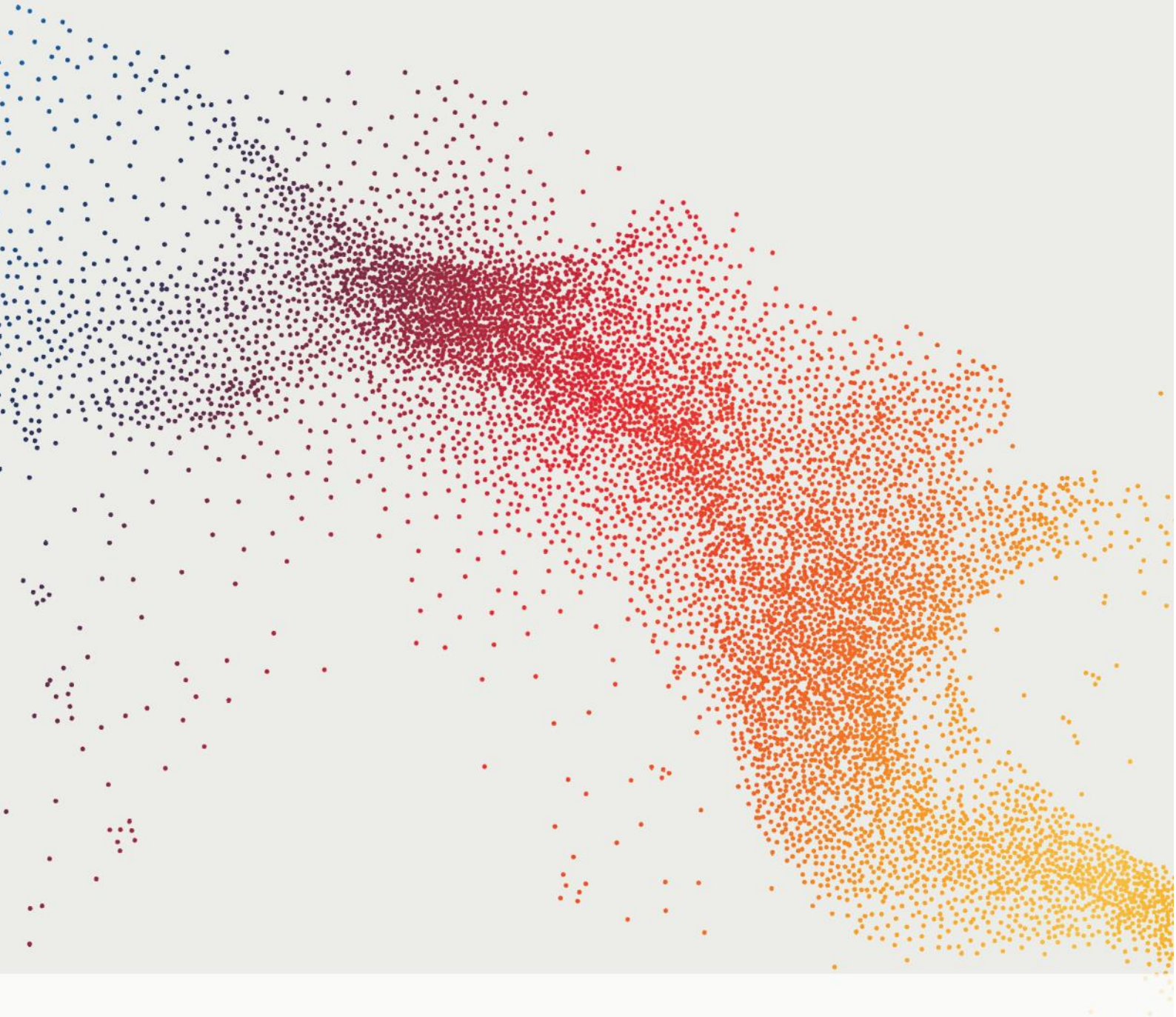


Value of Physiotherapy in Australia

Australian Physiotherapy Association

1 October 2020

nous

Disclaimer:

*Nous Group (**Nous**) has prepared this report for the benefit of Australian Physiotherapy Association (the **Client**).*

The report should not be used or relied upon for any purpose other than as an expression of the conclusions and recommendations of Nous to the Client as to the matters within the scope of the report. Nous and its officers and employees expressly disclaim any liability to any person other than the Client who relies or purports to rely on the report for any other purpose.

Nous has prepared the report with care and diligence. The conclusions and recommendations given by Nous in the report are given in good faith and in the reasonable belief that they are correct and not misleading. The report has been prepared by Nous based on information provided by the Client and by other persons. Nous has relied on that information and has not independently verified or audited that information

Foreword

The Australian Physiotherapy Association is the peak body representing the interests of Australian physiotherapists and their patients. It is a national organisation that represents more than 29,000 members who conduct more than 23 million consultations each year.

Our vision is that all Australians will have access to quality physiotherapy, when and where required, to optimise the health and wellbeing of individuals and to contribute to improved public health.

We engaged Nous to quantify and present the economic value that physiotherapy provides in Australia. As a profession we have extensive research and evidence to demonstrate the efficacy of our interventions and the value we provide to the health care sector. Prior to this report, there have also been numerous cost benefit analyses that considered the economic value of specific treatment approaches and modalities for different cohorts.

Our desire was to draw these isolated pieces of economic evidence together, to form a succinct report that highlights the cost savings and economic benefits that physiotherapy provides; to individual patients, and the gamut of funders that finance our services.

2020 has presented Australians with immense challenges. We have witnessed the worst fire season in recorded Australian history, toxic levels of smoke across the nation and the ongoing COVID-19 pandemic crisis. Faced with a global pandemic the physiotherapy profession seized an opportunity to consider innovative approaches to the delivery and funding of our services.

The COVID-19 pandemic has demonstrated the importance of high-quality healthcare, and of physiotherapy specifically. Throughout the pandemic, physiotherapy was deemed an essential service, underlining the critical role of physiotherapy to wellbeing and quality of life. From respiratory care in Intensive Care Units, to rehabilitative care throughout hospitalisation and discharge, physiotherapists have played a vital role in the management of COVID-19.

With scientists predicating more pandemics in future, coupled with an escalation of natural disasters in coming years, we have an opportunity and obligation to reinforce our health system through the provision of effective healthcare and efficient use of government funds.

Physiotherapy has the power to enhance quality of life, improve health outcomes and offer best value for money in the allocation of scarce resources.

We trust this report will illustrate the pivotal role physiotherapy plays in the life of Australians, and to the economy at large.

Anja Nikolic

CEO, Australian Physiotherapy Association

AUSTRALIAN PHYSIOTHERAPY ASSOCIATION

Contents

Executive Summary

The Australian Physiotherapy Association engaged Nous to examine the costs and benefits of a representative selection of physiotherapy treatments relevant to various life stages. The report below synthesises the clinical research into the treatments offered and compares the benefits they deliver with estimates of the cost of delivering the treatment. Where the average quality of life improvement delivered to patients exceeds the cost of a treatment, or where the treatment costs less than the usual alternative treatment, the physiotherapy treatment was determined to have a net economic benefit.

A conservative approach was taken to estimating the net-benefit to ensure a robust basis for all claims of cost-effectiveness. For this reason, potential indirect or flow-on benefits such as marginal gains in productivity were not included in the calculation. The cost of treatment included the financial cost of the services delivered, as well as the opportunity cost of patient time attending physiotherapy sessions (including estimated time to travel to and from appointments) and completing their recommended exercises where relevant.

The results show that all physiotherapy treatments investigated were clinically effective and delivered net economic benefits, with improvements in the quality of life experienced by patients exceeded by the net cost of the treatment (see Table 1 below).

Table 1 | Average net economic benefit of physiotherapy treatments per episode of care

Osteoarthritis of the knee and hip	Back pain	Falls prevention	Stress urinary incontinence	Parkinson's disease	Chronic obstructive pulmonary disease
$3,772	$6,063	$1,320	$16,814	$6,626	$2,436

Cerebral palsy	Tennis elbow	Orthopaedic outpatient services	Emergency department services	Chronic neck pain
$1,502	$5,610	$9,798	$24,028	$3,416

The results in this report demonstrate that more widespread use of the physiotherapy treatments investigated, where clinically appropriate, would deliver both health and economic benefits. The fact that a wide variety of treatments were found to deliver a net-benefit also suggests that physiotherapy can be beneficial for many patients in different stages of life or experiencing different life events; ranging from easing the burden of disabilities in children, to recovering from sports or workplace injuries and through to ensuring a healthy retirement.

The critical role that physiotherapy has played in the treatment and recovery of COVID-19 patients illustrates how research and innovation can identify new ways for physiotherapy to deliver value, including through further research into whether physiotherapy can be used effectively to treat new clinical indications or applied in a broader range of clinical settings. The benefit delivered by physiotherapists could also be expanded, for example by through the use of Telehealth services for regional and remote communities.

Glossary of Terms

Item	Description
Allied health	Allied health professionals are health professionals that are not part of the medical, dental or nursing professions. They are university qualified practitioners with specialised expertise in preventing, diagnosing and treating a range of conditions and illnesses. Allied health practitioners often work within a multidisciplinary health team to provide specialised support for different patient needs.
APA	The Australian Physiotherapy Association (APA) is the national peak body organisation representing the interests of Australian physiotherapists and their patients.
Avoided costs	A benefit assessed in terms of the cost occurring in the counterfactual, for example without an intervention or when treated using an alternative method.
Benefit : cost ratio	The benefit : cost ratio is the dollar value of economic benefit per dollar value of cost (not included where net costs are negative).
Confidence interval	The confidence interval is a range of values that is likely to include a population value with a certain degree of confidence.
Cost-effective	The World Health Organisation (WHO) estimates that an intervention is cost-effective if it costs three times the gross domestic product (GDP) per capita to save a year of life. Locally, the Department of Prime Minister and Cabinet recommends all government agencies use the value of a statistical life year (VSLY) in cost benefit analysis to estimate the value of a healthy life year, which is based on observed marketplace risk valuations, and is also around three times GDP per capita. Interventions which cost less to produce a QALY gain are deemed highly cost effective
COVID-19	Coronaviruses are a large family of viruses that cause respiratory infections. These can range from the common cold to more serious diseases. COVID-19 is a disease caused by a form of coronavirus.
Efficacy	Efficacy is the ability of an intervention to produce an intended result, usually some improvement in length or quality of life. Efficacy is typically established in comparison to alternatives available at the time. These types of comparisons are often made in randomized clinical trials.
Epidemiological/Markov modelling	An epidemiological model is 'a mathematical and/or logical representation of the epidemiology of disease. A Markov model is probably the most common type of model used in economic evaluation of healthcare interventions. It uses disease states to represent all possible consequences of an intervention of interest.
Incremental cost	The cost added by an intervention above and beyond the alternative or current state.
MBS	The Medicare Benefits Schedule (the MBS) is a list of the medical services for which the Australian Government will pay a Medicare rebate, to provide patients with financial assistance towards the costs of their medical services.
Meta-analysis	Meta-analyses are category of systematic review that take use a quantitative, formal, epidemiological study design to systematically assess the results of previous research and derive conclusions about that body of research. The benefits of meta-analysis include a consolidated and quantitative review of a large, and often complex, sometimes seemingly conflicting, body of literature.

Item	Description
Net-benefit	The average net economic benefit delivered per episode of care, calculated as quality of life benefits minus net costs (which may be positive or negative).
Opportunity cost	An opportunity cost of an activity is the value of the next-highest-valued alternative use of the resource. Since resources are limited, every time you make a choice about how to use them, you are also choosing to forego other options. In the case of interventions, the patient time is considered an opportunity cost because time might be otherwise spent.
QALY	The Quality Adjusted Life Year (QALY) is a measure of both length and quality of life where years of life lived with less than full health are assigned a lower value than healthy life years. They are calculated by multiplying each life year by a number between 1 and 0, where 1 is full health and 0 is death. This quality adjustment typically takes into account dimensions such as mobility, self-care, ability to undertake usual activities, pain/discomfort, and anxiety/depression
Randomised control trial	Randomised controlled clinical trials are a clinical method for ascertaining the efficacy an intervention. Randomised controlled clinical trials are quantitative, comparative, controlled experiments in which investigators randomly allocating subjects to two or more groups, treating them differently (e.g. intervention and 'usual care' or alternative care), and then comparing them with respect to a measured response. The randomised controlled clinical trial is one of the simplest and most powerful tools in clinical research.
Systematic review	A systematic review attempts to collate existing empirical evidence that fits prespecified eligibility criteria to answer a specific research question. The key characteristics of a systematic review are a clearly stated set of objectives with predefined eligibility criteria for studies; an explicit, reproducible methodology; a systematic search that attempts to identify all studies that meet the eligibility criteria; an assessment of the validity of the findings of the included studies (e.g., through the assessment of risk of bias); and a systematic presentation and synthesis of the attributes and findings from the studies used.
Telehealth	The use of telecommunication techniques for the purpose of providing telemedicine, medical education, and health education over a distance. Telehealth services use information and communication technology to transmit voice, data, images and information rather than moving care recipients, health professionals or educators. It encompasses diagnosis, treatment, preventive (educational) and curative aspects of healthcare services and typically involves care recipients, care providers or educators in the provision of these services directed to the care recipient.
VSLY	The Value of a Statistical Life Year (VSLY) is an estimate of the value society places on a year of healthy life.

Background and context

Physiotherapy plays a crucial role in Australia's healthcare system.

Physiotherapists help large numbers of Australians to recover from injury, manage disease and improve their wellbeing every year, either as the primary care provider or as important contributors to multi-disciplinary healthcare teams. It is estimated that around 11.9 million physiotherapy services were provided under private health insurance in 2019-20, plus 2.9 million through the MBS in addition to services paid for out-of-pocket by patients.[1]

The research reviewed in this report indicates that physiotherapy is an effective and cost-effective treatment for a broad range of clinical indications.[2] Physiotherapy can be valuable both as an alternative to other interventions (as in the case of surgery for osteoarthritis) and as a complementary form of therapy (as in the case of pre- and post-surgery).

As physiotherapy can be used to treat multiple conditions, demand comes from across the entire Australian community. Many treatments require specialised expertise, including geriatrics, sports physiotherapy, women's health, among others. As a result, there is a high level of diversity amongst physiotherapy businesses, both in terms of the patients they focus on and the types of services they deliver. Some businesses for example choose to focus on treating one specialist area, while others offer services as generalists or across specialisations where it makes sense.[3]

The importance of high-quality healthcare, and of physiotherapy specifically, has been highlighted by the COVID-19 pandemic. Throughout the course of the pandemic, physiotherapy has been considered an essential service, underlining how critical physiotherapy treatment can be to people's wellbeing and quality of life. During periods where many elective surgeries were cancelled, physiotherapy has been used to manage the symptoms and pain of patients on waiting lists and has also played a crucial role in the treatment and rehabilitation of patients with COVID-19. Cardiorespiratory physiotherapy can help COVID-19 patients clear obstructed airways and improve oxygenation. Physiotherapy can also help prevent or treat intensive care unit (ICU) acquired weakness in patients who have experienced severe or long-term COVID-19 symptoms.[4]

Physiotherapy is one of the largest allied health industries in Australia and continues rapid growth.

Physiotherapy is expected to play an even more important role in the lives of many Australians as demand continues to grow. For example, as the proportion of Australians working in offices grows, the prevalence of office related injuries such as back and neck pain is increasing. Now that the practicality of working from home has been demonstrated during COVID-19 related lockdowns, it is possible this could be further exacerbated by a greater proportion of the population working from ad hoc or poorly adjusted home offices.

