



Principles of Differential Screening

Independent Study
Course 29.3.1

John Heick, PT, DPT, PhD, OCS, NCS, SCS
Northern Arizona University
Flagstaff, AZ

Seth Peterson, PT, DPT, OCS, FAAOMPT
The Motive Physical Therapy Specialists
Tucson, AZ

Tarang Jain, PT, DPT, PhD
Northern Arizona University
Flagstaff, AZ

References

1. Federation of State Boards of Physical Therapy. Continuing competence in physical therapy: an ongoing discussion.. <https://www.fsbpt.org/Portals/0/documents/free-resources/ccdiscussionpaper.pdf>. Accessed April 15, 2019.
2. Jordan K, Clarke AM, Symmons DP, et al. Measuring disease prevalence: a comparison of musculoskeletal disease using four general practice consultation databases. *Br J Gen Pract*. 2007;57(534):7-14.
3. MacKay C, Canizares M, Davis AM, Badley EM. Health care utilization for musculoskeletal disorders. *Arthritis Care Res (Hoboken)*. 2010;62(2):161-169.
4. American Physical Therapy Association. Levels of Patient Access to Physical Therapist Services in the States. American Physical Therapy Association; 2016. <http://www.apta.org/PTinMotion/2016/10/DirectAccess/>. Accessed April 18, 2019.
5. Greathouse DG, Schreck RC, Benson CJ. The United States Army physical therapy experience: evaluation and treatment of patients with neuromusculoskeletal disorders. *J Orthop Sports Phys Ther*. 1994;19(5):261-266.
6. Donato EB, DuVall RE, Godges JJ, Zimmerman GJ, Greathouse DG. Practice analysis: defining the clinical practice of primary contact physical therapy. *J Orthop Sports Phys Ther*. 2004;34(6):284-304.
7. Murphy BP, Greathouse D, Matsui I. Primary care physical therapy practice models. *J Orthop Sports Phys Ther*. 2005;35(11):699-707.
8. Shaffer SW, Moore JH. US Army Physical Therapist roles and contributions in Operations Enduring Freedom and Iraqi Freedom. *US Army Med Dep J*. 2016;(2-16):52-57.
9. American Physical Therapy Association. Physical Therapist's Role in Primary Care. <http://www.apta.org/ScopeOfPractice/>. Accessed April 19, 2019.
10. Lim ML, Murphy GS, Calloway M, Tribble D. History of U.S. military contributions to the study of diarrheal diseases. *Mil Med*. 2005;170(4 Suppl):30-38.
11. Moore JH, McMillian DJ, Rosenthal MD, Weishaar Risk determination for patients with direct access to physical therapy in military health care facilities. *J Orthop Sports Phys Ther*. 2005;35(10):674-678.
12. Boissonnault WG, Ross MD. Physical therapists referring patients to physicians: a review of case reports and series. *J Orthop Sports Phys Ther*. 2012;42(5):446-454. doi: 10.2519/jospt.2012.3890. Epub 2012 Jan 25.
13. Boissonnault WG. Prevalence of comorbid conditions, surgeries, and medication use in a physical therapy outpatient population: a multicentered study. *J Orthop Sports Phys Ther*. 1999;29(9):506-519; discussion 520-505.
14. Jette AM, Smith K, Haley SM, Davis KD. Physical therapy episodes of care for patients with low back pain. *Phys Ther*. 1994;74(2):101-110; discussion 110-115.
15. Arndt BG, Beasley JW, Watkinson MD, et al. Tethered to the EHR: primary care physician workload assessment using EHR event log data and time-motion

