

COST OF MYELOPATHY TO SOCIETY

Executive summary

Degenerative Cervical Myelopathy (DCM) is a common and disabling condition that arises when degenerative conditions of the cervical spine (the neck) compress the spinal cord, leading to an evolving spinal cord injury. Symptoms are varied, but often include gait disturbance, impaired balance and falls, loss of dexterity, numbness, bowel and/or bladder dysfunction and pain. Owing to widespread underdiagnosis, it is not known exactly how common DCM is, but recent estimates using studies screening healthy populations, suggest this could be as many as 1 in 50 adults.

Surgery to alleviate degenerative cervical cord compression is the only treatment currently available to stop further spinal cord injury. Owing to the potential risks of surgery, and the potential for DCM symptoms to remain mild for extended periods, surgery is currently offered to those with moderate to severe, or progressive disease. Surgery is able to offer most meaningful benefit but fewer than 5% of patients make a full recovery and are instead left with lifelong disabilities. Whilst this has been associated with high levels of long-term dependence, consequent unemployment and low quality of life, the cost to society has never before been quantified. This gap has been recognised as an international research priority by the AO Spine RECODE DCM initiative, involving people both living and working with DCM.

This report details the first estimate of the health-economic implications for treating DCM, with respect to the UK population. Using the NHS Hospital Episode Statistics data, with UK population data and information from the published literature, the report:

1. Describes the number of people treated for DCM by the NHS and their demographics
2. Confirms that surgical treatment is cost effective
3. Estimates the cost to an individual (in terms of lost income) and to society as a whole

For 2018/19, this data suggests a total cost to English society of £74.1m, a likely conservative estimate, owing to missing indirect healthcare costs and widespread underdiagnosis. This is significant, principally because it is potentially avoidable. Timely DCM surgery is the gold standard treatment, however patients today can wait years to access treatment and must navigate a system without dedicated care pathways nor systematic triage based on urgency. Further, DCM patients have limited, if any, access to rehabilitation services, an essential part of management for other neurological conditions. DCM must become a priority for the UK and beyond.

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Requirements for a burden of illness model

1

Incidence:

How many people are affected and at what age?

2

Direct costs:

What are the costs of treating the condition?

3

Indirect costs:

What are the costs to society as a consequence?

1 Incidence

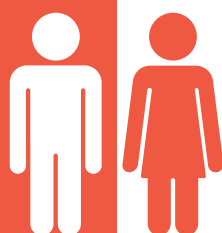
The true incidence of DCM in the UK isn't known. This section provides an estimate of the number of DCM patients attending hospital for treatment, using the Hospital Episode Statistics from 2012 to 2019 inclusive [NHS Digital, Leeds UK]. Hospital Episode Statistics report on hospital attendance in England.

ICD codes used

In the absence of a specific code for DCM, the following codes were selected as being specific for the definition of DCM.

M47.12	Other spondylosis with myelopathy, cervical region
M50.0	Cervical disc disorder with myelopathy
M99.31	Osseous stenosis of neural canal, cervical region
M99.41	Connective tissue stenosis of neural canal, cervical region
M99.51	Intervertebral disc stenosis of neural canal, cervical region

Age and gender



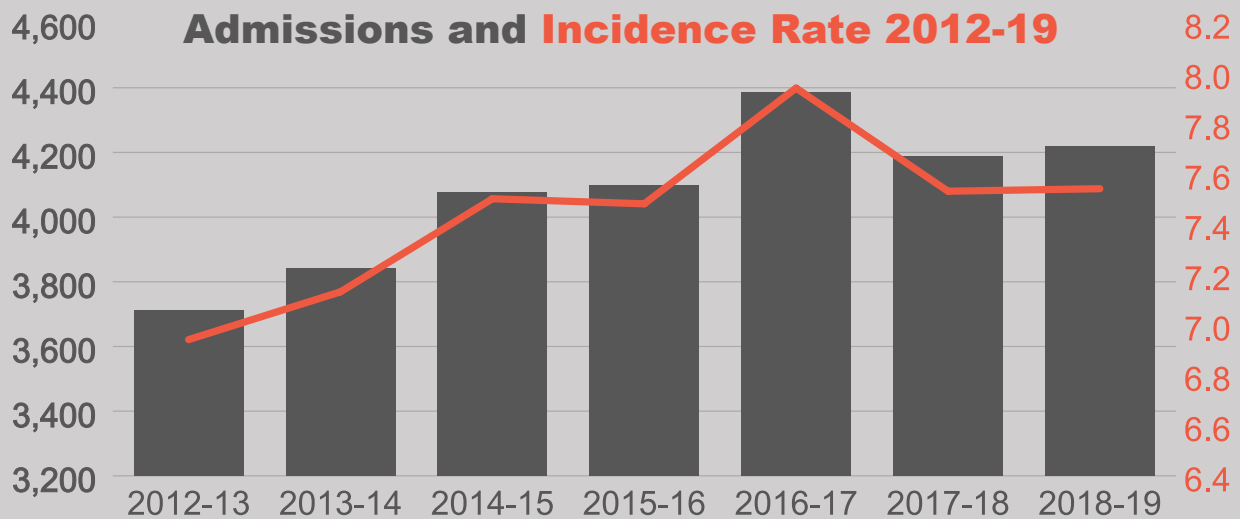
The weighted average age of patients contained within the Hospital Episodes Statistics (HES) data for the years 2012–2019 is **62.1 years**. To determine the indirect costs of patients of working age, the proportion of patients aged 18–65yr were separated. In this group, the average weighted age was **51.3 years**. **The results show that this was 53.67% of all patients hospitalised for DCM.** This value will be important to estimate parameters such as lost productivity and loss of income.

