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# Act now - serious pathology of the spine is affected by health inequalities.

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## 1. Purpose

This commentary explores how health inequalities can impact on serious pathology of the spine.

## 2. Background

People from more deprived areas are more likely to practice risky health behaviours, seek healthcare later and have poorer health literacy, compounded by a digital divide. As a result, all musculoskeletal clinicians working in areas of deprivation are more likely to see complex cases with multiple co-morbidities ([Arthritis and Musculoskeletal Alliance \(ARMA and\), 2024](#)), but they are also more likely to see more serious pathology and see these cases later in the disease process with safety-netting challenges compounded by poor health literacy and digital access. This is an important factor for musculoskeletal physiotherapists. Direct access to physiotherapy is available in a growing number of countries around the world ([Bury and Stokes, 2013](#)). The prevalence of serious pathology varies depending on where in the world the clinician works and where on the clinical pathway the clinician has contact with the person ([Finucane et al., 2020](#)). A clinician's ability to identify potential serious pathology is critical within these roles. Moreover, serious pathology symptoms change over time and so despite the referral mechanism, all clinicians working in musculoskeletal services globally have an important role in recognising Red Flags to ensure the best possible patient outcome ([Finucane et al., 2020](#)).

Serious spinal pathology *in general* tends to fall into four groups; malignancy, fracture, infection and cauda equina syndrome ([Finucane et al., 2020](#)). Early diagnosis is the key to optimise patient outcomes, yet early diagnosis can be adversely affected by health inequalities. In this paper we consider the impact of health inequalities on the incidence and outcome for these serious spinal musculoskeletal (MSK) pathologies.

Health inequalities have been described as unfair, systematic, and avoidable differences in health between different groups of people ([The King's Fund, 2024a](#)). Health inequalities can be experienced by people grouped around a range of factors ([Office for Health Improvement and Disparities, 2022](#)) These include socio-economic factors, the environmental conditions in which people live, protected characteristics such as ethnicity and disability, and socially excluded groups such as people who are homeless ([Arthritis and Musculoskeletal Alliance \(ARMA and\), 2024](#)). These factors can affect people's exposure to health risks and their opportunities to lead healthy lives ([Office for Health Improvement and Disparities, 2022](#)). A person's behaviour is a key determinant of their health status. 'Risky' health behaviours include smoking, poor diet, harmful alcohol consumption and lack of exercise, and are more common in these groups ([Office for Health Improvement and Disparities, 2022](#); [The King's Fund, 2024c](#)). Importantly, socio-economic factors combined with health behaviours influence the health inequalities a person may experience.

In relation to MSK conditions, the Arthritis and Musculoskeletal Alliance (ARMA) ([Arthritis and Musculoskeletal Alliance \(ARMA\) and, 2024](#)) highlight that the most significant social and economic factors influencing poor MSK health are poverty, education, employment, environment, and food ethos. These determinants of health not only predispose people living in deprivation to having benign MSK conditions at a younger age and with worse outcomes, they are also risk factors of more serious MSK pathologies.

The Organisation for Economic Co-operation and Development (OECD) ([Office for Health Improvement and Disparities, 2022](#)) has identified that people with lower incomes are less likely to see a specialist, take part in cancer screening or use preventative services such as smoking cessation. People in low-income rural areas experience delayed or absent care due to transport, access and cost issues; resulting in less healthcare use. Once care is accessed, similar amounts of specialist care is received, but access later in their disease process ([Office for Health Improvement and Disparities, 2022](#)). Therefore, if the underlying cause is serious, early diagnosis is compromised. Globally, there is good evidence that confirm health inequalities are strongly linked to an increased risk of serious pathology ([World Health Organization, 2020](#)) with one large study in England reporting a positive correlation between all cancer types and social deprivation ([Waterhouse et al., 2023](#)). An OECD (2018) survey of 33 countries, found particular groups, such as indigenous people, ethnic minorities, and people not fluent in the primary language, had additional barriers to accessing healthcare.

As early diagnosis of any serious pathology is key, this relies on the patient presenting to a clinical setting with Red Flag symptoms in a timely manner. Yet studies identify lower serious symptom awareness in people from deprived populations who are living with complex comorbidities with other symptoms masking serious pathologies ([Moriarty et al., 2019](#)).

