

CHARTERED SOCIETY OF PHYSIOTHERAPY

The Economics of Physiotherapy

**Summary Report from
York Health Economics Consortium
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Section 1: Introduction

1.1 OVERVIEW OF PROJECT

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 YHEC findings from the literature review and the three economic models. It develops the initial report provided by YHEC to the CSP. Additions were made following a short external review undertaken by CSP. The augmentations are intended to assist users in understanding the main assumptions, results and their interpretation. The changes are presentational to improve comprehension; no change has been made to the evidence base or the results.

Accompanying this document are three other products which together aim to inform readers on the economic value of physiotherapy in COPD, stroke and low back pain. These are:

- the detailed findings from a literature review conducted by YHEC
- a user manual summarising the structure of the three models which uses pictures of the key screens to describe the pre-populated data fields, the inputs which can be inserted by users and the results.
- The three Microsoft Excel spreadsheets which comprise the economic models.

1.2 STRUCTURE OF REPORT

Section Two provides the summary of the individual literature reviews for the four disease/condition areas including evidence collected. Section Three summarises the development of each model, the key sources used, its results and conclusions for a typical primary care trust. The descriptions of the assumptions, results and conclusions have all been added to the initial YHEC report by the external reviewer.

Section 2: Literature review

2.1 OVERVIEW OF LITERATURE REVIEW

The literature reviews were undertaken for four disease areas/conditions. The methodology employed including the search terms and the databases searched are shown in the appendix to the literature review report. Evidence was extracted from the literature reviewed for the development of the models and for the population of the outcomes of the pathways described in them.

2.2 FINDINGS FROM LITERATURE ON RESPIRATORY CONDITIONS

There is robust evidence that:

- Pulmonary rehabilitation is clinically effective. It improves the quality of life 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. It is not always clear which elements of a disease management programme have the greatest impact;
- Pulmonary rehabilitation is cost effective and reduces service costs. Rehabilitation can reduce admissions to hospital in COPD patients and, for those who are admitted, reduce the lengths of stay. The net use of healthcare resources also falls, with the savings from fewer hospital inpatient days exceeding the additional resources required to provide rehabilitation. Estimates suggest that the savings may be four times the cost of the intervention. Home based rehabilitation is at least as effective as that offered via outpatients and cheaper;
- 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.

2.3 FINDINGS FROM LITERATURE ON THE MANAGEMENT OF STROKE

There is robust evidence that:

- early supported discharge following stroke using physiotherapy reduces the amount of time in hospital by between 8 and 10 days, with equivalent clinical outcomes for the patient; and
- early supported discharge is cost saving; the higher cost of therapy in the community is less than the cost of managing such patients in hospital. Cost savings ranged from 2 to 30% with sensitivity analyses showing that these findings are robust.
- the direct cost of physiotherapy provided in the home was 38% lower than providing the service in a day hospital.

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;
- 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.

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.

2.4 FINDINGS FROM LITERATURE ON BACK PAIN

There is robust evidence that:

- Large numbers of referrals to secondary care could be avoided by early referral to physiotherapy based services ;
- Physiotherapists have a wide ranging role at all stages of back and neck pain diagnosis and assessment;

- advice to patients to remain active has a positive effect and is clinically and cost effective;
- 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;

2.5 FINDINGS FROM LITERATURE ON 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 clinically or cost 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.

2.6 USE OF THE EVIDENCE

The strong evidence, especially on the impact of physiotherapy interventions, was used to populate the models. The evidence from the impact of physiotherapy interventions on the management of childhood obesity was extremely limited and no model was developed.

Section 3: Development and use of models

3.1 OVERVIEW OF DEVELOPMENT OF MODELS

Three models have been developed using evidence from the literature. The models have been discussed extensively with the CSP Project Team and with a group of invited physiotherapists to whom the models were demonstrated. The models are in fact simplified patient pathways, and, as with all models, they are representations of reality.

Three spreadsheets have been created in Microsoft Excel, one for each of the three conditions. Each spreadsheet is essentially the same in structure and user input. The front sheet of each spreadsheet shows the pathway diagrammatically. A single manual is available for users. Whilst the manual is designed to lead a potential user through the models and their workings, a **basic** knowledge of how spreadsheets work would be an advantage. For example, each spreadsheet has a number of worksheets; the titles of these worksheets are shown on the tabs at the bottom of the spreadsheet. Also, the diagrammatic representation of the model and the assumption sheets all contain small red triangles in the corners of spreadsheet cells. When a cursor is held over one of these triangles, a box pops up showing the evidence used and the source of this evidence. It is assumed that service managers would be the most likely users of the model, and it is also likely that these people would have a basic knowledge of spreadsheets.

