and potential

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		<p>Whilst based upon two Cochrane reviews, update literature searches were also carried out for this bulletin. Fourteen electronic databases were searched to identify both published and unpublished studies. 35 Random Controlled Trials are included in this bulletin.</p>		<p>sedentary behaviour may help reduce childhood obesity.</p> <p>Two school based RCTs suggest that active programmes of physical activity are not enough to reduce levels of obesity in children of primary school age.</p> <p>There is some evidence to suggest that multi-faceted interventions may help to reduce obesity in school children, particularly girls.</p> <p>A large RCT (n=1295) involving the multi faceted 'Planet Health' programme targeted older children (aged 11-13 years). This programme promoted physical activity, modification of dietary intake and reduction of sedentary behaviours. After 18 months, the prevalence of obesity among girls in the intervention schools was reduced compared with controls (OR, 0.47; 95% CI: 0.24- 0.93; p=0.03). In addition, there were fewer obese girls in the intervention group (OR, 2.16; 95% CI: 1.07-4.35; p=0.04). The programme statistically reduced</p>	<p>important role in the recognition and management of childhood obesity.</p> <p>There is some evidence that family based programmes which actively increase physical activity, provide dietary education and target reductions in sedentary behaviour may help children lose weight.</p>			<p>bias. Many are also poorly reported e.g. some authors give insufficient information regarding the method of randomization</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
				<p>television viewing hours for both boys and girls.</p> <p>In a small RCT, school children aged 10 -13 years took part in a 12 week dance for health programme. This programme comprised of thrice weekly aerobic dance classes plus health education (n=43) had a greater impact on increasing aerobic capacity, maintaining or decreasing weight and improving attitudes towards fitness, than usual physical education. At the end of the programme there was a statistically significant decrease in BMI and change in heart rate for girls in the intervention group compared to those in control. There were no statistically significant differences for the boys.</p> <p>Another RCT (n=35) compared a calisthenics group, a lifestyle exercise group, and an aerobic exercise programme. All groups also received dietary education. Although children in each group experienced reductions in % overweight during the first</p>				



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				<p>12 months of the study, there were no statistically significant differences between groups. At 24 months, the percentage overweight for the lifestyle group was significantly smaller than those for the calisthenics and aerobic groups. Analysis at ten year follow up indicated that children in the lifestyle and aerobic exercises groups had achieved a statistically significant greater reduction in percentage overweight than the calisthenics group.</p>				
14	Systematic Review	<p>The Task Force on community preventive services chose the topic “increasing physical activity” for inclusion in the Guide to community Preventive Services (the community guide) in the USA. Using systematic review methods, the task force sought evidence of effectiveness of interventions to increase physical activity and</p>	<p>The systematic reviews were designed to address the following research questions: What interventions are effective in increasing or maintaining levels of physical activity in populations? What interventions in current use are ineffective, inefficient, or potentially harmful?</p>	<p>Regular physical activity is associated with enhanced health and reduced risk of all cause mortality. Increased physical activity has been linked not only to behavioural and social correlates but also to physical and social environmental correlates. The task force strongly recommends community-wide health education campaigns, school-based PE, and social support in community settings, highlighting the role of multisite, multi-component interventions in successfully increasing physical activity behaviours.</p>				<p>Evidence is insufficient to assess a number of interventions: classroom based health education focused on information provision, and family based social support; mass media campaigns and college based health education and physical education (due to insufficient number of studies).</p>

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		<p>reduce the public health burden of sedentary behaviour. The reviews of interventions to increase physical activity reflect systematic searches of seven computerized databases (MEDLINE, Sportdiscus, PsycINFO, Transportation Research Information Services [TRIS], Enviroline, Sociological Abstracts, and Social SciSearch) as well as reviews of reference lists and consultations with experts in the field. These yielded 6238 titles and abstracts for review. A total of 849 reports were retrieved. Of these, 253 were retained for full review. 159 were excluded on the basis of limitations in execution or design or</p>						

