**Title:** Defining health and disease: Setting the boundaries for physiotherapy. Are we undertreating or overtreating? How can we tell?

**Author names:** Baldwin JN1\*, McKay MJ1, Hiller CE1, Nightingale EJ1, Moloney N1, Vanicek N2, Ferreira P1, Simic M1, Refshauge K1 and Burns J1,3 *on behalf of the 1000 Norms Project Consortium*

**Institutional affiliations:**

Arthritis and Musculoskeletal Research Group, Faculty of Health Sciences, The University of Sydney, Australia

Department of Sport, Health and Exercise Science, University of Hull, United Kingdom

Paediatric Gait Analysis Service of New South Wales, Sydney Children’s Hospitals Network (Randwick and Westmead), Australia

**Corresponding Author:**

Jennifer N Baldwin BAppSci(Phty)Hons, PhD Student

Address: The University of Sydney, Faculty of Health Sciences, 75 East Street, Lidcombe, NSW Australia 2141

Email: [jennifer.baldwin@sydney.edu.au](mailto:jennifer.baldwin@sydney.edu.au)

T: +61 410 281 779

**Keywords**: Health; Disease; Outcome Assessment; Physical activity; Rehabilitation

**Word Count: 795**

**Defining health and disease: Setting the boundaries for physiotherapy. Are we undertreating or overtreating? How can we tell?**

Overdiagnosis and overtreatment is rife in medicine and has been identified in the discipline of sports medicine,[[1](#_ENREF_1)] as well as many others. Labelling healthy individuals with mild problems as ‘sick’ is concerning, notwithstanding the risks and costs of unnecessary treatment.[[2](#_ENREF_2)] Clinical decision-making depends on understanding the boundaries between health and disease. However boundaries are often blurred due to complex and interactive psychosocial and cultural factors.

In the era of patient-centred care the goal of treatment should be to address the individual as a whole and enable return to usual daily life. Targeting disability, rather than disease alone, must be a priority for clinicians, particularly in the case of diseases such as osteoarthritis that may be considered ‘par for the course’ of ageing. For example, osteoarthritis is a leading cause of disability worldwide, and this burden is set to rise alongside population ageing. Thus, cost-effective interventions are essential. Identifying disease and discerning when to intervene are salient concerns for clinicians, particularly in light of the problems of overdiagnosis and overtreatment. But when does a joint change from being ‘healthy’ to ‘diseased’? Definitions of health and disease change over time and vary across contexts and cultures.

**Defining health**

Health is a multi-dimensional concept in which individuals respond to internal and external changes in order to maintain participation in normal daily life. Ideally, health is a state of complete independence in activities of daily living, however in practical terms health is best understood as a state of *adequate* independence.[[3](#_ENREF_3)]

The term ‘healthy’ denotes the ability of individuals to cope with their internal states and environmental conditions. Yet there is a great deal of normal human variation present among ‘healthy’ physical and genetic features, much of which has no particular clinical significance. Our understanding of health must take into account human experience. A major health catastrophe for one person is ‘just a flesh wound’ to another. Health may therefore be regarded as the ability to successfully manage the inevitable occurrence of disease.[[4](#_ENREF_4)] But what constitutes a disease is complex.

**Defining disease**

As clinicians know, ‘disease’ may refer to a group of symptoms, a disorder of structure or function, or features attributed to a specific cause. But is that helpful in the clinic? Disease is also labelled as the deviation from ‘normal’, yet not all variation is abnormal and not all abnormalities are problematic. Further, disease as merely an ‘unhealthy state’ is inadequate.

Diagnosis of disease is generally based on individual disease definitions and diagnostic thresholds. However, broadened definitions and lowered or unclear thresholds can lead to mild or low-risk problems diagnosed as disease. Moreover, diagnosis is all too often accompanied by the urge to treat, e.g. medication or surgery. But disease manifests differently and does not always necessitate a cure. For example, meniscal damage is highly prevalent among the elderly general population yet is not always accompanied by pain or impairment.[[5](#_ENREF_5)] There is a similar incongruity between radiographic and clinical osteoarthritis.[[6](#_ENREF_6)] Individuals with mild disease may still be considered (or consider themselves) healthy if they can still take part in everyday life with minimal dysfunction. Return to normal daily activities is therefore a central goal for patients and clinicians.