### 3. How health inequalities can impact serious spinal pathology

#### 3.1. Spinal malignancy

Prostate, breast, and lung cancers are the main cancers that metastasise to the spine ([Finucane et al., 2020](#)). If not identified at an early stage, spinal cancer can progress to metastatic spinal cord compression (MSCC) with the potential for a poor outcome and earlier than expected death. It is noteworthy that 25% of MSCC cases present to a clinical setting with MSCC as the first sign of malignancy with no known underlying cancer diagnosis ([Finucane et al., 2020](#)). If identified earlier whilst the patient is still ambulant, the potential for surgical intervention is higher, there is a longer life expectancy, with a better quality of life remaining. Hence early identification of spinal cancer is vital. Cancer cases and deaths occur unequally as a result of health inequalities. By 2040, 67% of annual cancer cases will be in low and middle income countries ([World Health Organization, 2020](#)). The [World Health Organization \(2020\)](#) confirms that socially and economically disadvantaged groups not only present late, they experience geographical and economic barriers to care and participate less in screening programmes, resulting in more late diagnoses and marked differences in clinical outcomes. Even when cancers are diagnosed at an early stage, disadvantaged groups are reported as more frequently receiving lower-quality care, failure to complete treatment or, for cancers with a poor prognosis, be transitioned to non-curative care ([World Health Organization, 2020](#)). People living in more socio-economically deprived areas of high-income countries have lower cancer survival than those in less deprived areas ([Ingleby et al., 2022](#)). Emergency departments (ED) are commonly used by those living in deprivation as a source

of healthcare, commonly late in a disease process ([Exarchakou et al., 2024](#)). ED new cancer presentations have a substantially poorer one-year relative survival than other routes ([Elliss et al., 2012](#)). This potentially late presentation in socially and economically deprived settings poses a significant challenge for the MSK clinician in primary, community and emergency care. In the UK, 20,000 more cancer cases a year are diagnosed in the most deprived areas ([Cancer Research UK, 2020](#)). The differential distribution of cancer rates by socio-economic status is partly explained by differences in tobacco use, alcohol consumption, unhealthy nutrition, obesity and lack of physical activity ([World Health Organization, 2020](#)). If the health benefits of physical activity alone are considered, those with low levels of physical activity have a 30% increased risk of breast cancer. Obesity contributes to more than 1 in 20 cancer cases in the UK with 8% of breast cancer cases attributed to overweight and obesity ([Cancer Research UK](#)). There is a strong association between lung cancer mortality and deprivation for both males and females in England with mortality rates 170% higher for males in the most deprived areas compared to the least and 176% higher for females ([Cancer Research UK and National Cancer Intelligence Network, 2014](#)). For breast and prostate cancer, survival inequalities between occupations have also been identified ([Ingleby et al., 2022](#)). Environmental factors also contribute to socio-economic inequality in cancer. People with cancer can experience high rates of financial hardship ([World Health Organization, 2020](#)). For people experiencing health inequalities this can result in financial catastrophe. Severe financial distress after a cancer diagnosis may increase the likelihood of death, even after apparently effective treatment ([World Health Organization, 2020](#)) and militate against early presentation to a healthcare setting.

### 3.2. Spinal infection

Spinal infection has traditionally been associated with low-middle income countries and there continues to be a high prevalence in these countries, which is associated with socio-economic disadvantage and poor access to care ([Wu et al., 2023](#)). However, in high-income and upper middle-income countries, spinal infection has steadily increased over recent years, not only due to an ageing population ([Behmanesh et al., 2021](#); [Nagashima et al., 2018](#)), but an increase in intravenous drug abuse ([Arthritis and Musculoskeletal Alliance \(ARMA and\), 2024](#)). Spinal infection, including Tuberculosis (TB) ([Public Health England, 2021](#)), is seen more frequently in disadvantaged populations such as, homeless, intravenous drug users and asylum seekers as a result of adverse life conditions. TB is a significant public health issue in urban cities. In the UK there is a particular issue reported in London which accounts for 40% of all TB cases in England.

Diabetes mellitus risk, another high-risk factor for spinal infection ([Yusuf et al., 2019](#)), increases by 40% with a low activity lifestyle ([Arthritis and Musculoskeletal Alliance \(ARMA and\), 2024](#)).