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		because they provided no additional information on studies that were already included. 94 studies were considered qualifying studies.						
15	National Clinical Guide	To provide recommendations based on current evidence for best practice in the management of obesity in children and young people, up to the age of 18.	To provide recommendations based on current evidence for best practice in the management of obesity in children and young people.	<p>Children should be encouraged to be more physically active and aim for an average of 30 minutes of physical activity per day. Increases in activity, through lifestyle changes and exercise, reduction in energy intake and reduction in sedentary behaviour should be considered for the treatment of obesity. Family support is needed if treatment is to succeed.</p> <p>Weight maintenance and or weight loss can only be achieved by sustained behavioural changes, e.g.:</p> <ul style="list-style-type: none"> <li>• Healthier eating</li> <li>• Increasing physical activity to a minimum of 30 minutes a day. In healthy children, 60 minutes of moderate-vigorous physical activity/day has been recommended.</li> <li>• Reducing physical inactivity, e.g.</li> </ul>				<p>Evidence in this area has been difficult to identify. In the absence of individual trials, recommendations were based on the advice of the US Expert Committee.</p> <p>It is interesting to note that the guideline development group of 18 people and also the specialist peer review group did not include a physiotherapist.</p>

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				(watching television, computer games) to < 2 hours a day on average or the equivalent of 14 hours a week.				
16	DOH Tool Kit for developing local strategies	Specifically tailored for England, however much of the information and guidance applies equally to Scotland, Wales and Northern Ireland. Primarily aimed at Commissioners of public health services in both primary care trusts and local authorities.	A resource to help those working at local level to plan, coordinate and implement comprehensive strategies to prevent and manage overweight and obesity.	<p>Section B of the toolkit looks at ways of tackling overweight and obesity. It focuses on the five key themes highlighted in Healthy Weight, Healthy Lives: A cross government strategy for England. The five themes are:</p> <ul style="list-style-type: none"> <li>• Children: healthy growth and healthy weight looking at prevention.</li> <li>• Promoting healthier food choices.</li> <li>• Building physical activity into our lives.</li> <li>• Creating incentives for better health.</li> <li>• Personalised support for overweight and obese individuals.</li> </ul> <p>Recommendations to support practitioners in delivering effective interventions to increase physical activity, including brief advice in primary care, have been developed by NICE.</p>	<p>NICE recommends that overweight and obesity can be tackled in schools by assessing the whole-school environment and ensuring that the ethos of school policies help children maintain a healthy weight, eat healthy and become more physically active.</p> <p>Providing a core range of activities from 8am to 6pm all year round can include breakfast clubs, parenting classes, cookery classes, food co-ops, sports clubs and use of leisure facilities.</p> <p>NICE has identified that</p>	<p>NICE has identified that healthcare professionals play an important and highly cost-effective role in providing brief advice on physical activity in primary care. In 2007, the total annual cost to the NHS of diseases for which elevated BMI is a risk factor (direct healthcare costs) was estimated to be £17.4 billion, of which overweight and obesity were estimated to account for £4.2 billion, and obesity</p>		NICE guidance on exercise referral schemes – The Public Health Independent Advisory Committee determined that there was insufficient evidence to the use of these schemes to promote physical activity other than as part of research studies were effectiveness can be evaluated.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
					healthcare professionals play an important role and highly cost effective role in providing brief advice on physical activity in primary care. Health Trainers were also highlighted as professionals who work closely within communities promoting healthy lifestyles.	alone for £2.3 billion. By 2050 it is estimated it could rise to £22.9 billion of which overweight and obesity predicted to cost the NHS £9.7 billion and obesity alone £7.1 billion. In 2007, indirect costs of overweight and obesity were estimated to be as much as £15.8 billion. The wider cost of overweight and obesity to society by 2050 is estimated to be £49.9 billion.		
17.	Article	This article focuses on community characteristics that interact with children's weight status in America.	It reviews community based programs and whether they are successfully slowing the rate of children's obesity: including demonstrations of recipe preparation, community gardens,	Parents, schools, and after school settings need to work together to ensure that the environments in which each child operates are undergoing changes to reduce barriers to make healthy choices.	State legislation focused on school physical activity. In 2006, at least 31 states introduced or amended bills to improve schools	Annual hospital costs related to childhood obesity totalled \$127 million from 1997 to 1999 (in 2001		Research has led us to conclude that early intervention and prevention are more effective and less costly than treatment of adolescent or adult obesity.