Australia's ageing population is expected to require more physiotherapy treatment to support people in the later stages of life. The frequency with which people tend to need physiotherapy increases with age, with older Australians also requiring preventative physiotherapy measures that help people to remain physically strong and reduce the likelihood of falls.[5] Initiatives to support older Australians, including plans

1 IBIS world, Physiotherapy Services in Australia, April 2020
2 Bürge E, Monnin D, Berchtold A, Allet L. Cost-Effectiveness of Physical Therapy Only and of Usual Care for Various Health Conditions: Systematic Review. Phys Ther. 2016;96(6):774-786. doi:10.2522/ptj.20140333
3 APA & William Buck, 2016 Physio Benchmarking Survey, September 2017
4 Thomas P, Baldwin C, Bissett B, et al. Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations. J Physiother. 2020;66(2):73-82. doi:10.1016/j.jphys.2020.03.011
5 IBIS world, Physiotherapy Services in Australia, April 2020

to include a call-out fee rebate for physiotherapists travelling to nursing homes for example, will continue to underpin strong growth in demand as demographics change.[6]

Policy decisions have also created an added demand for physiotherapists, as previous issues around access to essential healthcare and human services are addressed. For example, in 2018 alone 50,000 healthcare jobs created were directly linked to the National Disability Insurance Scheme (NDIS) and it's estimated another 100,000 jobs are still to come,[7] with many of these roles in allied health care. With the recommendations of the aged care royal commission still to come, it is likely that this rapid growth in demand for healthcare services, including physiotherapy, will continue for the foreseeable future.

As a result of demand growth, the size of the industry and its relative economic importance are also expected to grow. Since 2013 when the Australian Physiotherapy Association (APA) and Nous considered the future of the physiotherapy industry in the *InPractice 2025*[8] report, physiotherapy has grown from being a $1.5 billion industry made up of around 4,200 businesses to a nearly $2.2 billion industry made up of more than 7,000 businesses.[9]

Physiotherapy also supports a burgeoning workforce. In 2020 there are 35,392 physiotherapists registered with the Physiotherapy Board of Australia, with many more workers in supporting employment. This represents an average growth rate of roughly 5.4 per cent per year from 23,301 registered physiotherapists in 2012.[10] A strong pipeline of students in the higher education system studying physiotherapy will ensure that the sector continues to meet demand into the future.

This report aims to quantify the economic value of the different services delivered by physiotherapists

Although there is an abundance of high-quality research examining the efficacy and cost-effectiveness of individual physiotherapy treatments, there has been less analysis that looks at the range of services and treatments delivered by the industry. This report looks to address this gap by analysing a range of physiotherapy services covering physiotherapy's diverse applications.

For each area of focus, Nous has estimated the average total cost of delivering the service and balanced this against the average total benefits that arise from the treatment, recognising that the benefit of treatment can vary substantially across patients. The resulting calculation provides an estimate of the average net economic benefit that arises each time the service is delivered to a patient in need, offering a robust estimate of the value physiotherapy delivers to Australians.

[6] Commonwealth of Australia | Department of Health, New Medicare support for older Australians: The Hon Greg hunt MP interview, accessed at: https://www.health.gov.au/ministers/the-hon-greg-hunt-mp/media/new-medicare-support-for-older-australians
[7] Carruthers, F., NDIS: what happens when the powerful deal with disability, AFR, accessed at: https://www.afr.com/life-and-luxury/ndis-what-happens-when-the-powerful-deal-with-disability-20180601-h10u0z
[8] APA & Nous, InPractice 2025: what will future physiotherapy practice look like?, August 2013, accessed at: https://australian.physio/tools/clinical-practice/inpractice-2025
[9] IBIS world, Physiotherapy Services in Australia, April 2020
[10] Physiotherapy Board Ahpra, Statistics, March 2020, accessed at: https://www.physiotherapyboard.gov.au/About/Statistics.aspx

Approach and Methodology

An evidence base for the economic modelling was built following an extensive literature review.

The APA has consulted with numerous subject matter experts across a range of physiotherapy specialisations to help identify and prioritise a list of focus areas. The eleven focus areas were chosen because (a) they reflect the relevance of physiotherapy across patient demographics and stages of life as well as across the breadth of professional practice, and (b) research was available with enough detail that economic modelling was possible. Meeting these criteria was a central consideration for refining the focus areas to the final list included in this report.

Building the evidence base for the economic modelling involved an extensive literature review, which included Boolean searches of research repositories including PubMed and the Physiotherapy Evidence Database (PEDro). Studies reviewed as part of this paper included randomised control trials, epidemiological modelling (e.g. Markov modelling), simulations (e.g. decision tree models), meta-analysis and systematic reviews. A full list of the studies reviewed can be found in Appendix A. The purpose of reviewing a variety of studies was to develop a broad understanding of a treatment's efficacy and effectiveness for each focus area, but also to provide a prioritised evidence base. Evidence was prioritised for use in the modelling where the study had a more robust design (e.g. greater sample sizes), it was more recent, and more accurately reflected the Australian context (or a similar health system like the UK or Canada).

This report endeavoured to make use of the best available literature for economic modelling, however some focus areas demonstrated a stronger evidence base than others. For those focus areas where a review of PubMed, PEDro and other repositories revealed gaps in evidence or where further research would assist with future modelling, we have noted this in the Detailed results section..

Net-benefits were calculated accounting for quality of life improvements, the cost of service delivery, patient-time opportunity costs, and the avoided costs of alternative or usual treatment.

The value of physiotherapy treatment has two main aspects:

- quality of life improvements such as reduced pain, increased mobility, reduced burden of disease and longer life expectancy, and
- avoided costs of healthcare (which may accrue to funders of the healthcare system in the form of savings or to other individuals in the form of shorter waiting periods).

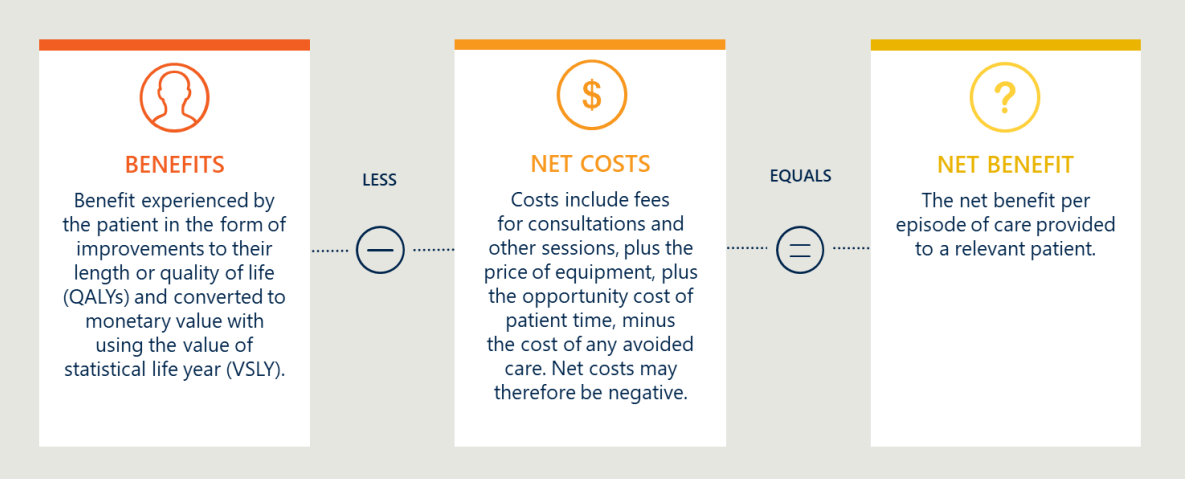
Where the economic value attached to the quality of life improvement exceeds the net cost of treatment, the treatment delivers a net-benefit. Net-benefit per treatment therefore represents a best estimate of the dollar value of the economic benefit delivered when physiotherapy is used instead of alternative or standard treatments. Where possible (where the net cost is positive), other indicators of value such as a benefit : cost ratio or cost per Quality Adjusted Life Year (QALY) have also been calculated. Figure 1, below provides an overview of the basic formula underpinning the calculation of net-benefit for each focus areas, noting that the details may vary in some cases.

Benefits were calculated by estimating the change in quality of life experienced by a patient receiving physiotherapy treatment compared to one receiving alternative or standard treatment. Quality of life was measured using Quality Adjusted Life Years (QALYs) for consistency across different studies. QALYs are designed to apply a value to changes in life expectancy and the quality of life experienced during their lifetime.[11]This allows for different changes in quality of life to be measured in the same units, for instance a

11 Prüss-Üstün A, et al. Introduction and methods: assessing the environmental burden of disease at national and local levels. Geneva, World Health Organization, 2003. (WHO Environmental Burden of Disease Series, No. 1).

reduction in pain levels vs an improvement in mobility. Although methods for estimating the economic value of quality of life all have limitations, QALYs are useful for ensuring consistency of approach when looking at the impact of treatments for different clinical indications or for different conditions. In most cases, the QALYs in the studies reviewed for this report are a combined measure of mobility, pain, mental wellbeing and other indicators – making it a comprehensive indicator of outcomes.

Figure 1 | High-level approach for determining the net-benefit of each physiotherapy episode of care



Benefits in the form of QALYs were converted to values using an estimate for the Value of a Statistical Life Year (VSLY). Based on international and Australian research, the Australian Government indicates that a credible estimate of the Value of a Statistical Life (VSL) is $4.9m and the VSLY is $213,000 in 2019 dollars. [12] This is adjusted to around of $215,875 dollars in 2020 using a 1.35 per cent inflation rate for the previous 12 months.[13]

This report has excluded indirect (or 'second round') benefits, such as productivity gains, as they are likely to be smaller and more uncertain. Costs and benefits estimates can be considered conservative for this reason. However, each focus area in the 'Detailed results' section below includes qualitative descriptions of the potential indirect impacts of physiotherapy interventions where relevant.

Net costs consisted of the cost of physiotherapy treatment (whether paid by the individual, public health funders, or private health insurers) plus the opportunity cost of patient time minus the avoided costs of standard or usual treatment replaced by the physiotherapy treatment. Physiotherapy session costs were taken directly from the study where possible. Where this was not possible, a physiotherapist consultation cost of $96.5 per hour was used, which approximates the average upper limits for physiotherapy consultation rates (initial consultation and treatment) across states according to Comcare (a figure tested with subject matter experts).[14]

Other intervention costs were tailored to each focus area and include the group sessions, exercise equipment, and the opportunity cost of patient time. Patient time was assumed to include attendance at relevant sessions, undertaking exercise for treatment purposes, and a 30-minute travel time estimate for each physiotherapy consultation. In most cases, the value of patient time was estimated at $33.97 which is the inflation-adjusted midpoint of the value of business and non-business per-person hours used by the

[12] Department of Prime Minister and Cabinet, Best Practice Regulation Guidance Note: Value of statistical life, August 2019, accessed at: https://www.pmc.gov.au/sites/default/files/publications/value-of-statistical-life-guidance-note_0_0.pdf
[13] ABS, 6401.0 - Consumer Price Index, Australia, June 2020, accessed at: https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6401.0June%202020?OpenDocument
[14] Comcare, Rate for medical and allied health treatment, accessed at: https://www.comcare.gov.au/service-providers/medical-allied-health/treatment-rates

Transport and Infrastructure Council, [15] although for falls prevention the value of leisure time was used as the treatment is predominantly targeted at retired individuals.

Avoided costs were accounted for where the physiotherapy intervention reduces a patient's reliance on other services. In some cases, this meant the net cost of treatment was negative where the overall avoided costs for the individual and healthcare system were greater than the cost of the physiotherapy treatment.

All benefits and costs presented in this report are measured in 2020 Australian dollars (AUD). Other currencies were converted to AUD using the 10-year long-term average exchange rate of 1.73 for British pounds (GBP), 1.02 for Canadian dollars (CAN) and 1.45 for euros (EUR) as reported by the Reserve Bank of Australia (RBA).[16] Inflation was accounted for using actual inflation reported by the Australian Bureau of Statistics (ABS), which is applied as an average since the original year of the study and noted each time in the detailed findings below.[17] Most physiotherapy interventions are measured over the course of one year, unless otherwise indicated.

The net-benefit of treatment was generally calculated per episode of care (i.e. per person) over the course of 12 months. In some cases, such as emergency department treatment, such a calculation is not possible given the information provided in the literature and a shorter timeframe was used. Where the literature included information on the variation in results between different patients in the sample, a range has also been calculated for the net-benefit estimate. Unless otherwise indicated, the range provided is the interval containing 95 per cent of results in the study. The net-benefit range includes some negative values for some focus areas, indicating that the physiotherapy treatment may not be cost effective in every case for every person.

[15] Transport and Infrastructure Council, Australian Transport Assessment and Planning Guidelines, August 2016, accessed at: https://www.atap.gov.au/sites/default/files/pv2_road_parameter_values.pdf
[16] RBA, Historical Data: Exchange Rates – Monthly – January 2010 to latest complete month of current year, accessed at: https://www.rba.gov.au/statistics/historical-data.html
[17] ABS, 6401.0 - Consumer Price Index, Australia, June 2020, accessed at: https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6401.0June%202020?OpenDocument

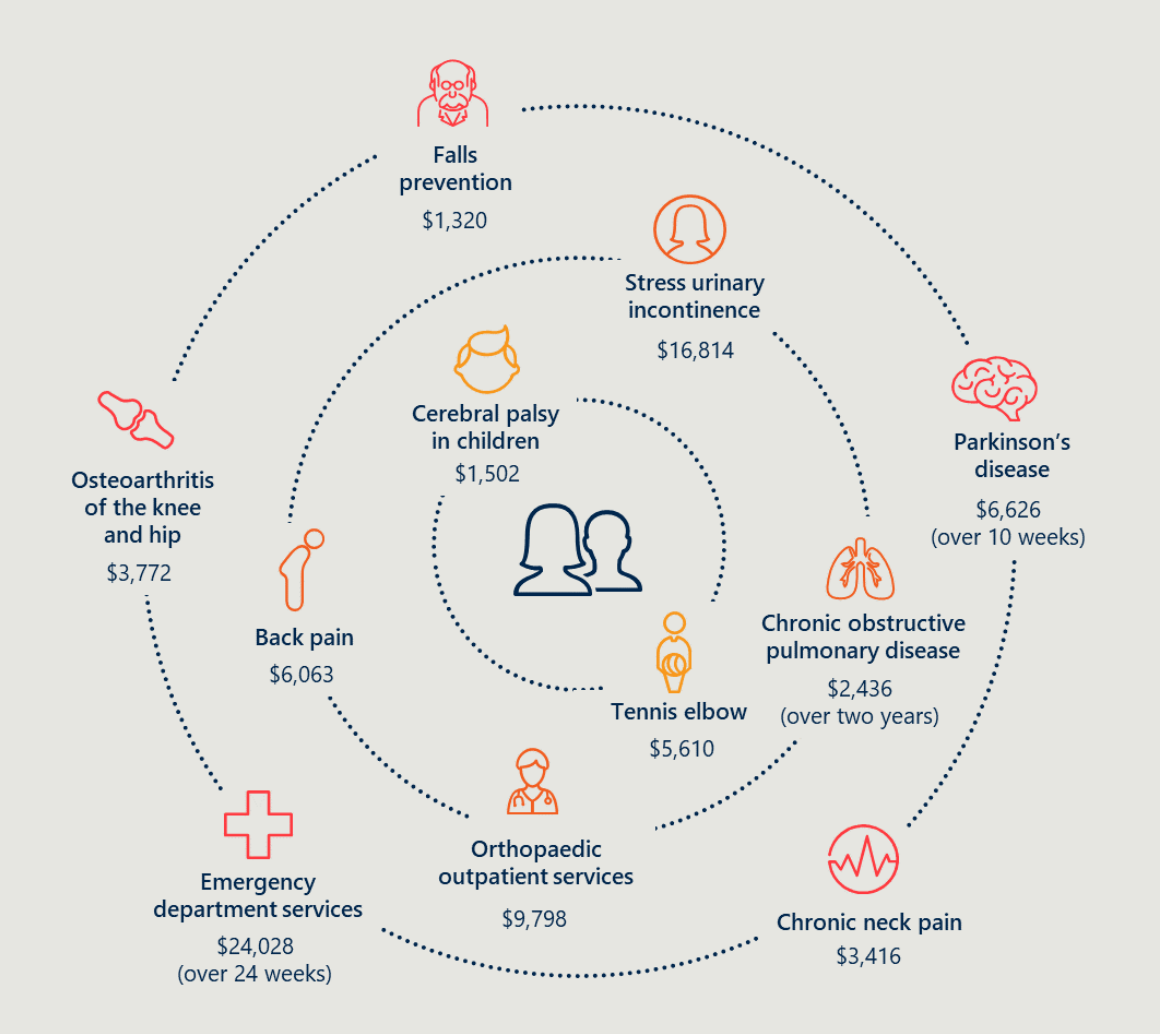
Summary of findings

Physiotherapy provides value to Australians, at all stages of life, and in response to many different life events.