Over the period, the male:female ratio has been:

Men	Women
57.2%	42.8%

Yearly hospital admissions

Year	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Admissions	3,711	3,841	4,076	4,097	4,387	4,187	4,218



Incidence of hospital admissions for DCM

The HES data combined with population data for the corresponding years provided sufficient information for an estimate of incidence. Overall, the average incidence was **7.44/100,000** (SD ± 0.32).

Diagnostic delay

The time it took to obtain a diagnosis, combined with the age of admission to hospital, enables the age to be estimated at which symptoms become severe enough to affect activities of daily living and, in turn, reduce the potential for full employment. From the HES data, the mean waiting time, that is, the time from referral to admission, can be estimated.

Time from onset of symptoms to referral can be estimated from three other sources:

1. An open survey by Myelopathy.org including 774 people with DCM (Pope, Mowforth, Davies, & Kotter, 2020)
2. A retrospective cohort study from Israel (Behrbalk et al., 2013)
3. A retrospective cohort study from UK (Hilton, Tempest-Mitchell, Davies, & Kotter, 2019)

From these studies, the range of mean delays was 15mo–2.2yr. The weighted mean waiting time was 73 days (2.4 months) and the time to treatment from first presentation was between 17 months and 2.5 years.

Therefore for those of working age [18–65yr] the mean age at which symptoms may have affected employment is estimate at **49.4 years**.

2 Estimation of the direct cost of surgery for DCM

Using the hospital admissions for 2018–19 from the HES data, we can calculate the overall cost of managing DCM.

ICD-10 codes/associated HRG codes	Admissions	Costs
M47.12/ HC28	1,161	£10,801,545
M50.0/ HC28	2,994	£27,855,148
M99.31/ HD26; HC27	11	£68,212
M99.41/ HD26; HD29	2	£4,715
M99.51/ HD26; HC27	50	£141,914
Sum		£38,871,534

Estimation of cost/QALY

The ratio of treatment cost per **Quality Adjusted Life Year (QALY)** gained is often used to estimate the cost-effectiveness of a treatment. The National Institute for Health and Care Excellence, UK, uses the incremental differences of cost/QALY between two treatments, or the ICER, as a means of comparison and takes an ICER of **≤ £20,000** as a **cost-effective threshold**.

The QALY gain from surgery has been estimated, using a Canadian population; Fehlings et al. (2016) (Fehlings et al., 2012; Witiw et al., 2016) estimated the gain to be 0.64. If this applied to the NHS England costs shown above, the **estimated cost/QALY is £14,399**.

Weighted mean cost of admission 2018–19	QALY gain	Cost/QALY
£9,216	0.64	£14,399
-20% utility	0.512	£17,999
+20% utility	0.768	£12,000

This figure of £14,399/QALY falls well within the upper boundary generally accepted to be cost-effective, even when applying the same criteria as Fehlings in a sensitivity analysis, i.e. $\pm 20\%$ in utility value, where the range becomes £12,000–17,999, still below the accepted threshold of £20,000/QALY.

Surgery is cost-effective in the UK.

3

Lost income and societal cost associated with DCM

In an open survey conducted by Myelopathy.org, 774 people with DCM, from North America and the UK, shared their current employment status (Pope et al., 2020).

Effect of DCM on employment status – the Cambridge survey (Pope et al., 2020)

Employment status of respondents	Total (N)	Overall %	Total (N) 18–65 yr	% 18–65 yr
Disabled, not able to work	278	36%	220	41%
Employed, working full-time	201	26%	153	28%
Employed, working part-time	88	11%	73	14%
Not employed, looking for work	23	3%	14	3%
Not employed, not looking for work	58	7%	38	7%
Retired	126	16%	39	7%
Total	774		537	

Lost personal income in the UK

Restricting the Myelopathy.org survey to participants of working age (18-65) and from the UK, 68 (34%) were in continued full time employment.

Employment status of respondents 18–65yr	Total UK (%)
Disabled, not able to work	90 (45%)
Employed, working full-time	68 (34%)
Employed, working part-time	41 (21%)
Total potential work force	199

According to the Office for National Statistics [ONS], average regular pay, in June 2020 equates to an annual salary £26,156 before tax and other deductions (Office for National Statistics, n.d.).

Those working part-time averaged about 16 hours per week. Assuming they earned the Living Wage, £8.72 (as at June 2020), i.e. £139.52/week for 48 weeks/year, they earned £6,696/year.

The average potential income lost by those who are disabled and not able to work is therefore **£18,663** using ONS data for the weighted average monthly and annual salaries of those employed. However, the weighted average is **£25,524**, if based upon the reported higher annual salary from the Organisation for Economic Cooperation and Development [OECD] data is used.

Assuming people with DCM lose 15.6 years of employment life, and an inflation rate of 3% (the usual rate of discounting in health economic evaluations), the inflated total loss of earnings over 15 years becomes **£474,719** using the OECD values and **£357,525** using ONS values.

Cost of illness

From the previous sections, we were able to estimate the following for England:

Yearly cost of illness, DCM (England) 2018

Direct Healthcare Costs

Annual cost of hospitalization	£9,216	
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Number of hospital admissions	4,218	
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Total (Rounded to nearest £100,000)		£38,900,000
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Loss of Productivity

Of working age (18–65yr)	$(53.67\% \times 4218) = 2264$	
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And unable to work due to disability	$(45\% \times 2264) = 1019$	
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Weighted average annual salary for those employed	£25,524	
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Total (Rounded to nearest £100,000)		£26,000,000
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Disability Benefits

Average disability payments per person (2020)	£9,021.72	
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Total (Rounded to nearest £100,000)		£9,200,000
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Lost productivity + Disability benefits

		£35,200,000
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Societal Cost

		£74,100,000
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