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
			and school-based curricula.	Parent food choice, eating style, activity level, and screen time are all influences on how children will behave in relation to food intake and physical activity.	nutrition environment and physical activity.	constant U.S dollars), up from \$35 million from 1979 to 1981 (Wang and Dietz 2002). According to the U.S Department of Health and Human services (2001), the total costs of obesity in 2000 were \$117 billion. Using current 2007 U.S population data, this is an additional \$387 per person per year (U.S. Census Bureau 2007).		
18.	NICE Public Health Guidance	A quick reference guide to present recommendations in promoting physical activity, active play and sport for preschool, school and community settings. The recommendations relate to all		<u>Recommendations</u> 1: National Campaign 2: Raising Awareness of the importance of physical activity. 3: Developing physical activity plans. 4: Planning the provision of spaces and facilities. 5: Local transport plans. 6: Responding to children and young people.				Recommendation 2 states that the strategy should ensure that partnership working is developed and supported within local physical activity networks.  Recommendation 3 states that one

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
		children and young people up to the age of 18.		<p>7: Leadership and instruction.</p> <p>8: Training and continuing professional development.</p> <p>9: Multi-component school and community programmes.</p> <p>10: Facilities and Equipment.</p> <p>11: Supporting girls and young women.</p> <p>12: Active and sustainable school travel plans.</p> <p>13: Helping Children to be active.</p> <p>14: Helping girls and young women to be active.</p> <p>15: Helping families to be active.</p>				<p>action is to identify groups of local children and young people in the design, planning and delivery of physical activity opportunities. Consultation with different groups of children and young people and families regularly to understand the factors that helps or prevent them from being physically active.</p> <p>Recommendation 6 suggests that physical activity programmes are run by people with the relevant training or experience.</p> <p>Although physiotherapists are not specified in the recommendations of who should take action, some do state health practitioners and physical activity professionals should be the ones to help implement</p>

N	Design of Study	Methods and Patients	Overview summary	Clinical Results	System Results	Economic Results	Staffing Costs	Comments
								these recommendations.



## **APPENDIX E**

### **Literature Search Methodology**

We carried out four sets of searches:

- extensive searches for systematic reviews, trials and economic evaluations of physiotherapy in relation to childhood obesity/physical activity, stroke, respiratory problems, in a range of databases;
- more focused searches, in resources appropriate to the research questions and the types of evidence expected to be retrieved, for evidence of the impact of activity and exercise on health outcomes for obese children (without limiting to the concept of physiotherapy);
- more focused searches, in resources appropriate to the research questions and the types of evidence expected to be retrieved, for evidence of the impact of physiotherapy on hospital admissions for adults with COPD, asthma and emphysema;
- A focused search for systematic reviews of the effectiveness of physiotherapy in acute back pain.

The searches are described in more detail below. These searches represent an extensive but not comprehensive search of the available literature. With the resources available we were not able to search other relevant databases such as CINAHL, AMED and sources of grey literature. However, we have searched the major biomedical databases for systematic reviews, trials and economic evaluations and a specialist physiotherapy resource in the time available. The search strategy has been designed to be reasonably sensitive using several relevant synonyms for the topics of interest. However, further terms could usefully have been added to the strategies to improve sensitivity if we had had the time to process the number of records these more sensitive searches would have produced. Finally, the broad physiotherapy searches were restricted to publications in the period 2000-2008. This means that relevant older studies have not been assessed. However, it is reasonable to expect that many studies published prior to 2002 will have been incorporated into recent systematic reviews, for which we have searched.

We undertook extensive searches to identify research on physiotherapy in relation to childhood obesity/physical activity, stroke, respiratory problems, in a range of databases. We limited the search results to records with publication dates of 2000 onwards.