The volume and type of physiotherapy someone might need depends on individual circumstances; for instance, as people grow older, they tend to require more health support. However, at all stages of life there are some Australians for whom physiotherapy treatment can deliver substantial benefits. This report investigates the impact of physiotherapy treatment covering a broad range of life events and stages, with the goal of quantifying the average net-benefit in economic terms.

For each of the focus areas investigated, the estimates indicate the average net economic benefit of treatment (see Figure 2, below). It is important to remember however, that each person is different, and the net impact experienced by individuals will vary case-by-case. For some, physiotherapy will provide a greater net-benefit than the average, while for others it will be less. We have therefore tended to make conservative assumptions when estimating the net-benefit and, where appropriate, the benefit : cost ratio (for more details on this, see the Approach and Methodology section from page 8).

Figure 2 | Physiotherapy delivers an average net-benefit for a range of life events and stages



Physiotherapy can deliver value to both the individual and to the healthcare system more broadly

Where physiotherapy is more clinically effective than standard or alternative treatments, the person receiving the treatment benefits from improvements in their quality of life that may include reduced pain, greater mobility, a return to work or leisure activities, and in some cases a longer life and avoided disability (for instance with falls prevention). Physiotherapy treatment for many of the focus areas considered as part of this report present changes in patient quality of life by assessing health states across dimensions including mobility, self-care, usual activities, pain/discomfort, and anxiety/depression.

However, physiotherapy treatment can also prevent unnecessary future health expenditure, both by replacing other forms of treatment (which in some cases is more costly) and reducing future avoidable treatment such as hospital admissions. The direct beneficiary of such cost savings is not always clear, due to Australia's mixture of healthcare funding sources.

The benefit of reduced costs may accrue to the individual through reduced out of pocket expenses, to private health insurers through lower insurance benefit payments, to state governments through lower hospital or other health costs, or the Australian Government through reduced Medicare or other health expenditure. In some cases, the benefit of avoided future treatment may not be realised in the form of cost savings. For instance, some of the benefit of physiotherapy treatment in an emergency department setting is the associated reduction in readmission rates. This may reduce costs in the future by lowering the number of services that end up being delivered, or the benefit may be realised through reduced wait times. The latter benefit results in an improved quality of life for other patients who can access a bed that would otherwise be occupied, rather than reduced costs.

As this variation may occur even in different cases in the same focus area, this report has not attempted to allocate the impact of reduced costs to the potential beneficiaries, however net cost reductions and quality of life improvements have been separately identified to help funders understand the implications for overall health system costs.

Finally, physiotherapy can also deliver indirect benefits at a societal level. For example, the treatment of back pain will in many cases allow skilled employees to return to work more quickly, improving the overall productivity of the economy. In keeping with an overall conservative approach to estimating the economic benefit of physiotherapy, this report does not include these less direct and more uncertain benefits in its calculations, however they remain critical features of physiotherapy's overall contribution to the economy and Australian society.

Physiotherapists can further enhance the value they deliver by continuing to innovate.

The importance of physiotherapy as a discipline has also been highlighted through the COVID-19 pandemic, with cardiorespiratory physiotherapists providing critical support for patients recovering from COVID-19.[18] Despite major challenges, the industry has proven resilient and flexible, continuing to provide critical services, including through the expanded use of digital service delivery such as Telehealth.

Traditionally, take-up of digital services in Australian health settings has been relatively low, with little progress made on incorporating Telehealth items in the Medicare Benefits Schedule for instance.[19] With the sudden impetus to offer services online during the COVID-19 pandemic, the physiotherapy sector has embraced Telehealth as a means of ensuring ongoing access to essential health services at a time of elevated risk for both patients and practitioners. Although Telehealth is not suitable for every patient (especially where manual manipulation is required), capitalising on these changes will mean that in the

[18] Thomas P, Baldwin C, Bissett B, et al. Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations. J Physiother. 2020;66(2):73-82. doi:10.1016/j.jphys.2020.03.011
[19] IBIS world, Physiotherapy Services in Australia, April 2020

future, patient access and choice is improved. This is especially true for rural and remote regions, where access to physiotherapy is often limited.[20]

Telehealth also has the potential to improve the economic benefits estimated in this report. When used appropriately, Telehealth can reduce costs by eliminating patient travel time, facilitate easier access for patients in rural and remote areas, and improve outcomes by making treatment less disruptive for certain patients (such as infirm or frail patients). If implemented well, Telehealth may therefore have the potential to substantially increase the net-benefit of treatment for some patients.

[20] National Rural Health Alliance, Allied health workforce in rural, regional & remote Australia, July 2019, accessed at: https://www.ruralhealth.org.au/sites/default/files/publications/fact-sheet-allied-health.pdf

Detailed results

Osteoarthritis of the knee and hip

The average net-benefit of treating osteoarthritis of the knee and hip with physiotherapy is estimated to be **$3,772** per episode of care.

The estimated BCR is **1.78:1** and the cost per QALY gained is estimated to be **$121,585** (less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost-effective according to Australian government guidance).

Description

Osteoarthritis is a chronic, and progressive, condition that affects many parts of the body but is particularly common in the knees and hip. It is the most common form of arthritis and the predominant condition leading to knee and hip replacement surgery in Australia.[21]

Osteoarthritis has a significant burden of disease with symptoms that include pain, joint swelling/stiffness and an associated loss of mobility. Globally, osteoarthritis of the knee-and-hip is the eleventh highest contributor to global disability – partly due to its high prevalence.[22] In 2017 to 2018 one in eleven (9.3 per cent) or approximately 2.2 million Australians were living with osteoarthritis.[23]

Research and findings

There has been considerable research into the treatment of osteoarthritis of the knee and hip with physiotherapy. Nous reviewed a range of these studies, including both randomised control trials and systematic reviews. This research demonstrated that the treatment of osteoarthritis of the knee and hip with physiotherapy can improve patient quality of life by reducing pain and increasing mobility.

Many randomised control-trials also found evidence that the treatments were cost-effective compared to the usual treatment provided for osteoarthritis patients.[24][25] In general, land-based exercise programs (e.g. aerobic, tai chi, mixed exercise) were found to be more successful in treating osteoarthritis than hydrotherapy.[26] Data from a 2013 randomised control trial in New Zealand evaluating the cost effectiveness of manual physiotherapy, exercise physiotherapy, and a combination of these therapies for patients with osteoarthritis of the hip or knee were used as the basis for modelling. This study was chosen as its findings were consistent with the other studies reviewed, but it used a more robust methodology and included detail useful for the cost-benefit modelling.[27] The intervention was measured over a one-year

[21] Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/chronic-musculoskeletal-conditions/osteoarthritis/contents/impact-of-osteoarthritis

[22] Cross M, Smith E, Hoy D, et al. The global burden of rheumatoid arthritis: estimates from the global burden of disease 2010 study. *Ann Rheum Dis*. 2014;73(7):1316-1322. doi:10.1136/annrheumdis-2013-204627

[23] Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/chronic-musculoskeletal-conditions/osteoarthritis/contents/impact-of-osteoarthritis

[24] Fransen M, McConnell S, Harmer AR, Van der Esch M, Simic M, Bennell KL. Exercise for osteoarthritis of the knee: a Cochrane systematic review. Br J Sports Med. 2015;49(24):1554-1557. doi:10.1136/bjsports-2015-095424

[25] Pinto D, Robertson MC, Hansen P, Abbott JH. Cost-effectiveness of nonpharmacologic, nonsurgical interventions for hip and/or knee osteoarthritis: systematic review. Value Health. 2012;15(1):1-12. doi:10.1016/j.jval.2011.09.003

[26] Escalante Y, García-Hermoso A, Saavedra JM. Effects of exercise on functional aerobic capacity in lower limb osteoarthritis: a systematic review. J Sci Med Sport. 2011;14(3):190-198. doi:10.1016/j.jsams.2010.10.004

[27] Pinto, D. J.H. Abbott, M.C. Robertson, et al. Manual therapy, exercise therapy, or both, in addition to usual care, for osteoarthritis of the hip or knee: a randomized controlled trial. 1: clinical effectiveness, Osteoarthritis and Cartilage, Volume 21, Issue 4, 2013, pp. 525-534, ISSN 1063-4584, https://doi.org/10.1016/j.joca.2012.12.014.

period, with costs and benefits measured in comparison to the usual care provided to osteoarthritis patients.

The study did not exclude patients also receiving benefits from other treatments (e.g. total knee arthroplasty) and for this reason, the cost effectiveness of some alternatives could not be directly compared with the physiotherapy results. Improvements to patient quality of life were measured through a 12-dimension instrument for measuring (generic) health-related quality of life across outcomes including physical functioning, social functioning, emotional role, and mental health.

Based on the above research, the estimated quality of life benefit of treating osteoarthritis with physiotherapy was an average gain of 0.0400 QALYs. This equates to a benefit of $8,635 using the VSLY method described earlier in the Approach and Methodology section. Although the clinical outcomes delivered by the program presumably varied from patient to patient, no information on this variation was provided in the study and therefore the range of likely outcomes could not be estimated.

The incremental cost of physiotherapy for osteoarthritis when compared to usual care was estimated to be $4,863. Cost data is derived from a popular approach for treatment of osteoarthritis of the hip and knee in Australia shared by an APA recommended subject matter expert.[28] Of this cost, $753 was derived from the direct costs of treatment, assuming 14 one-hour group sessions at $40 per session and two physiotherapy visits at a national average allied health rate of $96.5 per hour of consultation.[29]

Patient opportunity costs were estimated to be $4,110 based on 121 hours of patient time (113 spent in treatment or exercise and 8 hours of travel time to and from in-person sessions) at a cost of $33.97 per hour (see 'Approach and Methodology' for more detail on estimates of the value of patient time).

Subtracting the estimated total cost of $4,863 from the $8,635 value of the quality of life benefit provides an average estimated net-benefit of $3,772 per episode of care for osteoarthritis of the knee and hip (and a cost-benefit ratio of 1.78 : 1). Given a quality of life gain of 0.04 QALYs this suggests a cost per QALY gained of $121,585, substantially less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost effective according to Australian government guidance.

Costs and benefits are estimated over a 12-month time horizon. Physiotherapy for osteoarthritis requires ongoing intervention, and therefore the estimates provided here are valid only as long as treatment continues.

[28] 2017 GLA:D Australia, accessed at: https://gladaustralia.com.au/

[29] Comcare, Rate for medical and allied health treatment, accessed at: https://www.comcare.gov.au/service-providers/medical-allied-health/treatment-rates

Back pain

The average net-benefit of treating back pain with physiotherapy is estimated to be **$6,063** per episode of care.

The average estimated benefit : cost ratio is **6.71 : 1** and the average cost per QALY gained is estimated at **$32,155** (less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost-effective according to Australian government guidance).

Description

Back pain is a common issue in Australia, with an estimated 4 million Australians (16 per cent or around one in six) suffering from back problems in 2017-18.[30] People suffering from back pain may experience reduced mobility, and the condition may interfere with their ability to undertake certain activities including work, exercise or self-care, and can be associated with poor mental health. Back pain and its associated conditions are the second leading cause of burden of disease in Australia, accounting for 4.1 per cent of the total disease burden.[31]

While it affects Australians of all stages of life, back pain is particularly prevalent amongst working aged Australians and therefore has considerable impact on labour force participation. As working from home becomes the new normal for many Australian workers in the aftermath of the COVID-19 pandemic, less than optimal ergonomic setups could mean that back pain has the potential to become even more widespread.

Research and findings

Nous reviewed several studies on the treatment of back pain with physiotherapy, including randomised control trials. Most of this research indicated strong evidence of clinical benefits for physiotherapy, physical therapy, exercise, or some combination of these in the treatment of back pain, [32] for both acute and chronic back pain.[33] This research demonstrated that the treatment of back pain with physiotherapy can improve patient quality of life by reducing pain and improving mobility.

Of the studies that assessed cost-effectiveness, all but one concluded that treatment of back pain with physiotherapy was cost effective,[34] with the other study indicating that physiotherapy may be cost-effective under certain circumstances and approximately cost neutral in others.[35]

Data from a 2004 randomised control trial from the United Kingdom (UK) was selected as the basis of the modelling, as the study was transparent, came from a health system with many similarities to Australia's, and reported on quality of life improvements and treatment dosage in a manner which enabled more comprehensive modelling of both costs and benefits.[36]

---

[30] Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/chronic-musculoskeletal-conditions/back-problems/contents/what-are-back-problems

[31] Australian Institute of Health and Welfare 2019. Australian Burden of Disease Study: impact and causes of illness and death in Australia 2015. Cat. no. BOD 22. Canberra: AIHW. doi:10.25816/5ebca2a4fa7dc,

[32] Hollinghurst S, Sharp D, Ballard K, et al. Randomised controlled trial of Alexander technique lessons, exercise, and massage (ATEAM) for chronic and recurrent back pain: economic evaluation. BMJ. 2008;337:a2656. Published 2008 Dec 11. doi:10.1136/bmj.a2656

[33] Critchley DJ, Ratcliffe J, Noonan S, Jones RH, Hurley MV. Effectiveness and cost-effectiveness of three types of physiotherapy used to reduce chronic low back pain disability: a pragmatic randomized trial with economic evaluation. Spine (Phila Pa 1976). 2007;32(14):1474-1481. doi:10.1097/BRS.0b013e318067dc26

[34] Moffett JK, Torgerson D, Bell-Syer S, et al. Randomised controlled trial of exercise for low back pain: clinical outcomes, costs, and preferences. BMJ. 1999;319(7205):279-283. doi:10.1136/bmj.319.7205.279

[35] Whitehurst DG, Lewis M, Yao GL, et al. A brief pain management program compared with physical therapy for low back pain: results from an economic analysis alongside a randomized clinical trial. Arthritis Rheum. 2007;57(3):466-473. doi:10.1002/art.22606

[36] UK BEAM Trial Team. United Kingdom back pain exercise and manipulation (UK BEAM) randomised trial: cost effectiveness of physical treatments for back pain in primary care. BMJ. 2004;329(7479):1381. doi:10.1136/bmj.38282.607859.AE

The study assessed the cost effectiveness of adding spinal manipulation, exercise classes, or a combination of manipulation followed by exercise, to best care in general practice for 1,287 patients with lower back pain over the course of a year. Patients receiving physiotherapy for back pain reported quality of life improvement across health states based on mobility, self-care, ability to undertake a variety of activities, pain-discomfort, and anxiety-depression.

In this study cost and benefit estimates were measured in addition to (not as an alternative to) best care in general practice which includes basic active management and access to instructional reading material. The results are not comparable to alternative, non-physiotherapy treatment, such as surgery because participants also had access to such treatments throughout the trial.

Based on the above research, the estimated quality of life benefit of treating back pain with physiotherapy was an average gain of 0.0330 QALYs. This equates to a benefit of $7,124 using the VSLY method described in the Approach and Methodology section earlier. For 95 per cent of patients the quality of life gain was found to range from -0.001 to 0.067 QALYs which indicates that not every patient receiving physiotherapy is guaranteed to see overall improvement. This range reflects variation in clinical outcomes for different individuals; the positive outcome for most people exceeds the cost of treatment, but for a minority of patients the quality of life improvement is lower than the cost of treatment.

The net cost of treatment was estimated to be an additional $1,061 compared to patients receiving best care in general practice only. The direct cost of the treatment and exercise sessions of £152 was converted to a total of A$382 using the 10-year average exchange rate of 1.73. Patient opportunity costs were estimated to be $747 based on 22 hours of patient time (13 spent in treatment or exercise – across one consultation, eight 20 minute manipulation sessions, eight 60 minute exercise sessions and a refresher session – plus 9 hours of travel time to and from in-person sessions) at a cost of $33.97 per hour (see 'Approach and Methodology' for more detail on estimates of the value of patient time). A saving of £27 in other costs, including hospital inpatient stay, outpatient attendance and general practice consultation, was incorporated into the net cost of treatment, which was derived from National Health Service (NHS) unit pricing and converted from GBP to A$68 at the 10-year average exchange rate of 1.73.