### 3.3. Spinal fractures

Spinal fractures make up the largest number of serious pathologies in the spine ([Finucane et al., 2020](#)). Globally, studies have consistently highlighted the impact that health inequalities can have on both the risk for osteoporosis and the development of fragility fractures. A large systematic review covering 61 studies from 26 countries and over 19 million individuals showed low socio-economic status led to a 25% higher risk for fragility fracture ([Valentin et al., 2021](#)). Data from a US study shows strong links between risk factors for fragility fracture and social determinants of health, specifically “inequalities in the greater social environment (e.g., access to resources), and overall health” ([Gough et al., 2021](#)). An increased risk of

fracture has been identified in women from ethnic minorities who have been shown to find engagement with healthcare more difficult ([Lewiecki and Erb, 2022](#)). Even if healthcare was sought, complying with treatment regimens has been shown to be problematic ([Yeowell, 2010](#)). A UK study of prescription rates for osteoporosis medication has showed disparities related to deprivation with a statistically significant and negative effect on prescription levels of alendronic acid, denosumab, ibandronic acid and risedronate sodium ([Agirrezabal et al., 2020](#)).

### 3.4. Cauda Equina Syndrome

There is little evidence in the literature to point to an increased incidence of Cauda Equina Syndrome (CES) related to health inequalities - but there is a potential impact on timely surgery and on the final outcome. No link between socio-economic status and the incidence of CES was found in a UK study which explored the incidence of CES and patient demographics in Scotland over a one-year period in a series of 149 patients ([Woodfield et al., 2021](#)). Other factors associated with deprivation, such as obesity have been shown to have no relation to the incidence of CES ([Kaiser et al., 2020](#)). Although there may be some controversy surrounding the effects of health inequalities on incidence of CES, timely surgery is essential to optimise recovery ([Getting it Right First Time, 2023](#)) and as the OECD point out, those in deprived areas are likely to see a specialist later in their disease process ([Office for Health Improvement and Disparities, 2022](#)).

### 3.5. Safety-netting

Safety-netting is a management strategy used for people who present with a clinical risk of possible serious pathology developing in the future. These strategies should include advice on what signs and symptoms to look out for, which action to take, and the time frame within which that action needs to be taken. Hence, safety-netting disadvantaged populations can be problematic, due to presenting late to a clinical setting and poor health literacy, this problem is further exacerbated by the digital divide. A King's Fund report in the UK highlighted the challenge of digital exclusion for those from lower socio-economic backgrounds, stating "There is a risk that this problem [health inequalities] may become even more acute given the [current shift towards digital and remote care](#), which more deprived groups, who are [more likely to experience](#) digital exclusion, could [struggle to access](#)" ([The King's Fund, 2024d](#)).

## 4. Conclusion

Serious pathology of the spine is affected by health inequalities. Identifying serious pathology as the cause of a person's musculoskeletal presentation is complex. However, identifying serious pathology early significantly enhances the chances of a more favourable patient outcome ([Finucane et al., 2020](#)). To facilitate this early diagnosis, patients need to present to a healthcare setting in a timely manner. Therefore, those at risk of serious disease should be safety-netted when possible. People from socio-economically deprived areas are more likely to have multiple conditions and therefore clinically complex and are less likely to recognise serious symptoms early. The determinants of health can play a big part in helping to inform the clinician's level of concern and facilitate early suspicion and timely onward management.

## 5. Take home message

Health inequalities are avoidable and unfair but impact on the incidence of serious pathology - we need to act now to make a difference. Consideration should be given to.

Gaining an understanding of the health inequalities in your local population

Gaining an understanding of the drivers for poor MSK health locally

Could the patient in front of you be affected by health inequalities?

Could health inequalities be contributing to a serious pathology risk?

Delivering bespoke quality clinical encounters to facilitate communication and support onward management.

Are there new ways of working which could lessen the health inequalities gap?

Going forwards health care professional can play a substantial role in influencing public health initiatives, targeting those who adopt risky health behaviours. Consider targeted activities to decrease the exposure of these behaviours at an early stage before a condition develops.