<b>Resource</b>	<b>URL/interface and limits</b>	<b>Date searched</b>
MEDLINE	OvidSP	Searched 15/4/08
EMBASE	OvidSP	Searched 15/4/08
DARE	<a href="http://www.crd.york.ac.uk/crdweb/">http://www.crd.york.ac.uk/crdweb/</a>	Searched 15/4/08
HTA database	<a href="http://www.crd.york.ac.uk/crdweb/">http://www.crd.york.ac.uk/crdweb/</a>	Searched 15/4/08
NHS EED	<a href="http://www.crd.york.ac.uk/crdweb/">http://www.crd.york.ac.uk/crdweb/</a>	Searched 15/4/08
HEED	Wiley interface	Searched 15/4/08
Cochrane Database of Systematic Reviews	Cochrane Library, Wiley interface	Searched 15/4/08
CENTRAL	Cochrane Library, Wiley interface	Searched 15/4/08
PEDro	<a href="http://www.pedro.fhs.usyd.edu.au/index.html">http://www.pedro.fhs.usyd.edu.au/index.html</a>	Searched 15/4/08

Searches were undertaken for evidence of the impact of activity and exercise on health outcomes for obese children. We searched the following key resources to identify systematic reviews of the evidence and national guidance because this issue has been the subject of many reviews of the evidence:

<b>Resource</b>	<b>URL/interface</b>	<b>Date searched</b>	<b>Records identified</b>	<b>Records selected for assessment</b>
Cochrane Database of Systematic Reviews	Cochrane Library, Wiley interface	2008, issue 3 Searched 09/09/08	38	2
Database of Abstracts of Reviews of Effects	Cochrane Library, Wiley interface	2008, issue 3 Searched 09/09/08	37	24
NICE website	<a href="http://www.nice.org.uk/">http://www.nice.org.uk/</a>	09/09/08	2	2

Searches were undertaken to identify evidence of the impact of physiotherapy for adults with COPD, asthma and emphysema in terms of hospital admissions. We searched the following resources for systematic reviews, guidance, trials and research studies:

<b>Resource</b>	<b>URL/interface</b>	<b>Date searched</b>	<b>Records identified</b>	<b>Records selected for assessment</b>
Cochrane Database of Systematic Reviews	Cochrane Library, Wiley interface	2008, issue 3 Searched 09/09/08	58	3
CENTRAL	Cochrane Library, Wiley interface	2008, issue 3 Searched 09/09/08	12	10
DARE website	<a href="http://www.crd.york.ac.uk/crdweb/">http://www.crd.york.ac.uk/crdweb/</a>	09/09/08	5	0
British Thoracic Society website	<a href="http://www.brit-thoracic.org.uk/ClinicalInformation/tabid/66/Default.aspx">http://www.brit-thoracic.org.uk/ClinicalInformation/tabid/66/Default.aspx</a>	09/09/08	2	1
MEDLINE	OvidSP interface	In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1950 to Present>, searched 10/9/8	54	21
AMED	OvidSP interface	1985 to September, 2008, searched 10/9/8	5	1
PEDro	<a href="http://www.pedro.fhs.usyd.edu.au/index.html">http://www.pedro.fhs.usyd.edu.au/index.html</a>	searched 10/9/8	104	88

Searches were undertaken to identify systematic reviews of the effectiveness of physiotherapy for the treatment of acute back pain. We searched the following resources which are key sources of systematic reviews:

<b>Resource</b>	<b>URL/interface</b>	<b>Date searched</b>	<b>Records identified</b>	<b>Records selected for assessment</b>
Cochrane Database of Systematic Reviews	Cochrane Library, Wiley interface	2008, issue 3 Searched 08/10/08	25	6
Database of Abstracts of Reviews of Effects	Cochrane Library, Wiley interface	2008, issue 3 Searched 08/10/08	60	16
Health Technology Assessment database	Cochrane Library, Wiley interface	2008, issue 3 Searched 08/10/08	30	4
TRIP index	<a href="http://www.tripdatabase.com/index.html">http://www.tripdatabase.com/index.html</a>	08/10/08	47	0
Clinical Evidence	<a href="http://clinicalevidence.bmj.com/ceweb/index.jsp">http://clinicalevidence.bmj.com/ceweb/index.jsp</a>	08/10/08	1	1
Clinical Knowledge Summaries	<a href="http://cks.library.nhs.uk/home">http://cks.library.nhs.uk/home</a>	08/10/08	1	0

**Search 1:** to identify research on physiotherapy in relation to childhood obesity/physical activity, stroke, respiratory problems, in a range of databases.