Subtracting the estimated total cost of $1,061 from the $7,124 value of the quality of life benefit provides an average estimated net-benefit of $6,063 per episode of care for back pain (and a cost-benefit ratio of 6.71 : 1). For 95 per cent of patients the quality of life gain was found to range from -0.001 to 0.067 QALYs (a cost of $1,277 to a benefit of $13,403).

Given a quality of life gain of 0.0330 QALYs this suggests a cost per QALY gained of $32,155, substantially less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost effective according to Australian government guidance. Costs and benefits are measured over a 12-month time horizon. Physiotherapy for back pain requires ongoing intervention, and therefore the estimates provided here are valid only as long as treatment continues.

According to self-reported data, people aged 15–64 with back problems are less likely to be employed (73 per cent) compared with people without back problems (77 per cent) and are more likely to be outside the labour force (22 per cent compared with 19 per cent).[37] Whilst the analysis in this report does not specifically address productivity loss, it is likely that treatment of back pain with physiotherapy also generates societal benefits through second order productivity gains, in addition to the benefits outlined in this report.

[37] ABS, 4364.0.55.001 - National Health Survey: First Results, 2017-18, accessed at: https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4364.0.55.001Explanatory%20Notes12017-18?OpenDocument

Falls prevention

The average net-benefit per referred patient participating in a physiotherapy treatment program for falls prevention is estimated to be **$1,320**.

The average estimated benefit : cost ratio is **1.79 : 1** and the average cost per QALY gained is estimated at **$120,937** (less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost-effective according to Australian government guidance).

Description

Australians have one of the highest life expectancies in the world, and today are living longer than ever.[38] In fact, one in seven Australian's (15 per cent) or roughly 3.8 million are over 65 years of age and this demographic is expected to continue growing as a proportion of our population in decades to come.[39] Ensuring continued good health as we age is therefore becoming increasingly important.

A key concern for geriatric health is the prevention of falls, which are the leading cause of deaths from injury for those over 65 years of age; one in three Australians aged over 65 sustain a fall each year.[40] Falls have a significant burden of disease and are a major risk for subsequent long-term care and institutionalisation. Physiotherapy can help reduce this risk of falling through strength and balance training.

Research and findings

Nous reviewed several key studies that examined the use of physiotherapy for the prevention of falls, which included randomised control trials and epidemiological modelling. The literature indicated that there are a variety of treatments that can effectively reduce the risk of falls amongst older people[41], but that the relationship between falls reduction and healthcare costs can sometimes be complicated.[42] Physiotherapy for falls prevention can improve patient quality of life by improving strength and balance to reduce the risk of injury through falls. The modelling primarily drew on data from two Australian studies that demonstrated the cost effectiveness of a physiotherapy-led falls prevention programs using simulation modelling.

One Australian study from 2014 measured the impact and cost-effectiveness of a public health falls prevention programme,[43] while a second also informed the evidence base, including through interviews with the study's lead author.[44] These studies were chosen because they are Australian-based and include the necessary information to undertake detailed cost-benefit modelling (such as measuring clinical benefits in QALYs).

38 World Health Organisation (WHO) Global Health Observatory (GHO) data, accessed at: https://www.who.int/gho/mortality_burden_disease/life_tables/situation_trends_text/en/
39 Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/older-people/older-australia-at-a-glance/contents/demographics-of-older-australians
40 The Department of Health, The National Slips and Falls Prevention Project 2009, accessed at: https://www1.health.gov.au/internet/main/publishing.nsf/Content/phd-slips-falls-prev-project
41 Frick KD, Kung JY, Parrish JM, Narrett MJ. Evaluating the cost-effectiveness of fall prevention programs that reduce fall-related hip fractures in older adults. J Am Geriatr Soc. 2010;58(1):136-141. doi:10.1111/j.1532-5415.2009.02575.x
42 Robertson MC, Devlin N, Scuffham P, Gardner MM, Buchner DM, Campbell AJ. Economic evaluation of a community based exercise programme to prevent falls. J Epidemiol Community Health. 2001;55(8):600-606. doi:10.1136/jech.55.8.600
43 Farag I, Howard K, Ferreira ML, Sherrington C. Economic modelling of a public health programme for fall prevention. Age Ageing. 2015;44(3):409-414. doi:10.1093/ageing/afu195
44 Hewitt J, Saing S, Goodall S, Henwood T, Clemson L, Refshauge K. An economic evaluation of the SUNBEAM programme: a falls-prevention randomized controlled trial in residential aged care. Clin Rehabil. 2019;33(3):524-534. doi:10.1177/0269215518808051

Interventions in the studies included individual exercise, group community exercise programs and multi-factorial interventions. The costs and benefits of the program were measured as an average across each participant and were calculated in comparison to the alternative where no falls prevention program was introduced.[45] The 2014 study employed a Markov model to estimate the impact of a falls prevention programme on fall rates, health service use, hospitalisation and residential care admission. The Markov model assumed a relative risk ratio 0.75 (indicating program effectiveness in reducing falls), cost per participant of $A700 (in 2011 AUD) and an uptake of 50 per cent of the population. The estimates provided in this report are highly sensitive to these assumptions.

Based on the above research, the estimated quality of life benefit per referred patient participating in a fall treatment program was an average gain of 0.0139 QALYs. Benefits were derived mostly from avoided hospital admission and emergency department consultations. This equates to a benefit of $3,001 using the VSLY method described earlier in the Approach and Methodology section. Although the clinical outcomes delivered by the program presumably varied from patient to patient, no information on this variation was provided in the study and therefore the range of likely outcomes could not be estimated.

The net cost of treatment was estimated to be $1,681. The direct cost of the program was estimated to be $448 using Australian unit pricing and include hospital admission, emergency department consultation and allied health treatment, as well as residential aged care admission. Patient opportunity costs were estimated to be $1,233 based on 77 hours of patient time (all 77 spent in treatment or exercise and no hours of travel time given treatment is administered in an aged care setting) at a cost of $16.01 per hour (the cost of leisure time only as participants are likely to be retired from the workforce; see 'Approach and Methodology' for more detail on estimates of the value of patient time). The expected patient time commitment was based on a 2018 Australian study for a comparable programme for which more detailed patient time commitment information was provided.[46]

Subtracting the estimated total cost of $1,681 from the $3,001 value of the quality of life benefit provides an average estimated net-benefit of $1,320 per episode of care of osteoarthritis of the knee and hip (and a cost-benefit ratio of 1.79 : 1). Given a quality of life gain of 0.0139 QALYs this suggests a cost per QALY gained of $120,937, substantially less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost effective according to Australian government guidance. Costs and benefits are estimated over a 12-month time horizon, and it is unclear for how long beyond that timeframe benefits would continue.

45 Farag I, Howard K, Ferreira ML, Sherrington C. Economic modelling of a public health programme for fall prevention. Age Ageing. 2015;44(3):409-414. doi:10.1093/ageing/afu195

46 Hewitt J, Saing S, Goodall S, Henwood T, Clemson L, Refshauge K. An economic evaluation of the SUNBEAM programme: a falls-prevention randomized controlled trial in residential aged care. Clin Rehabil. 2019;33(3):524-534. doi:10.1177/0269215518808051

Stress urinary incontinence

The average net-benefit of treating stress urinary incontinence with physiotherapy is estimated to be **$16,814** per episode of care.

The average estimated benefit : cost ratio is **13.53 : 1** and the average cost per QALY gained is estimated at **$15,951** (much less than the estimated VSLY in Australia in 2020 of $215,875, and therefore highly cost-effective according to Australian government guidance).

The high net-benefit, high benefit : cost ratio and low cost per QALY gained are due to the low patient effort required to complete the course of treatment, combined with the resulting substantial improvement in quality of life compared to patients who received no further treatment. Cost-effectiveness measured against alternative treatments will depend on their comparative efficacy and costs.

Description

Pelvic health and specifically incontinence is an issue that many find difficult to talk about, yet it has a significant effect on the quality of life of a large proportion of the Australian population.[47] Stress urinary incontinence is the involuntary leakage of urine associated with effort or exertion, coughing, sneezing, or other Valsalva manoeuvres.[48] It affects up to 30 per cent of women over the age of 40, with incidence increasing with age,[49] and is particularly prevalent among women who have recently given birth.[50]

Stress urinary incontinence is not life-threatening, but its impact on the patient's quality of life is often devastating and leads to social isolation for many patients. There are a wide range of surgical and nonsurgical interventions for the treatment for stress urinary incontinence, making physiotherapy one of a range of possible alternative treatments.

Research and findings

Nous reviewed a variety of studies into the cost-effectiveness of physiotherapy as a treatment for stress urinary incontinence and identified a degree of variability across these studies. Multiple studies, including a 2019 Canadian study central to our economic model, found that non-surgical treatment of stress urinary incontinence was effective and was often a cost-effective option.[51][52]

This research demonstrated that the treatment of stress urinary incontinence with physiotherapy can improve patient quality of life by strengthening pelvic floor muscles to prevent incontinence. Some studies identified lower cost-effectiveness due to smaller quality of life improvements from physiotherapy treatment of stress urinary incontinence,[53] while others suggested cost-effectiveness may be higher in some environments as treatment may cost less – for example where treatment is managed through a mobile app.[54]

---

[47] Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/getmedia/0fc2a011-d290-42ef-a610-85073ef2909e/15387.pdf.aspx?inline=true

[48] Lipp A, Shaw C, Glavind K. Mechanical devices for urinary incontinence in women. Cochrane Database Syst Rev 2014;(12):CD001756.

[49] Qaseem A, Dallas P, Forciea MA, et al. Nonsurgical management of urinary incontinence in women: a clinical practice guideline from the American College of Physicians. Ann Intern Med 2014;161: 429–440.

[50] Thom, D.H. and Rortveit, G. (2010), Prevalence of postpartum urinary incontinence: a systematic review. Acta Obstetricia et Gynecologica Scandinavica, 89: 1511-1522. doi:10.3109/00016349.2010.526188

[51] Simpson AN, et al. A Cost-Utility Analysis of Nonsurgical Treatments for Stress Urinary Incontinence in Women. Female Pelvic Med Reconstr Surg. 2019;25(1):49-55. doi:10.1097/SPV.0000000000000502

[52] Vermeulen KM, et al. Cost-effectiveness of a pro-active approach of urinary incontinence in women. BJOG 2016;123:1213–1220.

[53] Hagen S, et al. Pelvic floor muscle training for secondary prevention of pelvic organ prolapse (PREVPROL): a multicentre randomised controlled trial. Lancet. 2017;389(10067):393-402. doi:10.1016/S0140-6736(16)32109-2

[54] Sjöström M, et al. Mobile App for Treatment of Stress Urinary Incontinence: A Cost-Effectiveness Analysis. J Med Internet Res. 2017;19(5):e154. Published 2017 May 8. doi:10.2196/jmir.7383

One of the keys studies used in the modelling was a cost-utility analysis of nonsurgical treatments for stress urinary incontinence in healthy adult women which adopted a health system perspective over a one-year time horizon. The study was chosen because it used a robust methodology in a similar health system to Australia's and included data useful for conducting detailed cost-benefit modelling. A decision tree model evaluated the quality of life outcomes and associated costs for patients when they were treated with pelvic floor muscle treatment (a physiotherapy treatment) compared to a disposable tampon device, a self-fitting intravaginal incontinence device, a traditional incontinence pessary or no further treatment.

Based on the above research, the average estimated quality of life benefit per patient treated with pelvic floor muscle therapy was a gain of 0.0841 QALYs compared to the 'no further treatment' control group. This equates to a benefit of $18,155 using the VSLY method described earlier in the Approach and Methodology section. The modelling assumed that the physiotherapy treatment either cured the patient's stress urinary incontinence or had no impact on it, a simplification used in the studies from which data was taken. As a result, a confidence interval for outcomes could not be estimated, however the studies indicate an approximate 60 per cent chance of "curing" stress urinary incontinence using pelvic floor muscle treatment.

The net cost of treatment was estimated to be $1,341 and were derived from a combination of data from relevant studies. The C$824 direct cost of treatment was converted to a total of A$883 using the 10-year average exchange rate of 1.02. Cure of stress-urinary incontinence symptoms typically required 4 to 6 sessions in the studies examined, as well as the patient completing short daily exercises and attending a 30 min follow-up session. As a result, patient opportunity costs were estimated to be $459 based on 13.5 hours of patient time at a cost of $33.97 per hour (the midway point of leisure and work time; see 'Approach and Methodology' for more detail on estimates of the value of patient time).

This estimate was based on 6 one-hour sessions and a 30-minute follow up, 3.5 hours of travel to and from in-person sessions, and 3.5 hours of exercise time. Exercise time was short due to the minimal length of time required to complete the at-home exercises (3 minutes per session). Given that the exercises can be completed incidentally, the inclusion of the opportunity cost of exercise time at all is a conservative assumption. In some forms of treatment of stress urinary incontinence with physiotherapy, additional costs may also arise due to the use of equipment for biofeedback or muscle stimulation.

Subtracting the estimated total cost of $1,341 from the $18,155 value of the quality of life benefit provides an average estimated net-benefit of $16,814 per episode of treatment for stress urinary incontinence (and a cost-benefit ratio of 13.53 : 1). Given a quality of life gain of 0.0841 QALYs this suggests a cost per QALY gained of $15,951, substantially less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost effective according to Australian government guidance.

It is important to note that this high cost-effectiveness is compared to no further treatment, rather than to alternative treatments. Further investigation is required to determine the cost-effectiveness of physiotherapy compared to alternative treatments. Costs and benefits are measured over a 12-month time horizon. Physiotherapy for stress urinary incontinence requires ongoing intervention, and therefore the estimates provided here are valid only as long as treatment continues.

Parkinson's disease

The average net-benefit of treating Parkinson's disease-related balance and gait disorders with physiotherapy as measured over a 10-week period is estimated to be **$6,626** per episode of care.

The average estimated benefit : cost ratio is **3.49 : 1** and the average cost per QALY gained is estimated at **$61,777** (less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost-effective according to Australian government guidance).

Costs and benefits presented in this focus area are estimated over a 10-week period only, limited by study horizon available in the literature reviewed, and the net-benefit is therefore not directly comparable to other focus areas included in this report.

Description

Parkinson's disease is a complex neurodegenerative disorder with wide reaching implications for patients and their families.[55] In Australia, there are approximately 80,000 people living with Parkinson's disease, with one in five of these people being diagnosed before the age of 50.[56] Parkinson's has a significant burden of disease with symptoms that include tremors, stiffness or slowing of movement.

Treatment of Parkinson's disease has the potential to dramatically improve someone's quality of life by increasing independence and reducing social isolation. The management of Parkinson's disease has traditionally centred on drug treatment, but recent research has shown that physiotherapy offers an effective addition to pharmacological and neurosurgical treatment in a multidisciplinary intervention.[57]

Research and findings

The evidence base to quantify the impact of physiotherapy as a treatment for Parkinson's disease is still developing. Systematic reviews of the literature demonstrate that physiotherapy does have short term benefits in treating Parkinson's disease, but further large randomised control trials are needed to assess efficacy and cost-effectiveness over the long term.[58][59]

Given the currently available research, Nous had to draw upon studies from other health systems, in particular a comprehensive 2018 Swedish study that examines the quality of life improvements for 100 participants as part of a 10-week balance training program, led by two physical therapists.[60] The data from this study was one of the few that provided the detail necessary for the cost-benefit modelling. As such Nous notes that it would be useful for similar studies into the treatment of Parkinson's with physiotherapy to be undertaken in the Australian context, and that the Physiotherapy Research Foundation may provide an avenue for funding such research.