3.2 EVIDENCE USED IN THE MODELS

Whilst decision points in the models have been populated as far as possible with evidence obtained from the literature reviews, assumptions have occasionally been made. These assumptions are clearly identified and the users of the models are able to substitute alternative assumptions.

All models are driven by assumption sheets. For example the stroke model has four assumption sheets, two of which are staffing assumptions, one for costs and one for outcomes. The use of the assumption sheets is explained clearly in the user manual.

All models are pre-populated with evidence. Users have the option to select their Primary Care Trust (PCT), from which data is automatically calculated on incidence and prevalence of the condition, as well as, for example, the number of inpatient cases (derived from nationally published hospital episode statistics). Users may also need to input other local variables specific to the condition. For example, in the modelling of the management of strokes, a user must select whether an acute stroke unit serves that population.

The CSP wished to be able to use the models to investigate the impact of changes in skill mix and grades for the undertaking of different roles. Because the evidence available does not indicate how the effectiveness or efficiency of physiotherapy impact varies by grade, users of the models have the option to impute differences, for example, number of physiotherapists and grade. These changes can be made through the assumption sheets by using the user defined options.

3.2.1 Stroke model

The key assumptions included:

- Has the PCT a stroke unit?
- Is a high cost area supplement applicable?
- Population
- Population over 65 years
- Number of emergency stroke admissions, and
- Number of strokes affecting people of working age.

Data from the Government data source 'Direct.gov' and 'Hospital Episode Statistics' were used to populate this section for each PCT.

The staffing assumptions were taken from a Cochrane Review of 'Services for reducing duration of hospital care for acute stroke patients' [Early Supported Discharge Trialists. Cochrane Database of Systematic Reviews 2005, Issue 2].

Sensitivity analysis was provided using upper and lower estimates of plus and minus 20% of the central case.

Staff costs include salary at midpoint of pay scales, national insurance and superannuation (plus about 24%) and overheads but exclude qualification costs. The sources were the Personal Social Services Research Unit (PSSRU) 'Unit Costs of Health and Social Care', 2007 and from Agenda for Change Pay Circular June 2008.

Evidence on the number of patients eligible for early discharge compared to hospital care and the resulting savings in length of inpatient stay came from a Cochrane Review of stroke units [Organised inpatient (stroke unit) care for stroke. Cochrane Database of Systematic Reviews 2007, Issue 4].

The tariff saving from early discharge used National Tariff process as published by the Department of Health and the value of early return to work came from Dame Carol Black's 'Working for a Healthier Tomorrow'.

3.2.2 Low back pain model

The key assumption was that the annual incidence of acute back pain was 5% of the population of a PCT.

The main interventions studied were:

- twenty minutes' advice as evidenced as being as effective as 'normal care' in 'Individual patient education for low back pain (Review) - Cochrane Review, Engers AJ et al, The Cochrane Library (2009).
- twenty minute manipulation and 1 hour group exercise as evidenced by UK BEAM Trial¹.

Staff costs were based on the same source as stroke, PSSRU. Outpatient costs came from Department of Health Reference Costs. Medication was assumed to comprise 400g Ibuprofen taken three times a day, price to NHS of £2.24 for 84 tablets². Adverse events per patient per year were assumed to cost £61.³

Referrals patterns were based on the study in Scotland by Holdsworth et al, Physiotherapy (2007). Resolution at six weeks was assumed to 90%⁴. The effectiveness of each intervention was informed by the results of BEAM (2004)

3.2.3 COPD model

The first assumption is the number of patients with at least one acute exacerbation in 2007/08. The rate varies from 0.002 to 0.004 of the PCT's population. The source is not referenced but could be Hospital Episode Statistics.

The base case assumed each patient would attend eight one-hour classes, that two patients would attend each class and that each of the following disciplines would provide two hours of classes: physiotherapy, dietetics, pharmacy, nursing, psychology, social work, occupational therapy and a respiratory doctor.

The staff costs assumptions were based on data from PSSRU.

The tariff cost of an emergency admission for COPD was assumed to be £2,337, as published by the Department of Health⁵.