## References

1. Arthritis and Musculoskeletal Alliance (ARMA). Act Now; Musculoskeletal Health Inequalities and Deprivation. Report of ARMA's inquiry [Internet]. London: ARMA; 2024 [cited 2024 May 2]. Available from: <https://arma.uk.net/musculoskeletal-health-inequalities-and-deprivation-report>
2. Bury TJ, Stokes EK. A global view of direct access and patient self-referral to physical therapy: implications for the profession. *Phys Ther*. 2013 Apr;93(4):449-59. doi: 10.2522/ptj.20120060. Epub 2012 Nov 29. PMID: 23197847.
3. Finucane LM, Downie A, Mercer C, Greenhalgh SM, Boissonnault WG, Pool-Goudzwaard AL, Beneciuk JM, Leech RL, Selfe J. International Framework for Red Flags for Potential Serious Spinal Pathologies. *\*J Orthop Sports Phys Ther\**. 2020 Jul;50(7):350-72. doi: 10.2519/jospt.2020.9971. Epub 2020 May 21. PMID: 32438853.
4. The King's Fund. What are health inequalities? [Internet]. London: The King's Fund; 2024 [cited 2024 Sep 12]. Available from: <https://www.kingsfund.org.uk/publications/what-are-health-inequalities>
5. Office for Health Improvement and Disparities. Guidance: Health disparities and health inequalities [Internet]. London: GOV.UK; 2022 [cited 2024 Sep 5]. Available from: <https://www.gov.uk/government/publications/health-disparities-and-health-inequalities>
6. The King's Fund. Illustrating the relationship between poverty and NHS services [Internet]. London: The King's Fund; March 2024 [cited 2024 Aug 15]. Available from: <https://www.kingsfund.org.uk/publications/relationship-between-poverty-and-nhs-services>

7. The King's Fund. Health inequalities in a nutshell [Internet]. London: The King's Fund; 2024 [cited 2024 Aug 15]. Available from: <https://www.kingsfund.org.uk/insight-and-analysis/data-and-charts/health-inequalities-nutshell>
8. World Health Organization. Report on Cancer, Setting Priorities, Investing Wisely and Providing Care for All [Internet]. Geneva: WHO; 2020 [cited 2024 Aug 22]. Available from: <https://www.who.int/publications/i/item/9789240001299>
9. Waterhouse J, Welch C, Battisti N, Sweeting M, Paley L, Lambert P, Deanfield J, Belder M, Peake M, Adlam D, Ring A. Geographical variation in underlying social deprivation, cardiovascular and other comorbidities in patients with potential curable cancers in England; Results from National Registry dataset analysis. *Clin Oncol*. 2023 [Epub ahead of print]. doi: 10.1016/j.clon.2023.04.007.
10. Moriarty Y, Townson J, Quinn-Scoggins H, Padgett L, Owen S, Smits S, Playle R, Dimitropoulou P, Sewell B, Kolovou V, Buckle P, Carter B, Edwards A, Hepburn J, Matthews M, Mitchell C, Neal RD, Robling M, Wood F, Brain K. Improving cancer symptom awareness and help-seeking among adults living in socioeconomically deprived communities in the UK using a facilitated health check: A protocol for the Awareness and Beliefs About Cancer (ABACus) Randomised Control Trial. *BMC Public Health*. 2019 Mar 11;19(1):285. doi: 10.1186/s12889-019-6612-9. PMID: 30866887; PMCID: PMC6417119.
11. Ingleby F, Woods L, Atherton I, Baker M, Elliss-Brookes L, Belot A. An investigation of cancer survival inequalities associated with individual-level socio-economic status, area-level deprivation, and contextual effects, in a cancer patient cohort in England and Wales. *BMC Public Health*. 2022;22:125. doi: 10.1186/s12889-022-12525-1.
12. Exarchakou A, Ratchet B, Lyratzopoulos G, Maringe C, Rubio FJ. What can hospital emergency admissions prior to cancer diagnosis tell us about socio-economic inequalities in cancer diagnosis? Evidence from population-based data in England. *Br J Cancer*. 2024 Apr 26. doi: 10.1038/s41416-024-02688-6. Epub ahead of print. PMID: 38671209.
13. Elliss-Brookes L, McPhail S, Ives A, Greenslade M, Shelton J, Hiom S, Richards M. Routes to diagnosis for cancer - determining the patient journey using multiple routine data sets. *Br J Cancer*. 2012 Oct 9;107(8):1220-6. doi: 10.1038/bjc.2012.408. Epub 2012 Sep 20. PMID: 22996611; PMCID: PMC3494426.
14. Cancer Research UK. UK health inequalities: 20,000 more cancer cases a year in the most deprived areas [Internet]. London: Cancer Research UK; 2020 [cited 2024 Sep 12]. Available from: <https://news.cancerresearchuk.org/2020/09/30/uk-health-inequalities-20000-more-cancer-cases-a-year-in-the-most-deprived-areas>
15. Cancer Research UK. Adult overweight and obesity statistics [Internet]. London: Cancer Research UK; [cited 2024 Sep 12]. Available from: <https://www.cancerresearchuk.org/health-professional/cancer-statistics/risk/overweight-and-obesity>
16. Cancer Research UK and National Cancer Intelligence Network. Cancer by deprivation in England: Incidence, 1996-2010, Mortality, 1997-2011. London: NCIN; 2014.
17. Wu S, Litvinjenko S, Magwood O, Wei X. Defining tuberculosis vulnerability based on an adapted social determinants of health framework: a narrative review. *Global Public Health*. 2023;18(1). doi: 10.1080/17441692.2023.2221729.
18. Behmanesh B, Gessler F, Kessel J, Keil F, Seifert V, Brudr M, Setzer M. The added value of cerebral imaging in patients with pyogenic spinal infection. *Front Neurol*. 2021;12:687517. doi: 10.3389/fneur.2021.687517.
19. Nagashima H, Tanishima S, Tanida A. Diagnosis and management of spinal infection. *J Orthop Sci*. 2018;23(4):667-673. doi: 10.1016/j.jos.2018.02.004.