This research suggests that treating Parkinson's disease with physiotherapy can improve patient quality of life through improved balance and therefore mobility. The intervention training program in the 2018 Swedish study was developed to specifically target balance impairments in persons with Parkinson's

[55] Rubenis J. A rehabilitational approach to the management of Parkinson's disease. Parkinsonism & Relat Dis 2007;13:S495-7.
[56] Department of Health & Human Services, Parkinson's disease, accessed at: https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/parkinsons-disease
[57] Tomlinson Claire L, Patel Smitaa, Meek Charmaine, Herd Clare P, Clarke Carl E, Stowe Rebecca et al. Physiotherapy intervention in Parkinson's disease: systematic review and meta-analysis BMJ 2012; 345 :e5004
[58] Tomlinson CL, Herd CP, Clarke CE, et al. Physiotherapy for Parkinson's disease: a comparison of techniques. Cochrane Database Syst Rev. 2014;2014(6):CD002815. Published 2014 Jun 17. doi:10.1002/14651858.CD002815.pub2
[59] Tomlinson Claire L, Patel Smitaa, Meek Charmaine, Herd Clare P, Clarke Carl E, Stowe Rebecca et al. Physiotherapy intervention in Parkinson's disease: systematic review and meta-analysis BMJ 2012; 345 :e5004
[60] Joseph C, Brodin N, Leavy B, Hagströmer M, Löfgren N, Franzén E. Cost-effectiveness of the HiBalance training program for elderly with Parkinson's disease: analysis of data from a randomized controlled trial. Clin Rehabil. 2019;33(2):222-232. doi:10.1177/0269215518800832

disease. Exercise included 60-minute group-based sessions three times per week, facilitated by two trained physiotherapists. The training program contained exercises that were individually tailored to the abilities of each participant and no fixed regime of predetermined exercises was used. Net-benefit results in this focus area are not directly comparable with other focus areas due to the different horizons used in the research.

Our research indicates an average quality of life benefit over ten weeks of 0.043 QALYs gained per patient participating in therapy when compared to no intervention. This benefit is converted to a value of $9,283 using the VSLY method described earlier. The quality of life gain was estimated to have a 95 per cent confidence interval of 0.011 to 0.075 QALYs. A patient with Parkinson's disease receiving physiotherapy treatment experienced quality of life improvement as measured through utility scores, balance performance, and gait velocity.

The net cost of treatment was estimated to be $2,656. The €753 direct cost of treatment in 2018 was converted to a total of A$1,128 in 2020 values using the 10-year average exchange rate of 1.45 and then adjusted for inflation. The intervention included an intense balance training schedule of 60-minute sessions facilitated by trained physiotherapists, three times per week for 10 weeks.

As a result, patient opportunity costs were estimated to be $1,529 based on 45 hours of patient time (30 spent exercising and 15 hours of travel time to and from in-person sessions) at a cost of $33.97 per hour (the midway point of leisure and work time; see 'Approach and Methodology' for more detail on estimates of the value of patient time).

Subtracting the estimated total cost of $2,656 from the $9,283 value of the quality of life benefit provides an average estimated net-benefit of $6,626 per episode of care for Parkinson's disease (and a cost-benefit ratio of 3.49 : 1). The range for this estimate is between a cost of $282 and a benefit of $13,534 which is reflective of the largely positive but wide variance in quality of life outcomes.

Given a quality of life gain of 0.043 QALYs this suggests a cost per QALY gained of $61,777, substantially less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost effective according to Australian government guidance. It is important to note that this high cost-effectiveness is compared to usual care from healthcare providers, rather than to alternative treatments. Further investigation is required to determine the cost-effectiveness of physiotherapy compared to alternative treatments.

Costs and benefits presented in this focus area are estimated over a 10-week period only, limited by study horizon available in the literature reviewed, and the net-benefit is therefore not directly comparable to other focus areas included as part of this report.

Chronic obstructive pulmonary disease

The average net-benefit of treating chronic obstructive pulmonary disease with physiotherapy over a two-year period is estimated to be **$2,436** per episode of care.

The estimated benefit : cost ratio is **1.39 : 1** and the cost per QALY gained is estimated to be **$154,978** (less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost-effective according to Australian government guidance).

Costs and benefits presented in this focus area are estimated over a two-year period, due to the study horizons available in the literature reviewed, and the net-benefit is therefore not directly comparable to other focus areas included in this report.

Description

Chronic obstructive pulmonary disease is a serious, progressive condition that limits airflow in the lungs. It is characterised by airflow limitation that is not fully reversible with the use of medication. Two of the most common types of chronic obstructive pulmonary disease are emphysema, for which smoking cigarettes is a significant risk factor, and chronic bronchitis. Chronic obstructive pulmonary disease causes long-term breathing difficulties and is behind a substantial burden of disease in Australia; it was the fifth leading cause of death for Australians in 2017 and affects one in 20 (4.8 per cent) or approximately 464,000 people.[61]

There is no cure for chronic obstructive pulmonary disease, but disease management with therapy including physiotherapy can help reduce the burden of disease.[62] During the COVID-19 pandemic those people suffering from comorbidities have been at a higher risk of complications and active management of respiratory illnesses like chronic obstructive pulmonary disease is therefore particularly important while COVID-19 is still circulating in the community.[63]

Research and findings

The literature review considered several randomised control trials exploring the effectiveness of physiotherapy for the treatment of chronic obstructive pulmonary disease in a range of settings. Studies demonstrated both efficacy and cost effectiveness where physiotherapy is part of a treatment for rehabilitation of chronic obstructive pulmonary disease in a hospital outpatient setting[64], home-based[65], and over a sustained period of time as part of a maintenance schedule.[66] Almost all studies provided evidence of at least some form of quality of life gain.[67]

[61] Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/chronic-respiratory-conditions/copd/contents/copd
[62] Department of Health & Human Services, Lung conditions - chronic obstructive pulmonary disease (COPD), accessed at: https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/lung-conditions-chronic-obstructive-pulmonary-disease-copd
[63] Tal-Singer R, Crapo JD. COPD at the time of COVID-19: a COPD Foundation perspective. Chronic Obstr Pulm Dis. 2020; 7(2): 73-75. doi: http://doi.org/10.15326/jcopdf.7.2.2020.0149
[64] Griffiths TL, Phillips CJ, Davies S, Burr ML, Campbell IA. Cost effectiveness of an outpatient multidisciplinary pulmonary rehabilitation programme. Thorax. 2001;56(10):779-784. doi:10.1136/thorax.56.10.779
[65] Burge AT, Holland AE, McDonald CF, et al. Home-based pulmonary rehabilitation for COPD using minimal resources: An economic analysis. Respirology. 2020;25(2):183-190. doi:10.1111/resp.13667
[66] Burns DK, et al. The Cost Effectiveness of Maintenance Schedules Following Pulmonary Rehabilitation in Patients with Chronic Obstructive Pulmonary Disease: An Economic Evaluation Alongside a Randomised Controlled Trial. Appl Health Econ Health Policy. 2016;14(1):105-115. doi:10.1007/s40258-015-0199-9
[67] Gillespie P, O'Shea E, Casey D, et al. The cost-effectiveness of a structured education pulmonary rehabilitation programme for chronic obstructive pulmonary disease in primary care: the PRINCE cluster randomised trial. BMJ Open. 2013;3(11):e003479. Published 2013 Nov 25. doi:10.1136/bmjopen-2013-003479

This research demonstrated that the treatment of chronic obstructive pulmonary disease with physiotherapy can improve patient quality of life by increasing mobility in daily activities and reducing breathlessness. Some of the key variables used in the economic modelling were derived from 2016 Dutch study that included contributions from Australian researchers, used a robust methodology and included the detailed information necessary to undertake the cost-benefit modelling.[68]. The study measured the impact of an 11-month community-based exercise programme of self-management for patients with chronic obstructive pulmonary disease after two years of follow-up. The intervention included training three times per week for six months and two times per week for a subsequent five months, partially supervised and unsupervised at home.

Outcomes were captured at both the one-year and two-year periods; however, research suggests costs and benefits are more meaningful at the two-year mark because changing behaviours to incorporate greater exercise is a key benefit of the use of physiotherapy to treat chronic obstructive pulmonary disease. We have therefore adopted the two-year time horizon for estimating costs and benefits. Treatment is likely to be even more effective with ongoing intervention.[69]

Drawing on the above research, the modelling estimated an average quality of life benefit of 0.04 QALYs gained per patient receiving physiotherapy compared to patients receiving limited intervention and no community-based exercise program. This benefit was converted to a value of $8,635 using the VSLY method described in the Approach and Methodology earlier. The quality of life gain was estimated to have a 95 per cent confidence interval of-0.1 QALYs to 0.18. Quality of life improvements were measured at a two-year follow up across five dimensions of mobility, self-care, usual activities, pain/discomfort and anxiety/depression.

The net cost of treatment was estimated to be $6,199. Our modelling assumed a combination of at-home exercise plus physiotherapist visits. Costs for treatment of chronic obstructive pulmonary disease with physiotherapy vary in the literature and overall costs can be minimised when exercise is home-based. [70][71] The €438 direct cost of treatment after two years was converted to a total of A$679 using the 10-year average exchange rate of 1.45 and then adjusted for inflation. This included some savings in avoided healthcare admission costs for patients receiving physiotherapy.

Although not included explicitly in our analysis, research has also shown that management of chronic obstructive pulmonary disease can also benefit hospitals by reducing acute hospital care utilisation and associated costs.[72]

The intervention included six months of training three times per week and a subsequent five-month period of training two times per week. In both periods, one of these weekly training sessions was performed at home to encourage the patients to exercise in their own environment. As a result, patient opportunity costs were estimated to be $5,520 based on 162.5 hours of patient time (125 spent exercising and 37.5 hours of travel time to and from in-person sessions) at a cost of $33.97 per hour (the midway point of leisure and work time; see 'Approach and Methodology' for more detail on estimates of the value of patient time).

[68] Zwerink M, et al. Cost-Effectiveness of a Community-Based Exercise program in COPD Self-Management. COPD. 2016;13(2):214-223. doi:10.3109/15412555.2015.1074171

[69] Burns DK, et al. The Cost Effectiveness of Maintenance Schedules Following Pulmonary Rehabilitation in Patients with Chronic Obstructive Pulmonary Disease: An Economic Evaluation Alongside a Randomised Controlled Trial. Appl Health Econ Health Policy. 2016;14(1):105-115. doi:10.1007/s40258-015-0199-9

[70] Burge AT, Holland AE, McDonald CF, et al. Home-based pulmonary rehabilitation for COPD using minimal resources: An economic analysis. Respirology. 2020;25(2):183-190. doi:10.1111/resp.13667

[71] Effing T, et al. Community based physiotherapeutic exercise in COPD self-management: a randomised controlled trial. Respir Med. 2011;105(3):418-426. doi:10.1016/j.rmed.2010.09.017

[72] Rasekaba TM, Williams E, Hsu-Hage B. Can a chronic disease management pulmonary rehabilitation program for COPD reduce acute rural hospital utilization?. Chron Respir Dis. 2009;6(3):157-163. doi:10.1177/1479972309104419

Subtracting the estimated total cost of $6,199 from the $8,635 value of the quality of life benefit provides an average estimated net-benefit of $2,436 per episode of care for chronic obstructive pulmonary disease (and a cost-benefit ratio of 1.39 : 1). The range for this estimate is between a cost of $27,787 and a benefit of $32,658 indicating that while the treatment was cost effective on average, there are cases where the intervention is less effective and results in a net cost.

Given a quality of life gain of 0.04 QALYs this suggests a cost per QALY gained of $154,978, which is less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost effective according to Australian government guidance. It is important to note that this cost-effectiveness is compared to a care for chronic obstructive pulmonary disease that includes only minimal self-management and some telephone reinforcement.

Further investigation is required to determine the cost-effectiveness of physiotherapy compared to alternative treatments. Costs and benefits presented in this focus area are estimated over a two-year period, due to the study horizon available in the literature reviewed, and the net-benefit is therefore not directly comparable to other focus areas included as part of this report.

Cerebral palsy

The average net-benefit of physiotherapy treatment for cerebral palsy in children is estimated to be **$1,502** per episode of care.

The estimated benefit : cost ratio is **2.13 : 1** and the cost per QALY gained is estimated to be **$101,247** (less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost-effective according to Australian government guidance).

Description

There are approximately 34,000 people currently living with cerebral palsy in Australia, a number expected to grow to nearly 48,000 by 2050.[73] It is particularly prevalent amongst children, with one in 700 Australian babies diagnosed with a disorder categorised under the umbrella term of cerebral palsy, making it the most common physical disability in childhood.[74] Cerebral palsy impacts a patient's life in many ways, including the ability to move and maintain balance and posture.

Physical activity and physical fitness is known to be beneficial for all people living with cerebral palsy, but is most critical for children since it helps optimise physical performance in daily life and prevents the development of secondary health problems later in life.[75][76] Cerebral palsy is a condition that is permanent, but not unchanging, which makes treatment (for example, with physiotherapy) an important management strategy.

Research and findings

Nous reviewed a range of studies, including a systematic review of treatment for cerebral palsy, to provide an evidence base for the modelling of benefits and costs. Several studies on the treatment of cerebral palsy in children were inconclusive for a some types of intervention, indicating a need for further research with larger sample sizes.[77] The literature does suggest that multidisciplinary approaches (including a significant physiotherapy component) were cost effective in a home-based setting[78][79], as well as studies where a physiotherapist designed the exercise regime.[80]

Due to limited research having been conducted in an Australian setting, some of the key data for the modelling was taken from a 2015 Dutch randomised control trial that focused on a physiotherapy-led intervention delivered to 57 adolescents and young adults living with cerebral palsy.[81] This data was used as the study's methodology was robust and the results included the detail necessary to undertake the

[73] 2018 Cerebral Palsy Alliance, Facts about cerebral palsy accessed at: https://cerebralpalsy.org.au/our-research/about-cerebral-palsy/what-is-cerebral-palsy/facts-about-cerebral-palsy/
[74] 2018 Cerebral Palsy Alliance, Facts about cerebral palsy accessed at: https://cerebralpalsy.org.au/our-research/about-cerebral-palsy/what-is-cerebral-palsy/facts-about-cerebral-palsy/
[75] Rimmer JH. Health promotion for people with disabilities: the emerging paradigm shift from disability prevention to prevention of secondary conditions. Phys Ther 1999; 79: 495–502
[76] Crespo, C.J. (1999). Exercise and the Prevention of Chronic Disabling Illness. In Frontera, W.R, Dawson, D.M. & Slovik, D.M. Exercise in Rehabilitation Medicine. Human Kinetics. Champaign, IL: 151 – 172
[77] Shih STF, Tonmukayakul U, Imms C, et al. Economic evaluation and cost of interventions for cerebral palsy: a systematic review. Dev Med Child Neurol. 2018;60(6):543-558. doi:10.1111/dmcn.13653
[78] Sharif Azar E, Ravanbakhsh M, Torabipour A, Amiri E, Haghighyzade MH. Home-based versus center-based care in children with cerebral palsy: a cost-effectiveness analysis. J Med Life. 2015;8(Spec Iss 4):245-251.
[79] Comans T, Mihala G, Sakzewski L, Boyd RN, Scuffham P. The cost-effectiveness of a web-based multimodal therapy for unilateral cerebral palsy: the Mitii randomized controlled trial. Dev Med Child Neurol. 2017;59(7):756-761. doi:10.1111/dmcn.13414
[80] Lauruschkus K, Hallström I, Westbom L, Tornberg Å, Nordmark E. Participation in physical activities for children with cerebral palsy: feasibility and effectiveness of physical activity on prescription. Arch Physiother. 2017;7:13. Published 2017 Nov 28. doi:10.1186/s40945-017-0041-9
[81] Slaman, Jorrit & van den Berg-Emons, Hendrika & Tan, Siok Swan & Russchen, Heleen & Meeteren, Jetty & Stam, Henk & Roebroeck, Marij. (2015). Cost-utility of a lifestyle intervention in adolescents and young adults with spastic cerebral palsy. Journal of rehabilitation medicine. 47. 10.2340/16501977-1929.

cost-benefit modelling. The intervention was a six-month lifestyle intervention consisting of physical fitness training combined with physiotherapist or counselling sessions focusing on physical behaviour and sport participation. Whilst the study indicated that physiotherapy led interventions for children with cerebral palsy appear to be cost effective, the results are limited in their statistical significance and the uncertainty of estimates should be treated with caution.