The clinical effectiveness of the intervention was assumed to reduce the number of acute exacerbations from 1.6 to 0.9.⁶

3.3 RESULTS FROM THE MODELS

Each of the models presents the results in equivalent ways, showing the number of physiotherapist and other team members required with associated costs. Estimates of the

¹ United Kingdom Back Pain Exercise and Manipulation (UK BEAM) Randomised Trial: Effectiveness of Physical Treatment for Back Pain; UK BEAM Trial Team, BMJ (2004)

² http://cks.library.nhs.uk/back_pain_low_and_sciatica/management/quick_answers/scenario_back_pain_low_and_sciatica/prescriptions/nsaid_ibuprofen#-340703.

³ Adverse events per patient prescribed ibuprofen were taken from 'Cost of NSAID adverse effects to the UK National Health Service; Moore RA, Phillips CJ, Journal of Medical Economics (1999)' updated by RPI from 1999 to 2009.

⁴ Outcome of low back pain in general practice: a prospective study, Croft PR et al, BMJ (1998)

⁵ http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_081096

⁶ Respiratory rehabilitation after acute exacerbation of COPD may reduce risk for readmission and mortality – a systematic review, Puhan et al, Respiratory Research (2005)

overall effectiveness of the physiotherapists as well as associated cost savings are also shown with an estimate of the net cost taking potential savings into account.

The three models have been run for a typical PCT, Croydon, with a population of 340,000. The main findings are outlined below.

3.3.1 Stroke model

The main findings for a typical PCT were:

- Early discharge was estimated to save about 16% of the costs to run the team; the cost of establishing a team was estimated at about £250,000 a year and was estimated to deliver annual savings from fewer inpatient days of £183,000 and from fewer nursing home placements of £107,700.
- Community based rehabilitation teams were estimated to save about 28% of the costs to run the team. For a typical PCT running costs of about £64,000 were estimated, with potential savings from avoided emergency admissions of £81,000.

3.3.2 Low back pain model

The results reported:

- a saving per appointment of £22 if a physiotherapist rather than a GP managed patients with acute low back pain
- that group exercise with GP management would be very slightly more expensive, about £2,000 a year, for a PCT than GP care alone
- that manipulation plus GP care offered the potential for greater cost savings, some £72,000 per year
- that with manipulation plus group exercise and GP care, the estimated savings rose to £274,000.

3.3.3 COPD model

The cost of operating a pulmonary rehabilitation team in a typical PCT was estimated to be almost £600,000 a year, with the potential to achieve savings of over £1 million a year from avoided inpatient stays and thus lower costs from the acute trusts. The net savings of £425,000 are 72% of the cost to operate the team. The team therefore is estimated to pay for itself plus a further 72% of its costs.

3.4 CONCLUSIONS FROM THE MODELS

The models are able to demonstrate the potential impact of different physiotherapy based interventions on the cost base for PCTs. They draw on the best available published evidence. The results should inform the strategic planning of services; they answer the big questions, such as does this service offer sufficient promise that we should undertake more detailed planning on its provision.

Using this test the models show that the following services should be considered by every PCT:

- a) Pulmonary rehabilitation for patients with COPD
- b) Substitution of GPs with physiotherapists to manage acute low back pain
- c) Introduction of manipulation and group exercise for patients with chronic back pain
- d) Enabling early discharge for stroke patients
- e) Setting up community rehabilitation services for stroke patients.

3.5 HOW CAN THE MODELS BE USED

Various scenarios are produced based upon the estimates in the assumption sheets. The base case scenario is based upon the base case (i.e. likely and evidence based) estimates. The best case scenario takes the assumptions that would be the most favourable to the introduction of physiotherapy. The worst case scenario uses the assumptions that would be the least favourable to the introduction of physiotherapy. By changing the assumptions, the results can be changed.

Thus the results from the models under varying scenarios and assumptions can be used in the development, for example, of a business case. These models can usefully be developed alongside guidance given in 'Making the Business Case' (published by the CSP in May 2007).

The models will allow a user to demonstrate how by employing physiotherapists to support the management of patients with one of the three conditions, resources can be saved. These resources can be inpatient days, emergency admissions or readmissions to hospital, outpatient appointments, medication (in particular non steroidal anti-inflammatory drugs or NSAIDs), or GP visits, to which costs have been applied. It is even possible to estimate the likelihood of a patient returning to work. Thus the resources saved can also be expressed in cost savings; in other words it is possible to calculate the costs of employing the physiotherapists (and where appropriate other team members) and what savings can be made through their employment.