1.1 MEDLINE, OvidSP, searched 15/04/08.

1. review.ab.
2. review.pt.
3. meta-analysis.ab.
4. meta-analysis.pt.
5. meta-analysis.ti.
6. or/1-5
7. clinical trial.pt.
8. randomized.ab.
9. placebo.ab.
10. randomly.ab.
11. trial.ab.
12. groups.ab.
13. dt.fs.
14. or/7-13
15. economics/
16. exp "costs and cost analysis"/
17. economics, dental/
18. exp "economics, hospital"/
19. economics, medical/
20. economics, nursing/
21. economics, pharmaceutical/
22. (economic\$ or cost or costs or costly or costing or price or prices or pricing or pharmaco-economic\$).tw.
23. (expenditure\$ not energy).tw.
24. (value adj1 money).tw.
25. budget\$.tw.
26. or/15-25
27. ((energy or oxygen) adj cost).ti,ab.
28. (metabolic adj cost).ti,ab.
29. ((energy or oxygen) adj expenditure).ti,ab.
30. or/27-29
31. 26 not 30
32. 6 or 14 or 31
33. letter.pt.
34. editorial.pt.
35. comment.pt.
36. or/33-35
37. Animals/
38. Humans/
39. 37 not (37 and 38)
40. 32 not (36 or 39)
41. "Physical Therapy (Specialty)"/ or Physical Therapy Modalities/
42. physiotherap\$.ti,ab.
43. physical therap\$.ti,ab.
44. or/41-43
45. 40 and 44
46. Physical Fitness/
47. exp \*Exercise/
48. (physical adj2 (activit\$ or fit\$)).ti,ab.

49. exercise.ti,ab.
50. exp \*Obesity/
51. \*Weight Loss/
52. (obesity or obese or overweight).ti,ab.
53. or/46-52
54. exp child/
55. exp adolescent/
56. (young adj (person\$ or people or adult\$ or individual\$)).ti,ab.
57. (boy or boys or girl or girls).ti,ab.
58. (child\$ or adolescen\$ or kid or kids or youth\$ or youngster\$ or minor or minors or teen\$ or juvenile\$ or student\$ or pupil or pupils).ti,ab.
59. or/54-58
60. 53 and 59
61. exp \*Stroke/
62. stroke\$.ti,ab.
63. (cerebrovascular or cerebral vascular).ti,ab.
64. or/61-63
65. exp \*Respiratory Tract Diseases/
66. (respiratory adj2 (disorder\$ or disease\$ or infection\$)).ti,ab.
67. (pulmonary adj2 (disorder\$ or disease\$ or infection\$)).ti,ab.
68. or/65-67
69. 45 and (60 or 64 or 68)
70. limit 69 to yr="2000 - 2008"

## 1.2 Embase, OvidSP, searched 15/04/08.

1. exp meta analysis/ or "systematic review"/
2. meta-analys\$.ti,ab.
3. metaanalys\$.ti,ab.
4. meta analys\$.ti,ab.
5. review\$.ti.
6. overview\$.ti.
7. or/1-6
8. random.tw.
9. clinical trial.mp.
10. exp Health Care Quality/
11. or/8-10
12. Health Economics/
13. exp Economic Evaluation/
14. exp Health Care Cost/
15. exp PHARMACOECONOMICS/
16. or/12-15
17. (econom\$ or cost or costs or costly or costing or price or prices or pricing or pharmaco-economic\$).ti,ab.
18. (expenditure\$ not energy).ti,ab.
19. (value adj2 money).ti,ab.
20. budget\$.ti,ab.
21. or/17-20
22. 16 or 21
23. (metabolic adj cost).ti,ab.
24. ((energy or oxygen) adj cost).ti,ab.
25. ((energy or oxygen) adj expenditure).ti,ab.
26. or/23-25
27. 22 not 26