The results of the modelling suggest an estimated quality of life benefit of 0.0131 in QALYs gained per child with cerebral palsy as a result of treatment with physiotherapy over a one-year time horizon. This benefit is converted to a dollar equivalent of $2,828 using the VSLY method described in Approach and Methodology. Adolescent patients receiving physiotherapy treatment for cerebral palsy experienced quality of life change across six multi-level dimensions of physical functioning, role limitation, social functioning, pain, mental health and vitality. No data was identified which could be used to calculate the variation in outcomes between different patients.

The incremental cost of physiotherapy for cerebral palsy when compared to no treatment was estimated to be $1,326. Of this cost, $1,640 was derived from the direct costs of treatment, assuming one consultation, 12 fitness sessions, six counselling sessions and two 30 minute sport advice sessions at a national average physiotherapy allied health rate of $96.5 per hour of consultation.[82] A saving of €761 in medical costs, including hospital admission and medication, was incorporated into the net cost of treatment, which was derived from Dutch healthcare unit pricing and converted from EUR to A$1,197 at the 10-year average exchange rate of 1.45 and adjusted for inflation.

Patient opportunity costs were estimated to be $883 based on 26 hours of patient time (17 spent in treatment or exercise and 9 hours of travel time to and from in-person sessions) at a cost of $33.97 per hour (see 'Approach and Methodology' for more detail on estimates of the value of patient time).

Subtracting the estimated total cost of $1,326 from the $2,828 value of the quality of life benefit provides an average estimated net-benefit of $1,502 per episode of care for cerebral palsy in children (and a cost-benefit ratio of 2.13 : 1). Given a quality of life gain of 0.0131 QALYs this suggests a cost per QALY gained of $101,247, which is less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost effective according to Australian government guidance. Costs and benefits are estimated over a 12-month time horizon. Physiotherapy for cerebral palsy requires ongoing intervention, and therefore the estimates provided here are valid only as long as treatment continues.

[82] Comcare, Rate for medical and allied health treatment, accessed at: https://www.comcare.gov.au/service-providers/medical-allied-health/treatment-rates

Tennis elbow

The average net-benefit of treating lateral epicondylalgia (tennis elbow) with physiotherapy is estimated to be **$5,610** per episode of care.

The estimated BCR is **3.88 : 1** and the cost per QALY gained is estimated to be **$55,600** (much less than the estimated VSLY in Australia in 2020 of $215,875, and therefore highly cost-effective according to Australian government guidance).

Description

Lateral epicondylalgia (more commonly known as 'tennis elbow') is a musculoskeletal condition that affects people regularly engaged in recreational activities or professions that require strenuous or repetitive use of the upper arm.[83] Lateral epicondylalgia typically presents in the fourth to sixth decade of life, and results in considerable individual morbidity and substantial healthcare utilisation and lost time from work.[84] Lateral epicondylalgia causes pain and tenderness of the elbow due to inflammation or, in some cases, micro tearing of tendons.

Workplace absenteeism is a considerable impact of lateral epicondylalgia given its prevalent amongst working age Australians. Although our modelling does not directly consider second order productivity impacts, it is worth considering that interventions that are effective in managing lateral epicondylalgia are also likely to have positive impact on productivity.

Research and findings

The research for the report literature review focussed on of sports-related injuries for which physiotherapy and surgery are common alternatives. We found several study protocols (i.e. documents indicating a researcher's intention to conduct a study) with the objective of examining physiotherapy for Achilles tendon rupture[85], anterior cruciate ligament (ACL) rehabilitation[868788] and knee meniscus tear,[89] suggesting that the evidence base for physiotherapy treatment of these conditions will grow in the years to come. However, there remains a research gap in this space, with a dearth of published randomised control trials that provide the reliable estimates needed for economic modelling of interventions.

Instead, this report examines the treatment of lateral epicondylalgia (which can be a sports injury as well as arising from other activities) with physiotherapy, an area where substantial research has been conducted. This research confirms that physiotherapy treatment for lateral epicondylalgia can improve patient quality of life, primarily by improving mobilisation.

[83] Health Direct, Tennis elbow, January 2019, accessed at: https://www.healthdirect.gov.au/tennis-elbow
[84] Walker-Bone K, Palmer KT, Reading I, et al. Occupation and epicondylitis: a population-based study. Rheumatology 2012;51:305–10.
[85] Willits K, Amendola A, Bryant D, et al. Operative versus nonoperative treatment of acute Achilles tendon ruptures: a multicenter randomized trial using accelerated functional rehabilitation. *J Bone Joint Surg Am*. 2010;92(17):2767-2775. doi:10.2106/JBJS.I.01401
[86] Stewart BA, Momaya AM, Silverstein MD, Lintner D. The Cost-Effectiveness of Anterior Cruciate Ligament Reconstruction in Competitive Athletes. *Am J Sports Med*. 2017;45(1):23-33. doi:10.1177/0363546516664719
[87] Mather RC 3rd, Koenig L, Kocher MS, et al. Societal and economic impact of anterior cruciate ligament tears. J Bone Joint Surg Am. 2013;95(19):1751-1759. doi:10.2106/JBJS.L.01705
[88] Farshad M, Gerber C, Meyer DC, Schwab A, Blank PR, Szucs T. Reconstruction versus conservative treatment after rupture of the anterior cruciate ligament: cost effectiveness analysis. BMC Health Serv Res. 2011;11:317. Published 2011 Nov 19. doi:10.1186/1472-6963-11-317
[89] van de Graaf VA, van Dongen JM, Willigenburg NW, et al. How do the costs of physical therapy and arthroscopic partial meniscectomy compare? A trial based economic evaluation of two treatments in patients with meniscal tears alongside the ESCAPE study Br J Sports Med 2020;54:538–546.

The modelling draws on data from a 165 participant randomised control trial from 2016 on the treatment of chronic lateral epicondylalgia with physiotherapy.[90] This data is particularly suitable for use in the modelling as the study used a robust methodology within an Australian context and included the necessary detail to undertake the cost-benefit modelling. This study followed on from earlier work demonstrating the efficacy of physiotherapy to treat lateral epicondylalgia,[91] and measured physiotherapy against no intervention (i.e. a placebo saline solution injection) after one year. The physiotherapy intervention included eight sessions of elbow manipulation and exercise.

The estimated quality of life benefit of the intervention is a gain of 0.035 QALYs over the 12-month period when compared to no intervention. The quality of life gain is estimated to have a 95 per cent confidence interval of 0.003 to 0.068 QALYs. This benefit converts to a dollar value of $7,556 using the VSLY method described earlier in Approach and Methodology. Patients in the studies experienced quality of life change across five dimensions of mobility, self-care, usual activities, pain/discomfort and anxiety/depression.

The net cost of treatment was estimated to be $1,946. The $1,097 direct cost of treatment includes the cost of medical services, including both government subsidies and patient co-payments obtained from the Medicare Australia database for the one-year follow-up period. Productivity cost (e.g. absence from work) was excluded for consistency with other clinical indications, however costs could not be further disaggregated for granularity in modelling beyond that.

The intervention included eight physiotherapist sessions at 30 minutes each, plus a weekly at home exercise program estimated at 15 minutes of effort. As a result, patient opportunity costs were estimated to be $849 based on 17 hours of patient time (17 spent in treatment or exercising and 8 hours of travel time to and from in-person sessions) at a cost of $33.97 per hour (the midway point of leisure and work time; see 'Approach and Methodology' for more detail on estimates of the value of patient time).

Subtracting the estimated total cost of $1,946 from the $7,556 value of the quality of life benefit provides an average estimated net-benefit of $5,610 per episode of care for tennis elbow (and a cost-benefit ratio of 3.88 : 1). The estimated net-benefit range that 95 per cent of patients fell within was between a cost of $1,298 and a benefit of $12,734. This indicates that, while the treatment was cost effective on average, there are cases where the intervention is less effective and results in a net cost.

The average cost per QALY gained was $55,600, substantially less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost effective according to Australian government guidance. It is important to note that this high cost-effectiveness is compared to no care, rather than to alternative treatments. Further investigation is required to determine the cost-effectiveness of physiotherapy compared to alternative treatments. Costs and benefits were estimated over a 12-month time horizon.

[90] Coombes BK, Connelly L, Bisset L, Vicenzino B. Economic evaluation favours physiotherapy but not corticosteroid injection as a first-line intervention for chronic lateral epicondylalgia: evidence from a randomised clinical trial. Br J Sports Med. 2016;50(22):1400-1405. doi:10.1136/bjsports-2015-094729

[91] Korthals-de Bos IB, Smidt N, van Tulder MW, et al. Cost effectiveness of interventions for lateral epicondylitis: results from a randomised controlled trial in primary care. Pharmacoeconomics. 2004;22(3):185-195. doi:10.2165/00019053-200422030-00004

Orthopaedic outpatient services

The average net-benefit per patient participating in a program to introduce orthopaedic physiotherapy screening in a hospital setting is estimated to be **$9,798.**

Due to the near-zero net cost of the program, an estimated benefit : cost ratio has not been presented. However, the cost per QALY gained is estimated to be an extremely low **$2,881** (much less than the estimated VSLY in Australia in 2020 of $215,875, and therefore highly cost-effective according to Australian government guidance).

This low cost per QALY gained is predominantly due to very low net costs, driven by cost savings from avoided hospital admissions, as well as the high-volume hospital setting facilitating low delivery costs per patient treated.

Description

Hospital resources are increasingly scarce. Healthcare system costs are rising for musculoskeletal conditions in particular, due to rising prevalence but also due to reliance on expensive surgical options for treatment.[92] As outlined in our analysis for treatment of osteoarthritis earlier in this report, non-invasive physiotherapy treatment can be a cost effective option for patients and funders. As many as 80 per cent of patients referred to orthopaedic outpatient services can be managed without surgery.[93]

Multidisciplinary care models are important for maintaining patient flow and the equitable distribution of health resources for those most in need, reducing patient waiting time and freeing up bed space in hospitals.[94, 95]

Research and findings

The report examined several leading studies into the role of physiotherapy in a hospital setting. In an Australian context, physiotherapist-led models have been the focus of substantial research because they have been shown to provide a high-quality patient care and be cost effective compared to medical specialist-led models of care in managing orthopaedic demand.[96] A randomised control trial from the UK also indicated that accelerated physiotherapy programs were cost effective for patients emerging from surgery.[97]

Much of the data used in the report's modelling draws on the results of an Australian study from 2014 that examined physiotherapists in advanced roles in hospital specialist outpatient services[98], as well as a follow up study from 2016.[99] The data from these studies were particularly suitable for use in the modelling as they were recent, robust and conducted in the Australian health system. The studies used a Markov model to simulate patients following one of two pathways – either receiving usual care or given a one-hour initial

[92] Australian Orthopaedic Association National Joint Replacement Registry. Annual Report 2013. In: Hip and Knee Arthroplasty. Adelaide: University of Adelaide, 2013
[93] Rymaszewski LA, et al. A team approach to musculoskeletal disorders. Ann R Coll Surg Engl 2005; 87: 174–80.
[94] Rigge M. Quality of life of long wait orthopaedic patients before and after admission: a consumer audit. Qual Health Care 1994; 3: 159–163
[95] Williams JI, et al. The burden of waiting for hip and knee replacements in Ontario. Ontario Hip and Knee Replacement Project Team. J Eval Clin Pract 1997; 3: 59–68
[96] Moretto, N., Comans, T.A., Chang, A.T. et al. Implementation of simulation modelling to improve service planning in specialist orthopaedic and neurosurgical outpatient services. Implementation Sci 14, 78 (2019). https://doi.org/10.1186/s13012-019-0923-1
[97] Fusco F, Campbell H, Barker K. Rehabilitation after resurfacing hip arthroplasty: cost-utility analysis alongside a randomized controlled trial. Clin Rehabil. 2019;33(6):1003-1014. doi:10.1177/0269215519827628
[98] Comans T, Raymer M, O'Leary S, Smith D, Scuffham P. Cost-effectiveness of a physiotherapist-led service for orthopaedic outpatients. J Health Serv Res Policy. 2014;19(4):216-223. doi:10.1177/1355819614533675
[99] Standfield L, Comans T, Raymer M, O'Leary S, Moretto N, Scuffham P. The Efficiency of Increasing the Capacity of Physiotherapy Screening Clinics or Traditional Medical Services to Address Unmet Demand in Orthopaedic Outpatients: A Practical Application of Discrete Event Simulation with Dynamic Queuing. Appl Health Econ Health Policy. 2016;14(4):479-491. doi:10.1007/s40258-016-0246-1

screening assessment with a physiotherapist. Following the initial screening the patient could be referred for co-ordinated multidisciplinary non-surgical management. The model estimated the quality-adjusted life years and health care costs from the perspective of health care payers for outpatients with low back, knee or shoulder conditions compared to usual orthopaedic care over a period of five years.

Based on the above findings, the intervention was estimated to result in an average quality of life improvement of 0.23 QALYs per participant in the treatment group when compared to those receiving usual care over five years. Benefits were identified across indicators of independent living, social relationships, physical senses and psychological wellbeing. A reduced quality of life for people on orthopaedic surgical waiting lists was also determined as part of the modelling.

In order to compare the QALY improvement with other focus areas, the incremental change over five years was divided by five to give an estimated 0.046 QALYs over 12-months (a conservative estimate as it is likely the benefits would be largest in the recovery period). This benefit was converted to a value of $9,930 using the VSLY method described earlier in Approach and Methodology. No clear range of benefits could be calculated as the available data did not include an indication of the variation in outcomes between patients.

The net cost of the program was estimated to be a very low $133 per patient to receive treatment under the program. This very low net cost was due to the substantial cost savings resulting from avoided hospital admissions and the low-cost of delivery per patient in a high-volume hospital setting, and the result depends on the assumption that the benefits of reduced admissions are realised in the form of avoided costs, although it is possible that they could also be realised in the form of use of the hospital bed for other purposes (such as reducing wait times).

Costs were calculated directly from retrospective analysis of the medical records of 980 patients managed at seven Queensland Public Hospitals between July 2008 and June 2010 and included hospital audit data, expert opinion and published data. Patient time is not considered separately in our modelling because the opportunity costs were already captured in the Markov models used in the studies, including travel time.

Subtracting the estimated total cost of $133 from the $9,930 value of the quality of life benefit provides an average estimated net-benefit of $9,798 per episode of care for orthopaedic physiotherapy screening in a hospital setting. Due to the near-zero net cost of the program, an estimated benefit : cost ratio has not been presented. However, with an incremental QALY estimate of 0.046 over 12 months then the cost per QALY gained is estimated to be an extremely low $2,881 (much less than the estimated VSLY in Australia in 2020 of $215,875, and therefore highly cost-effective according to Australian government guidance). This low cost per QALY gained is predominantly due to very low net costs, driven by cost savings from avoided hospital admissions, as well as the high-volume hospital setting facilitating low delivery costs per patient treated.

Emergency department services

The average net-benefit per patient receiving a physiotherapy led intervention to reduce emergency department re-admissions is estimated to be **$24,028** over the course of half a year, when targeted at high risk patients.

Due to the near-zero net cost of the program, an estimated benefit : cost ratio has not been presented. However, the cost per QALY gained is estimated to be a low **$12,244** (much less than the estimated VSLY in Australia in 2020 of $215,875, and therefore highly cost-effective according to Australian government guidance).

The high average net-benefit in this case is largely attributable to the quality of life gains made by avoiding emergency re-admission and the very low net costs due to health system savings achieved with increased hospital capacity and as well as the high-volume hospital setting facilitating low delivery costs per patient treated.

Description

Hospital bed days are a valuable commodity, even more so during times of healthcare system strain as in the case of COVID-19. Avoidable hospital readmissions are a substantial burden on the health system, and also result in significant reductions in quality of life for the individuals who are readmitted. For these reasons, hospital readmission rates have for many years been a key indicator for the Australian Government in measuring hospital performance.[100] Physiotherapy can play an important role in lowering hospital readmission rates by improving recovery and mobility, thereby preserving valuable healthcare resources.

Research and findings

The literature review found several Australian studies examining the role of physiotherapists in an Emergency Department setting. Research indicated that early physiotherapy intervention could increase patient satisfaction, [101] as well as improve the overall flow of the Emergency Department.[102, 103] This report's analysis draws key data from a 2009 Australian study examining a physiotherapy program to reduced emergency readmission in a high risk population.[104] This data was particularly suitable as the study used a robust methodology in an Australian context and included detail necessary for undertaking cost-benefit modelling.