**Identifying disease and disability: Case example**

Consider a 70-year old woman presenting with pain and stiffness in her right knee. Recently retired, she enjoys caring for her grandchildren, bushwalking and meeting friends. A degenerative meniscal tear and early osteoarthritic changes are present on MRI. On examination effusion and crepitus are present; she has decreased range of motion and weakness in her right knee. She reports difficulty walking long distances and climbing stairs due to pain. Consequently she has recently ceased her weekly group bushwalks and has trouble caring for her grandchildren.

From this history and examination dysfunction at each of the three World Health Organization’s functional levels is evident:

1. Impairments: knee pain, stiffness and weakness
2. Activity limitations: walking and stair-climbing
3. Participation restriction: participation in social and family activities is hindered

It is clear that this patient’s diseased knee is causing disability and impacting her health-related quality of life. Intervention is warranted. Where possible clinicians aim to eradicate disease, however in chronic conditions such as osteoarthritis the goal is to enable return to an appropriate state of health and function. Given recent evidence casting doubt over the efficacy of surgical intervention for degenerative meniscal tears,[[7](#_ENREF_7)] surgery in this case would be tantamount to overtreatment. Following the Osteoarthritis Research Society International guidelines, appropriate non-surgical intervention for this case involves exercise, education and, as appropriate, pharmacological treatment.[[8](#_ENREF_8)]

The key issue for clinicians is to identify when disease causes disability. Then management can be directed towards relevant impairments, not merely the disease alone, to ultimately restore health and quality of life. With the (functional) needs of the patient at the centre of the management plan, patient outcomes will be much ‘healthier’.

**Contributors and Sources**

The 1000 Norms Project Consortium was established in 2012 to create a framework for the 1000 Norms Project. Jennifer Baldwin BAppSci(Phty)Hons and Joshua Burns PhD contributed to the concept, design and construction of the final draft of the manuscript. Marnee McKay MHlthSci(Sports Physio), Claire Hiller PhD, Jean Nightingale PhD, Niamh Moloney PhD, Paulo Ferreira PhD, Milena Simic PhD, Natalie Vanicek PhD and Kathryn Refshauge PhD, contributed to the concept, design and review of the final draft of the manuscript.

**Funding**

The 1000 Norms Project is supported by grants from the National Health and Medical Research Council of Australia (NHMRC #1031893).

**Competing Interests**

The authors have no competing interests to declare.

Reference List

1. Moynihan R. Over-diagnosis, over-treatment and industry influence. Surely not in sports medicine? 2014. Br J Sports Med Podcast 24th May 2014 (accessed June 2014) URL:

https://soundcloud.com/bmjpodcasts/overdiagnosis-in-sports-medicine-fai-for-example-thegreat-ray-moynihan-selling-sickness?in=bmjpodcasts/sets/bjsm-1

2. Moynihan R, Doust J, Henry D. Preventing overdiagnosis: how to stop harming the healthy. BMJ 2012;**344**:e3502

3. Rattan SI. Healthy ageing, but what is health? Biogerontology 2013;**14**(6):673-7

4. Moynihan R, Smith R. Too much medicine?: Almost certainly. BMJ 2002;**324**(7342):859

5. Englund M, Roemer FW, Hayashi D, et al. Meniscus pathology, osteoarthritis and the treatment controversy. Nat Rev Rheumatol 2012;**8**(7):412-19

6. Bedson J, Croft PR. The discordance between clinical and radiographic knee osteoarthritis: a systematic search and summary of the literature. BMC musculoskelet disord 2008;**9**(1):116

7. Sihvonen R, Paavola M, Malmivaara A, et al. Arthroscopic partial meniscectomy versus sham surgery for a degenerative meniscal tear. New Engl J Med 2013;**369**(26):2515-24

8. McAlindon TE, Bannuru RR, Sullivan MC, et al. OARSI guidelines for the non-surgical management of knee osteoarthritis. Osteoarthr Cartilage 2014;**22**(3):363-88