28. 7 or 10 or 27
29. editorial.pt.
30. note.pt.
31. letter.pt.
32. or/29-31
33. 28 not 32
34. (rat or rats or mouse or mice or hamster or hamsters or animal or animals or dogs or dog or cats or bovine or sheep).ti,ab,sh.
35. exp animal/
36. Nonhuman/
37. or/34-36
38. exp human/
39. exp human experiment/
40. 38 or 39
41. 37 not (37 and 40)
42. 33 not 41
43. exp physiotherapy/
44. physiotherap\$.ti,ab.
45. physical therap\$.ti,ab.
46. or/43-45
47. 42 and 46
48. Physical Activity/
49. EXERCISE/
50. (physical adj2 (activit\$ or fit\$)).ti,ab.
51. exercise.ti,ab.
52. exp \*Obesity/
53. Weight Reduction/
54. (obesity or obese or overweight).ti,ab.
55. or/48-54
56. exp child/
57. exp adolescent/
58. (young adj (person\$ or people or adult\$ or individual\$)).ti,ab.
59. (boy or boys or girl or girls).ti,ab.
60. (child\$ or adolescen\$ or kid or kids or youth\$ or youngster\$ or minor or minors or teen\$ or juvenile\$ or student\$ or pupil or pupils).ti,ab.
61. or/56-60
62. 55 and 61
63. exp \*STROKE/
64. stroke\$.ti,ab.
65. (cerebrovascular or cerebral vascular).ti,ab.
66. or/63-65
67. exp \*RESPIRATORY TRACT DISEASE/
68. (respiratory adj2 (disorder\$ or disease\$ or infection\$)).ti,ab.
69. (pulmonary adj2 (disorder\$ or disease\$ or infection\$)).ti,ab.
70. or/67-69
71. 47 and (62 or 66 or 70)
72. limit 71 to yr="2000 - 2008"



**1.3** CRD/DARE, HTA and NHS EED databases, <http://www.crd.york.ac.uk/crdweb/>, searched 15/04/08

Physiotherapy\* or (physical near therap\*)  
(Physical near activit\*) or (physical near fit\*) or exercise  
obesity or obese or overweight  
#2 or #3  
(young near person\*) or (young near people) or (young near adult\*) or (young near individual\*)  
boy or boys or girl or girls  
child\* or adolescent\* or kid or kids or youth\* or youngster\* or minor or minors or teen\* or juvenile\* or student\* or pupil or pupils  
#5 or #6 or #7  
#4 and #8  
Stroke\* or cerebrovascular or (cerebral near vascular)  
(Respiratory near disorder\*) or (respiratory near disease\*) or (respiratory near infection\*)  
(pulmonary near disorder\*) or (pulmonary near disease\*) or (pulmonary near infection\*)  
#1 and (#9 or #10 or #11 or #12)

**1.4** HEED, Wiley interface, searched 15/04/08

AX=physiotherapy or physiotherapist or physiotherapists or (physical therapy) or (physical therapist) or (physical therapists)  
AX=(physical activity) or (physical activities) or (physical fitness) or exercise  
AX=obesity or obese or overweight  
CS=2 or 3  
AX=(young person) or (young persons) or (young people) or (young adult) or (young adults) or (young individual) or (young individuals)  
AX=(boy or boys or girl or girls)  
AX=(child or children or adolescent or adolescents or adolescence or kid or kids or youth or youths or youngster or youngsters or minor or minors or teen or teens or teenager or teenagers or juvenile or juveniles or student or students or pupil or pupils)  
CS=5 or 6 or 7  
CS=4 and 8  
AX=stroke or strokes or cerebrovascular or (cerebral vascular)  
AX=(respiratory disorder) or (respiratory disease) or (respiratory infection)  
AX=(pulmonary disorder) or (pulmonary disease) or (pulmonary infection)  
CS=1 and (9 or 10 or 11 or 12)  
JD>=2000  
CS=13 and 14