The intervention measured was a comprehensive nursing and physiotherapy assessment and an individually tailored program of exercise strategy commencing in hospital and continuing following discharge for 24 weeks. High risk was defined as multiple comorbidities, impaired functionality, older than 75 years, recent multiple admissions, poor social support, or history of depression. Net-benefit results in this focus areas are not directly comparable with other focus areas due to the different time horizons used. The study used a Markov model that drew data from a randomised control trial conducted in an Australian

[100] Australian Commission on Safety and Quality in Health Care, Avoidable Hospital Readmissions, June 2019, accessed at: https://www.safetyandquality.gov.au/publications-and-resources/resource-library/avoidable-hospital-readmission-literature-review-australian-and-international-indicators

[101] McClellan CM, Greenwood R, Benger JR. Effect of an extended scope physiotherapy service on patient satisfaction and the outcome of soft tissue injuries in an adult emergency department. Emerg Med J. 2006;23(5):384-387. doi:10.1136/emj.2005.029231

[102] Mandy Guengerich, Kim Brock, Susan Cotton, and Sam Mancuso. Emergency department primary contact physiotherapists improve patient flow for musculoskeletal patients, International Journal of Therapy and Rehabilitation 2013 20:8, 396-402.

[103] Alkhouri H, Maka K, Wong L, McCarthy S. Impact of the primary contact physiotherapy practitioner role on emergency department care for patients with musculoskeletal injuries in New South Wales. Emerg Med Australas. 2020;32(2):202-209. doi:10.1111/1742-6723.13391

[104] Graves N, Courtney M, Edwards H, Chang A, Parker A, Finlayson K. Cost-effectiveness of an intervention to reduce emergency re-admissions to hospital among older patients. PLoS One. 2009;4(10):e7455. Published 2009 Oct 14. doi:10.1371/journal.pone.0007455

metropolitan hospital.[105] Costs and benefits are estimated over six months only, limited by the duration of the study used.

The program was estimated to result in a quality of life improvement of 0.118 QALYs per patient in the intervention group when compared to existing practice at a 24 week follow up, with a 95 per cent confidence interval of 0.1 to 0.136. The benefit was converted to a dollar value $25,473 using the VSLY method described in the Approach and Methodology section earlier. Patients experienced quality of life changes across mobility, self-care, usual activities, pain/discomfort and anxiety/depression. The intervention group had significantly fewer hospital re-admissions and emergency general practitioner (GP) visits while participating in the program.

The incremental cost of the emergency department physiotherapy program for high risk patients when compared to usual treatment was estimated to be $1,445 per patient over 24 weeks. The direct cost of treatment included physiotherapist assessment, nurse visits, follow up calls, and exercise equipment. However, these costs were more than offset by a reduction in hospital emergency admission costs over the course of half a year. As a result, there was an average net reduction in health system costs (prior to considering the opportunity cost of patient time).

This result depends on the assumption that the benefits of reduced admissions are realised in the form of avoided costs, although it is possible that they could also be realised in the form of use of the hospital bed for other purposes (such as reducing wait times). Patient opportunity costs were estimated to be $1,868 based on 55 hours of patient time (all of which was spent in treatment or exercise) at a cost of $33.97 per hour (see 'Approach and Methodology' for more detail on estimates of the value of patient time). No travel time was added, and physiotherapy consultation time while a patient was in hospital was assumed to not come with an opportunity cost.

Subtracting the estimated total cost of $1,445 from the $25,473 value of the quality of life benefit provides an average estimated net-benefit of $24,028 per person participating in the emergency department physiotherapy program over the course of high a year. Due to the near-zero net cost of the program, an estimated benefit : cost ratio has not been presented. However, the cost per QALY gained is estimated to be an extremely low $12,244 (much less than the estimated VSLY in Australia in 2020 of $215,875, and therefore highly cost-effective according to Australian government guidance).

This low cost per QALY gained is predominantly due to very low net costs, driven by cost savings from avoided hospital re-admissions, as well as the high-volume hospital setting facilitating low delivery costs per patient treated. Costs and benefits are estimated over a 24-week time horizon.

[105] Courtney M, Edwards H, Chang A, Parker A, Finlayson K, Hamilton K. Fewer emergency readmissions and better quality of life for older adults at risk of hospital readmission: a randomized controlled trial to determine the effectiveness of a 24-week exercise and telephone follow-up program. J Am Geriatr Soc. 2009;57(3):395-402. doi:10.1111/j.1532-5415.2009.02138.x

Chronic neck pain

The average net-benefit of treating chronic neck pain with physical therapy is estimated to be **$3,416** per episode of care.

The estimated benefit : cost ratio is **2.72 : 1** and the cost per QALY gained is estimated to be **$79,242** (much less than the estimated VSLY in Australia in 2020 of $215,875, and therefore highly cost-effective according to Australian government guidance).

Description

As many as 3.24 million Australians are living with chronic pain and it costs Australia as much as $7.3 billion annually through health system costs, productivity losses, and other informal costs.[106] Globally, it is one of the leading causes of disability and represents a substantial burden on healthcare and productivity everywhere.[107]

Chronic pain is a common and complex condition characterised by persistent pain, generally ongoing for more than 3 months, experienced on most days of the week.[108] It is prevalent at all levels of society, but it is more likely (almost double) to affect lower socioeconomic demographics.[109] Chronic neck pain is difficult to manage and its therefore helpful to consider the role multidisciplinary approaches including physiotherapy might play in improving quality of life.[110]

Research and findings

Physiotherapy as an intervention to manage and treat chronic pain has been researched extensively. A systematic review of the literature has shown that a combination of different conservative treatments have demonstrated efficacy, but that ongoing research is needed to establish cost effectiveness of some.[111] There is also some evidence for cost effectiveness of manual therapy (e.g. spinal mobilisation) to treat chronic neck pain.[112] However, the results from a 2017 study from the United Kingdom (UK) with 293 participants provided the most reliable evidence base for modelling a type of physical therapy as an intervention.[113]

The data from this study was particularly suitable for use in the modelling because it used a robust methodology in a health system similar to Australia's and included detail useful for the cost-benefit modelling. The study is a randomised control trial that compares the quality of life improvement achieved with physical therapy and usual GP care alone in patients with chronic neck pain over the course of a year.

Based on this research, the estimated average quality of life improvement was 0.025 additional QALYS gained for the physical therapy group after a 12-month period when compared to usual care. The 95 per

[106] Deloitte Access Economics, The cost of pain in Australia: Painaustralia, March 2019, accessed at: https://www.painaustralia.org.au/static/uploads/files/the-cost-of-pain-in-australia-final-report-12mar-wfxbrfyboams.pdf
[107] Hoy D, March L, Woolf A, Blyth F, Brooks P, Smith E, et al. The global burden of neck pain: estimates from the global burden of disease 2010 study. Annals of the rheumatic diseases. 2014 Jul; 73(7):1309– 15. https://doi.org/10.1136/annrheumdis-2013-204431 PMID: 24482302
[108] Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/chronic-disease/chronic-pain-in-australia/contents/summary
[109] Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/chronic-disease/chronic-pain-in-australia/contents/summary
[110] Jull G, Sterling M, Falla D, Treleaven J, O'Leary S. Whiplash, Headache and Neck Pain. Edinburgh: Elsevier; 2008.
[111] Driessen MT, Lin CW, van Tulder MW. Cost-effectiveness of conservative treatments for neck pain: a systematic review on economic evaluations. Eur Spine J. 2012;21(8):1441-1450. doi:10.1007/s00586-012-2272-5
[112] Korthals-de Bos IB, Hoving JL, van Tulder MW, et al. Cost effectiveness of physiotherapy, manual therapy, and general practitioner care for neck pain: economic evaluation alongside a randomised controlled trial. BMJ. 2003;326(7395):911. doi:10.1136/bmj.326.7395.911
[113] Essex H, et al. An economic evaluation of Alexander Technique lessons or acupuncture sessions for patients with chronic neck pain: A randomized trial (ATLAS). PLoS One. 2017;12(12):e0178918. Published 2017 Dec 6. doi:10.1371/journal.pone.0178918

cent confidence intervals were -0.007 and 0.058 QALYs. This benefit is converted to a monetary value of $5,397 using the VSLY method described earlier in the Approach and Methodology section. The change in patients' health-related quality of life was measured using indicators of mobility, self-care, usual activities, pain/discomfort, and anxiety/ depression.

The net cost of treatment was estimated to be $1,981. The £587 direct intervention costs are taken directly from the study and converted from GBP to A$1,068 at the 10-year average exchange rate of 1.73 (which was then adjusted for inflation). Other incremental healthcare resources totalled £128 including GPs, hospital visits and prescriptions based on UK NHS pricing and converted from GBP to A$234 at the 10-year average of 1.73 (and then adjusted for inflation).

The intervention itself included twenty 30-minute sessions. As a result, patient opportunity costs were estimated to be $679 based on 20 hours of patient time (10 spent in treatment or exercising and 10 hours of travel time to and from in-person sessions) at a cost of $33.97 per hour (the midway point of leisure and work time; see 'Approach and Methodology' for more detail on estimates of the value of patient time).

Subtracting the estimated total cost of $1,981 from the $5,397 value of the quality of life benefit provides an average estimated net-benefit of $3,416 per episode of care for chronic neck pain (and a cost-benefit ratio of 2.72 : 1). The range for this estimate is between a cost of $3,492 and a benefit of $10,540, indicating that while the treatment was cost effective on average, there are cases where the intervention is less effective and results in a net cost.

Given a quality of life gain of 0.025 QALYs this suggests a cost per QALY gained of $79,242, less than the estimated VSLY in Australia in 2020 of $215,875, and therefore cost effective according to Australian government guidance. It is important to note that this high cost-effectiveness is compared to usual care, rather than to alternative treatments. Further investigation is required to determine the cost-effectiveness of physiotherapy compared to alternative treatments. Costs and benefits are estimated over a 12-month time horizon.

Appendix A References

Based on literature reviewed as at 31 August 2020.

2017 GLA:D Australia, accessed at: https://gladaustralia.com.au/

2018 Cerebral Palsy Alliance, Facts about cerebral palsy accessed at: https://cerebralpalsy.org.au/our-research/about-cerebral-palsy/what-is-cerebral-palsy/facts-about-cerebral-palsy/

ABS, 4364.0.55.001 - National Health Survey: First Results, 2017-18, accessed at: https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4364.0.55.001Explanatory%20Notes12017-18?OpenDocument

ABS, 6401.0 - Consumer Price Index, Australia, June 2020, accessed at: https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6401.0June%202020?OpenDocument

Alkhouri H, Maka K, Wong L, McCarthy S. Impact of the primary contact physiotherapy practitioner role on emergency department care for patients with musculoskeletal injuries in New South Wales. Emerg Med Australas. 2020;32(2):202-209. doi:10.1111/1742-6723.13391

APA & Nous, InPractice 2025: what will future physiotherapy practice look like?, August 2013, accessed at: https://australian.physio/tools/clinical-practice/inpractice-2025

APA & William Buck, 2016 Physio Benchmarking Survey, September 2017

Australian Commission on Safety and Quality in Health Care, Avoidable Hospital Readmissions, June 2019, accessed at: https://www.safetyandquality.gov.au/publications-and-resources/resource-library/avoidable-hospital-readmission-literature-review-australian-and-international-indicators

Australian Institute of Health and Welfare 2019. Australian Burden of Disease Study: impact and causes of illness and death in Australia 2015. Cat. no. BOD 22. Canberra: AIHW. doi:10.25816/5ebca2a4fa7dc,

Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/chronic-musculoskeletal-conditions/osteoarthritis/contents/impact-of-osteoarthritis

Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/chronic-musculoskeletal-conditions/back-problems/contents/what-are-back-problems

Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/older-people/older-australia-at-a-glance/contents/demographics-of-older-australians

Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/getmedia/0fc2a011-d290-42ef-a610-85073ef2909e/15387.pdf.aspx?inline=true

Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/chronic-respiratory-conditions/copd/contents/copd

Australian Institute of Health and Welfare 2020, accessed at: https://www.aihw.gov.au/reports/chronic-disease/chronic-pain-in-australia/contents/summary

Australian Orthopaedic Association National Joint Replacement Registry. Annual Report 2013. In: Hip and Knee Arthroplasty. Adelaide: University of Adelaide, 2013

Burge AT, Holland AE, McDonald CF, et al. Home-based pulmonary rehabilitation for COPD using minimal resources: An economic analysis. Respirology. 2020;25(2):183-190. doi:10.1111/resp.13667

Bürge E, Monnin D, Berchtold A, Allet L. Cost-Effectiveness of Physical Therapy Only and of Usual Care for Various Health Conditions: Systematic Review. Phys Ther. 2016;96(6):774-786. doi:10.2522/ptj.20140333

Burns DK, et al. The Cost Effectiveness of Maintenance Schedules Following Pulmonary Rehabilitation in Patients with Chronic Obstructive Pulmonary Disease: An Economic Evaluation Alongside a Randomised Controlled Trial. Appl Health Econ Health Policy. 2016;14(1):105-115. doi:10.1007/s40258-015-0199-9

Carruthers, F., NDIS: what happens when the powerful deal with disability, AFR, accessed at: https://www.afr.com/life-and-luxury/ndis-what-happens-when-the-powerful-deal-with-disability-20180601-h10u0z

Comans T, Mihala G, Sakzewski L, Boyd RN, Scuffham P. The cost-effectiveness of a web-based multimodal therapy for unilateral cerebral palsy: the Mitii randomized controlled trial. Dev Med Child Neurol. 2017;59(7):756-761. doi:10.1111/dmcn.13414

Comans T, Raymer M, O'Leary S, Smith D, Scuffham P. Cost-effectiveness of a physiotherapist-led service for orthopaedic outpatients. J Health Serv Res Policy. 2014;19(4):216-223. doi:10.1177/1355819614533675

Comcare, Rate for medical and allied health treatment, accessed at: https://www.comcare.gov.au/service-providers/medical-allied-health/treatment-rates

Commonwealth of Australia | Department of Health, New Medicare support for older Australians: The Hon Greg hunt MP interview, accessed at: https://www.health.gov.au/ministers/the-hon-greg-hunt-mp/media/new-medicare-support-for-older-australians

Coombes BK, Connelly L, Bisset L, Vicenzino B. Economic evaluation favours physiotherapy but not corticosteroid injection as a first-line intervention for chronic lateral epicondylalgia: evidence from a randomised clinical trial. Br J Sports Med. 2016;50(22):1400-1405. doi:10.1136/bjsports-2015-094729

Courtney M, Edwards H, Chang A, Parker A, Finlayson K, Hamilton K. Fewer emergency readmissions and better quality of life for older adults at risk of hospital readmission: a randomized controlled trial to determine the effectiveness of a 24-week exercise and telephone follow-up program. J Am Geriatr Soc. 2009;57(3):395-402. doi:10.1111/j.1532-5415.2009.02138.x

Crespo, C.J. (1999). Exercise and the Prevention of Chronic Disabling Illness. In Frontera, W.R, Dawson, D.M. & Slovik, D.M. Exercise in Rehabilitation Medicine. Human Kinetics. Champaign, IL: 151 – 172

Critchley DJ, Ratcliffe J, Noonan S, Jones RH, Hurley MV. Effectiveness and cost-effectiveness of three types of physiotherapy used to reduce chronic low back pain disability: a pragmatic randomized trial with economic evaluation. Spine (Phila Pa 1976). 2007;32(14):1474-1481. doi:10.1097/BRS.0b013e318067dc26

Cross M, Smith E, Hoy D, et al. The global burden of rheumatoid arthritis: estimates from the global burden of disease 2010 study. Ann Rheum Dis. 2014;73(7):1316-1322. doi:10.1136/annrheumdis-2013-204627

Deloitte Access Economics, The cost of pain in Australia: Painaustralia, March 2019, accessed at: https://www.painaustralia.org.au/static/uploads/files/the-cost-of-pain-in-australia-final-report-12mar-wfxbrfyboams.pdf