20. Public Health England. Collaborative TB Strategy for England 2015 to 2020. End of Programme report [Internet]. London: Public Health England; 2021 [cited 2024 Sep 12]. Available from: <https://www.gov.uk/government/publications/collaborative-tb-strategy-for-england-2015-to-2020-end-of-programme-report>
21. Yusuf M, Finucane L, Selfe J. Red flags for the early detection of spinal infection in back pain patients. *\*BMC Musculoskelet Disord\**. 2019;20:148. doi: 10.1186/s12891-019-2588-3.
22. Valentin G, Ravn M, Jensen E, et al. Socio-economic inequalities in fragility fracture incidence: a systematic review and meta-analysis of 61 observational studies. *\*Osteoporos Int\**. 2021;32(12):2433-2448. doi: 10.1007/s00198-021-06038-7.
23. Gough CM, Quintero Y, Godde K. Assessing the roles of demographic, social, economic, environmental, health-related, and political factors on risk of osteoporosis diagnosis among older adults. *\*Arch Osteoporos\**. 2021;16(1):177. doi: 10.1007/s11657-021-01042-0. PMID: 34817704; PMCID: PMC8722370.
24. Lewiecki EM, Erb SF. Racial disparities and inequalities in the management of patients with osteoporosis. *\*Orthop Nurs\**. 2022;41(2):125-134. doi: 10.1097/NOR.0000000000000832.
25. Yeowell G. What are the perceived needs of Pakistani women in the North West of England in relation to physiotherapy, and to what extent do they feel their needs are being met? *\*Physiotherapy\**. 2010 Sep;96(3):257-63.
26. Agirrezabal I, Cabasés JM, Di Tanna GL, Sánchez-Iriso E. Inequalities in prescription rates of anti-osteoporosis drugs in primary care in England: A practice-level prescribing data analysis in 2013-2018. *\*Bone\**. 2020;130:115125. doi: 10.1016/j.bone.2019.115125.
27. Woodfield J, Lammy S, Jamjoom AAB, Fadelalla MAG, Copley PC, Arora M, Glasmacher SA, Abdelsadg M, Scicluna G, Poon E. A systematic review of the cost-effectiveness of physiotherapy for musculoskeletal disorders. *Physiotherapy*. 2021;113:62-71. doi: 10.1016/j.phys.2021.05.004. Epub 2021 May 12. PMID: 34020885.
28. Kaiser R, Krajcova A, Waldauf P, Srikandarajah N, Makel M, Beneš V. Are there any risk factors associated with the presence of cauda equina syndrome in symptomatic lumbar disk herniation? *World Neurosurg*. 2020 Sep;14. doi: 10.1016/j.wneu.2020.05.260. Epub 2020 Jun 6. PMID: 32522648.
29. Getting it Right First Time. Spinal surgery: National suspected cauda equina syndrome pathway [Internet]. 2020 [cited 2024 Sep 12]. Available from: <https://www.gettingitrightfirsttime.co.uk/National-Suspected-Cauda-Equina-Pathway-Updated-July-2024.pdf>
30. The King's Fund. Illustrating the relationship between poverty and NHS services [Internet]. London: The King's Fund; March 2024 [cited 2024 Aug 15]. Available from: <https://www.kingsfund.org.uk/publications/relationship-between-poverty-and-nhs-services>