**1.5** CDSR and CENTRAL, Cochrane Libray, Wiley Interface, searched 15/04/08

**#1** MeSH descriptor Physical Therapy (Specialty) explode all trees  
**#2** MeSH descriptor Physical Therapy Modalities explode all trees  
**#3** (physiotherap\* or "physical therap\*"):ti,ab,kw  
**#4** (#1 OR #2 OR #3)  
**#5** MeSH descriptor Physical Fitness explode all trees  
**#6** MeSH descriptor Exercise explode all trees  
**#7** (physical NEAR/2 (activit\* or fit\*)):ti,ab,kw  
**#8** (exercise):ti,ab,kw  
**#9** MeSH descriptor Obesity explode all trees  
**#10** MeSH descriptor Weight Loss explode all trees

- #11 (obesity or obese or overweight):ti,ab,kw
- #12 (#5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11)
- #13 (child):kw
- #14 MeSH descriptor Adolescent explode all trees
- #15 (young near (person\* or people or adult\* or individual\*)):ti,ab,kw
- #16 (boy or boys or girl or girls):ti,ab,kw
- #17 (child\* or adolescen\* or kid or kids or youth\* or youngster\* or minor or minors or teen\* or juvenile\* or student\* or pupil or pupils):ti,ab,kw
- #18 (#13 OR #14 OR #15 OR #16 OR #17)
- #19 (#12 AND #18)
- #20 MeSH descriptor Cerebrovascular Accident explode all trees
- #21 (stroke\* or cerebrovascular or "cerebral vascular"):ti,ab,kw
- #22 MeSH descriptor Respiratory Tract Diseases explode all trees
- #23 (respiratory or pulmonary) NEAR/2 (disorder\* or disease\* or infection\*):ti,ab,kw
- #24 (#4 AND ( #19 OR #20 OR #21 OR #22 OR #23 )), from 2000 to 2008

1.6 PEDro, <http://www.pedro.fhs.usyd.edu.au/index.html>, searched 15/04/08.

We searched PeDRO using a variety of the search terms and combinations used in searching the databases above. Most references had already been retrieved via the other databases.

**Search 2** Searches for evidence of the impact of activity and exercise on health outcomes for obese children

2.1 CDSR and DARE via the Cochrane Library 2008/3, searched 9/9/08

#1	<u>(children or childhood):ti,ab,kw</u>	50914
#2	<u>obese or obesity or overweight</u>	7541
#3	<u>(#1 AND #2)</u>	655

The total Cochrane Library returned 655 records. The Cochrane Database of Systematic Reviews produced 38 records and 2 were downloaded. DARE produced 37 records of which 24 were downloaded.

2.2 NICE website, <http://www.nice.org.uk/>, searched 15/04/08.

Search terms: obesity and children  
 One relevant guideline was identified:  
<http://www.nice.org.uk/guidance/CG43/niceguidance/pdf/English>

Search terms: activity  
 Draft guidance was identified and downloaded:  
 National Institute For Health And Clinical Excellence Public Health Draft Guidance. *Promoting physical activity, active play and sport for pre-school and school-age children in family, pre-school, school and community settings.*  
<http://www.nice.org.uk/media/C11/72/PromotingPhysicalActivityChildrenDraftGuidanceConsultation.pdf>

**Search 3** Searches for respiratory disorders and physiotherapy: long term condition management to prevent admission

**3.1** Cochrane Library 2008/3, searched 9/9/08

#1	<u>copd</u>	3989
#2	<u>"chronic obstructive pulmonary"</u>	2759
#3	<u>asthma</u>	17671
#4	<u>emphysema</u>	608
#5	<u>physiotherap* or physical therap\$</u>	3679
#6	<u>admiss* or hospitali*</u>	23394
#7	<u>(#1 OR #2 OR #3 OR #4)</u>	22275
#8	<u>(#5 AND #6 AND #7)</u>	79

The total Cochrane Library returned 79 records. We downloaded 3 reviews of the 58 returned from the Cochrane Database of Systematic Reviews and 10 records of trials from the 12 returned by CENTRAL.