Department of Health & Human Services, Lung conditions - chronic obstructive pulmonary disease (COPD), accessed at: https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/lung-conditions-chronic-obstructive-pulmonary-disease-copd

Department of Health & Human Services, Parkinson's disease, accessed at: https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/parkinsons-disease

Department of Prime Minister and Cabinet, Best Practice Regulation Guidance Note: Value of statistical life, August 2019, accessed at: https://www.pmc.gov.au/sites/default/files/publications/value-of-statistical-life-guidance-note_0_0.pdf

Driessen MT, Lin CW, van Tulder MW. Cost-effectiveness of conservative treatments for neck pain: a systematic review on economic evaluations. Eur Spine J. 2012;21(8):1441-1450. doi:10.1007/s00586-012-2272-5

Effing T, et al. Community based physiotherapeutic exercise in COPD self-management: a randomised controlled trial. Respir Med. 2011;105(3):418-426. doi:10.1016/j.rmed.2010.09.017

Escalante Y, García-Hermoso A, Saavedra JM. Effects of exercise on functional aerobic capacity in lower limb osteoarthritis: a systematic review. J Sci Med Sport. 2011;14(3):190-198. doi:10.1016/j.jsams.2010.10.004

Essex H, et al. An economic evaluation of Alexander Technique lessons or acupuncture sessions for patients with chronic neck pain: A randomized trial (ATLAS). PLoS One. 2017;12(12):e0178918. Published 2017 Dec 6. doi:10.1371/journal.pone.0178918

Farag I, Howard K, Ferreira ML, Sherrington C. Economic modelling of a public health programme for fall prevention. Age Ageing. 2015;44(3):409-414. doi:10.1093/ageing/afu195

Farshad M, Gerber C, Meyer DC, Schwab A, Blank PR, Szucs T. Reconstruction versus conservative treatment after rupture of the anterior cruciate ligament: cost effectiveness analysis. BMC Health Serv Res. 2011;11:317. Published 2011 Nov 19. doi:10.1186/1472-6963-11-317

Fransen M, McConnell S, Harmer AR, Van der Esch M, Simic M, Bennell KL. Exercise for osteoarthritis of the knee: a Cochrane systematic review. Br J Sports Med. 2015;49(24):1554-1557. doi:10.1136/bjsports-2015-095424

Frick KD, Kung JY, Parrish JM, Narrett MJ. Evaluating the cost-effectiveness of fall prevention programs that reduce fall-related hip fractures in older adults. J Am Geriatr Soc. 2010;58(1):136-141. doi:10.1111/j.1532-5415.2009.02575.x

Fusco F, Campbell H, Barker K. Rehabilitation after resurfacing hip arthroplasty: cost-utility analysis alongside a randomized controlled trial. Clin Rehabil. 2019;33(6):1003-1014. doi:10.1177/0269215519827628

Gillespie P, O'Shea E, Casey D, et al. The cost-effectiveness of a structured education pulmonary rehabilitation programme for chronic obstructive pulmonary disease in primary care: the PRINCE cluster randomised trial. BMJ Open. 2013;3(11):e003479. Published 2013 Nov 25. doi:10.1136/bmjopen-2013-003479

Graves N, Courtney M, Edwards H, Chang A, Parker A, Finlayson K. Cost-effectiveness of an intervention to reduce emergency re-admissions to hospital among older patients. PLoS One. 2009;4(10):e7455. Published 2009 Oct 14. doi:10.1371/journal.pone.0007455

Griffiths TL, Phillips CJ, Davies S, Burr ML, Campbell IA. Cost effectiveness of an outpatient multidisciplinary pulmonary rehabilitation programme. Thorax. 2001;56(10):779-784. doi:10.1136/thorax.56.10.779

Hagen S, et al. Pelvic floor muscle training for secondary prevention of pelvic organ prolapse (PREVPROL): a multicentre randomised controlled trial. Lancet. 2017;389(10067):393-402. doi:10.1016/S0140-6736(16)32109-2

Health Direct, Tennis elbow, January 2019, accessed at: https://www.healthdirect.gov.au/tennis-elbow

Hewitt J, Saing S, Goodall S, Henwood T, Clemson L, Refshauge K. An economic evaluation of the SUNBEAM programme: a falls-prevention randomized controlled trial in residential aged care. Clin Rehabil. 2019;33(3):524-534. doi:10.1177/0269215518808051

Hollinghurst S, Sharp D, Ballard K, et al. Randomised controlled trial of Alexander technique lessons, exercise, and massage (ATEAM) for chronic and recurrent back pain: economic evaluation. BMJ. 2008;337:a2656. Published 2008 Dec 11. doi:10.1136/bmj.a2656

Hoy D, March L, Woolf A, Blyth F, Brooks P, Smith E, et al. The global burden of neck pain: estimates from the global burden of disease 2010 study. Annals of the rheumatic diseases. 2014 Jul; 73(7):1309– 15. https://doi.org/10.1136/annrheumdis-2013-204431 PMID: 24482302

IBIS world, Physiotherapy Services in Australia, April 2020

Joseph C, Brodin N, Leavy B, Hagströmer M, Löfgren N, Franzén E. Cost-effectiveness of the HiBalance training program for elderly with Parkinson's disease: analysis of data from a randomized controlled trial. Clin Rehabil. 2019;33(2):222-232. doi:10.1177/0269215518800832

Jull G, Sterling M, Falla D, Treleaven J, O'Leary S. Whiplash, Headache and Neck Pain. Edinburgh: Elsevier; 2008.

Korthals-de Bos IB, Hoving JL, van Tulder MW, et al. Cost effectiveness of physiotherapy, manual therapy, and general practitioner care for neck pain: economic evaluation alongside a randomised controlled trial. BMJ. 2003;326(7395):911. doi:10.1136/bmj.326.7395.911

Korthals-de Bos IB, Smidt N, van Tulder MW, et al. Cost effectiveness of interventions for lateral epicondylitis: results from a randomised controlled trial in primary care. Pharmacoeconomics. 2004;22(3):185-195. doi:10.2165/00019053-200422030-00004

Lauruschkus K, Hallström I, Westbom L, Tornberg Å, Nordmark E. Participation in physical activities for children with cerebral palsy: feasibility and effectiveness of physical activity on prescription. Arch Physiother. 2017;7:13. Published 2017 Nov 28. doi:10.1186/s40945-017-0041-9

Lipp A, Shaw C, Glavind K. Mechanical devices for urinary incontinence in women. Cochrane Database Syst Rev 2014;(12):CD001756.

Mandy Guengerich, Kim Brock, Susan Cotton, and Sam Mancuso. Emergency department primary contact physiotherapists improve patient flow for musculoskeletal patients, International Journal of Therapy and Rehabilitation 2013 20:8, 396-402.

Mather RC 3rd, Koenig L, Kocher MS, et al. Societal and economic impact of anterior cruciate ligament tears. J Bone Joint Surg Am. 2013;95(19):1751-1759. doi:10.2106/JBJS.L.01705

McClellan CM, Greenwood R, Benger JR. Effect of an extended scope physiotherapy service on patient satisfaction and the outcome of soft tissue injuries in an adult emergency department. Emerg Med J. 2006;23(5):384-387. doi:10.1136/emj.2005.029231

Moffett JK, Torgerson D, Bell-Syer S, et al. Randomised controlled trial of exercise for low back pain: clinical outcomes, costs, and preferences. BMJ. 1999;319(7205):279-283. doi:10.1136/bmj.319.7205.279

Moretto, N., Comans, T.A., Chang, A.T. et al. Implementation of simulation modelling to improve service planning in specialist orthopaedic and neurosurgical outpatient services. Implementation Sci 14, 78 (2019). https://doi.org/10.1186/s13012-019-0923-1

National Rural Health Alliance, Allied health workforce in rural, regional & remote Australia, July 2019, accessed at: https://www.ruralhealth.org.au/sites/default/files/publications/fact-sheet-allied-health.pdf

Physiotherapy Board Ahpra, Statistics, March 2020, accessed at: https://www.physiotherapyboard.gov.au/About/Statistics.aspx

Pinto, D. J.H. Abbott, M.C. Robertson, et al. Manual therapy, exercise therapy, or both, in addition to usual care, for osteoarthritis of the hip or knee: a randomized controlled trial. 1: clinical effectiveness, Osteoarthritis and Cartilage, Volume 21, Issue 4, 2013, pp. 525-534, ISSN 1063-4584, https://doi.org/10.1016/j.joca.2012.12.014.

Pinto D, Robertson MC, Hansen P, Abbott JH. Cost-effectiveness of nonpharmacologic, nonsurgical interventions for hip and/or knee osteoarthritis: systematic review. Value Health. 2012;15(1):1-12. doi:10.1016/j.jval.2011.09.003

Prüss-Üstün A, et al. Introduction and methods: assessing the environmental burden of disease at national and local levels. Geneva, World Health Organization, 2003. (WHO Environmental Burden of Disease Series, No. 1).

Qaseem A, Dallas P, Forciea MA, et al. Nonsurgical management of urinary incontinence in women: a clinical practice guideline from the American College of Physicians. Ann Intern Med 2014;161: 429–440.

Rasekaba TM, Williams E, Hsu-Hage B. Can a chronic disease management pulmonary rehabilitation program for COPD reduce acute rural hospital utilization?. Chron Respir Dis. 2009;6(3):157-163. doi:10.1177/1479972309104419

RBA, Historical Data: Exchange Rates – Monthly – January 2010 to latest complete month of current year, accessed at: https://www.rba.gov.au/statistics/historical-data.html

Rigge M. Quality of life of long wait orthopaedic patients before and after admission: a consumer audit. Qual Health Care 1994; 3: 159–163

Rimmer JH. Health promotion for people with disabilities: the emerging paradigm shift from disability prevention to prevention of secondary conditions. Phys Ther 1999; 79: 495–502

Robertson MC, Devlin N, Scuffham P, Gardner MM, Buchner DM, Campbell AJ. Economic evaluation of a community based exercise programme to prevent falls. J Epidemiol Community Health. 2001;55(8):600-606. doi:10.1136/jech.55.8.600

Rubenis J. A rehabilitational approach to the management of Parkinson's disease. Parkinsonism & Relat Dis 2007;13:S495-7.

Rymaszewski LA, et al. A team approach to musculoskeletal disorders. Ann R Coll Surg Engl 2005; 87: 174–80.

Sharif Azar E, Ravanbakhsh M, Torabipour A, Amiri E, Haghighyzade MH. Home-based versus center-based care in children with cerebral palsy: a cost-effectiveness analysis. J Med Life. 2015;8(Spec Iss 4):245-251.

Shih STF, Tonmukayakul U, Imms C, et al. Economic evaluation and cost of interventions for cerebral palsy: a systematic review. Dev Med Child Neurol. 2018;60(6):543-558. doi:10.1111/dmcn.13653

Simpson AN, et al. A Cost-Utility Analysis of Nonsurgical Treatments for Stress Urinary Incontinence in Women. Female Pelvic Med Reconstr Surg. 2019;25(1):49-55. doi:10.1097/SPV.0000000000000502

Sjöström M, et al. Mobile App for Treatment of Stress Urinary Incontinence: A Cost-Effectiveness Analysis. J Med Internet Res. 2017;19(5):e154. Published 2017 May 8. doi:10.2196/jmir.7383

Slaman, Jorrit & van den Berg-Emons, Hendrika & Tan, Siok Swan & Russchen, Heleen & Meeteren, Jetty & Stam, Henk & Roebroeck, Marij. (2015). Cost-utility of a lifestyle intervention in adolescents and young adults with spastic cerebral palsy. Journal of rehabilitation medicine. 47. 10.2340/16501977-1929.

Standfield L, Comans T, Raymer M, O'Leary S, Moretto N, Scuffham P. The Efficiency of Increasing the Capacity of Physiotherapy Screening Clinics or Traditional Medical Services to Address Unmet Demand in Orthopaedic Outpatients: A Practical Application of Discrete Event Simulation with Dynamic Queuing. Appl Health Econ Health Policy. 2016;14(4):479-491. doi:10.1007/s40258-016-0246-1

Stewart BA, Momaya AM, Silverstein MD, Lintner D. The Cost-Effectiveness of Anterior Cruciate Ligament Reconstruction in Competitive Athletes. Am J Sports Med. 2017;45(1):23-33. doi:10.1177/0363546516664719

Tal-Singer R, Crapo JD. COPD at the time of COVID-19: a COPD Foundation perspective. Chronic Obstr Pulm Dis. 2020; 7(2): 73-75. doi: http://doi.org/10.15326/jcopdf.7.2.2020.0149

The Department of Health, The National Slips and Falls Prevention Project 2009, accessed at: https://www1.health.gov.au/internet/main/publishing.nsf/Content/phd-slips-falls-prev-project

Thom, D.H. and Rortveit, G. (2010), Prevalence of postpartum urinary incontinence: a systematic review. Acta Obstetricia et Gynecologica Scandinavica, 89: 1511-1522. doi:10.3109/00016349.2010.526188

Thomas P, Baldwin C, Bissett B, et al. Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations. J Physiother. 2020;66(2):73-82. doi:10.1016/j.jphys.2020.03.011

Tomlinson CL, Herd CP, Clarke CE, et al. Physiotherapy for Parkinson's disease: a comparison of techniques. Cochrane Database Syst Rev. 2014;2014(6):CD002815. Published 2014 Jun 17. doi:10.1002/14651858.CD002815.pub2

Tomlinson Claire L, Patel Smitaa, Meek Charmaine, Herd Clare P, Clarke Carl E, Stowe Rebecca et al. Physiotherapy intervention in Parkinson's disease: systematic review and meta-analysis BMJ 2012; 345 :e5004

Transport and Infrastructure Council, Australian Transport Assessment and Planning Guidelines, August 2016, accessed at: https://www.atap.gov.au/sites/default/files/pv2_road_parameter_values.pdf

UK BEAM Trial Team. United Kingdom back pain exercise and manipulation (UK BEAM) randomised trial: cost effectiveness of physical treatments for back pain in primary care. BMJ. 2004;329(7479):1381. doi:10.1136/bmj.38282.607859.AE

van de Graaf VA, van Dongen JM, Willigenburg NW ESCAPE Research Group, et al, How do the costs of physical therapy and arthroscopic partial meniscectomy compare? A trial-based economic evaluation of two treatments in patients with meniscal tears alongside the ESCAPE study, British Journal of Sports Medicine 2020;54:538-545.

Vermeulen KM, et al. Cost-effectiveness of a pro-active approach of urinary incontinence in women. BJOG 2016;123:1213–1220.

Walker-Bone K, Palmer KT, Reading I, et al. Occupation and epicondylitis: a population-based study. Rheumatology 2012;51:305–10.

Whitehurst DG, Lewis M, Yao GL, et al. A brief pain management program compared with physical therapy for low back pain: results from an economic analysis alongside a randomized clinical trial. Arthritis Rheum. 2007;57(3):466-473. doi:10.1002/art.22606

Williams JI, et al. The burden of waiting for hip and knee replacements in Ontario. Ontario Hip and Knee Replacement Project Team. J Eval Clin Pract 1997; 3: 59–68

Willits K, Amendola A, Bryant D, et al. Operative versus nonoperative treatment of acute Achilles tendon ruptures: a multicenter randomized trial using accelerated functional rehabilitation. J Bone Joint Surg Am. 2010;92(17):2767-2775. doi:10.2106/JBJS.I.01401

World Health Organisation (WHO) Global Health Observatory (GHO) data, accessed at: https://www.who.int/gho/mortality_burden_disease/life_tables/situation_trends_text/en/

Zwerink M, et al. Cost-Effectiveness of a Community-Based Exercise program in COPD Self-Management. COPD. 2016;13(2):214-223. doi:10.3109/15412555.2015.1074171

nous

ABOUT NOUS

Nous Group is an international management consultancy operating in 10 locations across Australia, the UK and Canada. For over 20 years we have been partnering with leaders to shape world-class businesses, effective governments and empowered communities.

400 PEOPLE

10 LOCATIONS

3 COUNTRIES

Financial Review Client Choice Awards 2017
Best Management Consulting Firm
Best Provider to Government & Community
Most Cost Conscious Firm