**3.2** DARE, <http://www.crd.york.ac.uk/crdweb/>, searched 9/9/08

1	<u>MeSH Pulmonary Disease, Chronic Obstructive EXPLODE 1</u>	290
2	<u>copd</u>	280
3	<u>"chronic obstructive pulmonary"</u>	396
4	<u>MeSH Asthma EXPLODE 1 2 3 4</u>	625
5	<u>asthma*</u>	925
6	<u>MeSH Emphysema EXPLODE</u>	13
7	<u>emphysema</u>	59
8	<u>#1 or #2 or #3 or #4 or #5 or #6 or #7</u>	1450
9	<u>MeSH Physical Therapy Modalities EXPLODE 1</u>	904
10	<u>physiotherap*</u>	512
11	<u>#9 or #10</u>	1230
12	<u>#8 and #11</u>	51
13	<u>admiss*</u>	1535
14	<u>#12 and #13</u>	5

5 records were identified but none were relevant to download.

**3.3** British Thoracic Society, <http://www.brit-thoracic.org.uk/ClinicalInformation/tabid/66/Default.aspx>, searched 09/09/08

Asthma guideline – nothing about physiotherapy.

COPD guideline – section on physiotherapy downloaded.

**3.4** MEDLINE, Ovid, In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1950 to Present>, searched 10/9/8

1	exp Pulmonary Disease, Chronic Obstructive/ (22958)
2	exp Asthma/ (87698)
3	exp Emphysema/ (6592)
4	or/1-3 (113972)
5	exp Physical Therapy Modalities/ (90134)
6	physiotherap\$.ti,ab. (10009)

- 7 hospitalization/ or "length of stay"/ or patient admission/ or patient readmission/ (103330)
- 8 admission\$.ti,ab. (94557)
- 9 4 and (5 or 6) and (7 or 8) (54)
- 10 from 9 keep 1,3,5-6,8-9,11,16,18,22,25,28-29,31-32,34,37,39-41,44 (21)

54 records were identified and 21 were downloaded.

**3.5** AMED (Allied and Complementary Medicine), Ovid, 1985 to September, 2008, searched 10/9/8

- 1 exp Asthma/ (1216)
- 2 exp Emphysema/ (26)
- 3 physiotherap\$.ti,ab. (4563)
- 4 hospitalization/ or "length of stay"/ or patient admission/ or patient readmission/ (1383)
- 5 admission\$.ti,ab. (2045)
- 6 exp lung diseases obstructive/ (2310)
- 7 exp Physiotherapy/ or exp Physiotherapists/ (578)
- 8 or/1-2,6 (2331)
- 9 or/3,7 (4878)
- 10 or/4-5 (3123)
- 11 8 and 9 and 10 (5)
- 12 from 11 keep 4 (1)

Five records were identified and one was downloaded.

**3.6** PEDro, <http://www.pedro.fhs.usyd.edu.au/index.html>, searched 10/9/8

Search terms:

Copd admission\*

32 records retrieved

"chronic obstructive" admission\*

34 records retrieved, some duplicated previous search

Asthma admission\*

38 records retrieved

Emphysema admission\*

0 records retrieved.

**Search 4.** Searches for systematic reviews of physiotherapy treatment for acute back pain.

**4.1** Cochrane Library, Issue 2008/3, searched 8/10/08

- #1** MeSH descriptor Back Pain explode all trees 1857
- #2** acute NEAR/3 back NEAR/3 pain 263
- #3** MeSH descriptor Physical Therapy Modalities explode all trees 7969
- #4** physiotherap\*:ti,ab,kw 2115
- #5** physical NEXT therap\* 4297
- #6** (#1 OR #2) 1956
- #7** (#3 OR #4 OR #5) 11440
- #8** (#6 AND #7) 690

**4.2** TRIP, <http://www.tripdatabase.com/index.html>, searched 8/10/08

Search terms:

Acute back pain physiotherapy

**4.3** Clinical Evidence, <http://clinicalevidence.bmj.com/cweb/index.jsp>, searched 8/10/08

Downloaded the back pain chapter:

[http://clinicalevidence.bmj.com/cweb/conditions/msd/1102/1102\\_background.jsp](http://clinicalevidence.bmj.com/cweb/conditions/msd/1102/1102_background.jsp)

**4.4** Clinical Knowledge Summaries, <http://cks.library.nhs.uk/home>, searched 8/10/08

Navigated through the site via 'Musculoskeletal disorders', to 'Back pain'