- observations. *Ann Fam Med*. 2017;15(5):419-426. doi: 10.1370/afm.2121.
16. Shanafelt TD, Boone S, Tan L, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Arch Intern Med*. 2012;172(18):1377-1385.
 17. Tai-Seale M, McGuire TG, Zhang W. Time allocation in primary care office visits. *Health Serv Res*. 2007;42(5):1871-1894.
 18. Deyle GD. Direct access physical therapy and diagnostic responsibility: the risk-to-benefit ratio. *J Orthop Sports Phys Ther*. 2006;36(9):632-634.
 19. Childs JD, Whitman JM, Sizer PS, Pugia ML, Flynn TW, Delitto A. A description of physical therapists' knowledge in managing musculoskeletal conditions. *BMC Musculoskelet Disord*. 2005;6:32.
 20. Berry J. Painful conditions in the lumbar lumbosacral and sacro-iliac regions. *Arch Surg*. 1925;11(6):883-910.
 21. Downie A, Williams CM, Henschke N, et al. Red flags to screen for malignancy and fracture in patients with low back pain: systematic review. *BMJ*. 2013;347:f7095. doi: 10.1136/bmj.f7095.
 22. Ladeira CE. Physical therapy clinical specialization and management of red and yellow flags in patients with low back pain in the United States. *J Man Manip Ther*. 2018;26(2):66-77. doi: 10.1080/10669817.2017.1390652. Epub 2017 Nov 20.
 23. Williams CM, Henschke N, Maher CG, et al. Red flags to screen for vertebral fracture in patients presenting with low-back pain. *Cochrane Database Syst Rev*. 2013;(1):CD008643. doi: 10.1002/14651858. CD008643.pub2.
 24. Henschke N, Maher CG, Ostelo RW, de Vet HC, Macaskill P, Irwig L. Red flags to screen for malignancy in patients with low-back pain. *Cochrane Database Syst Rev*. 2013;(2):CD008686. doi: 10.1002/14651858. CD008686.pub2.
 25. Premkumar A, Godfrey W, Gottschalk MB, Boden SD. Red flags for low back pain are not always really red: a prospective evaluation of the clinical utility of commonly used screening questions for low back pain. *J Bone Joint Surg Am*. 2018;100(5):368-374. doi: 10.2106/JBJS.17.00134.
 26. Cook CE, George SZ, Reiman MP. Red flag screening for low back pain: nothing to see here, move along: a narrative review. *Br J Sports Med*. 2018;52(8):493-496. doi: 10.1136/bjsports-2017-098352. Epub 2017 Sep 18.
 27. Engel G, Morgan W. *Interviewing and Patient Care*. Philadelphia, PA: Saunders; 1973.
 28. Peterson MC, Holbrook JH, Von Hales D, Smith NL, Staker LV. Contributions of the history, physical-examination, and laboratory investigation in making medical diagnoses. *West J Med*. 1992;156(2):163-165.
 29. Tuteur A. Listen to your patient. https://web.archive.org/web/20120319170242/http://open.salon.com/blog/amytuteurmd/2008/11/19/listen_to_your_patient. Accessed January 15, 2019.
 30. Bird J, Cohen-Cole SA. The three-function model of the medical interview. An educational device. *Adv Psychosom Med*. 1990;20:65-88.
 31. Keifenheim KE, Teufel M, Ip J, et al. Teaching history taking to medical students: a systematic review. *BMC*

- Med Educ. 2015;15:159. doi: 10.1186/s12909-015-0443-x.
32. Bishop MD, Mintken PE, Bialosky JE, Cleland JA. Patient expectations of benefit from interventions for neck pain and resulting influence on outcomes. *J Orthop Sports Phys Ther.* 2013;43(7):457-465. doi: 10.2519/jospt.2013.4492. Epub 2013 Mar 18.
 33. Maitland GD. *Vertebral Manipulation.* 5th ed. London, UK: Butterworth Heinemann; 1986.
 34. Diener I, Kargela M, Louw A. Listening is therapy: Patient interviewing from a pain science perspective. *Physiother Theory Pract.* 2016;32(5):356-367. doi: 10.1080/09593985.2016.1194648. Epub 2016 Jun 28.
 35. Riddle DL, Slover JD, Ang DC, et al. Opioid use prior to knee arthroplasty in patients who catastrophize about their pain: preoperative data from a multisite randomized clinical trial. *J Pain Res.* 2018;11:1549-1557. doi: 10.2147/JPR.S168251. eCollection 2018.
 36. Celik D, Kaya Mutlu E. The relationship between latent trigger points and depression levels in healthy subjects. *Clin Rheumatol.* 2012;31(6):907-911. doi: 10.1007/s10067-012-1950-3. Epub 2012 Feb 11.
 37. Goel N, Rao H, Durmer JS, Dinges DF. Neurocognitive consequences of sleep deprivation. *Semin Neurol.* 2009;29(4):320-339. doi: 10.1055/s-0029-1237117. Epub 2009 Sep 9.
 38. Khan S, Duan P, Yao L, Hou H. Shiftwork-mediated disruptions of circadian rhythms and sleep homeostasis cause serious health problems. *Int J Genomics.* 2018;2018:8576890. doi: 10.1155/2018/8576890. eCollection 2018.
 39. Dinges DF, Pack F, Williams K, et al. Cumulative sleepiness, mood disturbance, and psychomotor vigilance performance decrements during a week of sleep restricted to 4-5 hours per night. *Sleep.* 1997;20(4):267-277.
 40. May S, Chance-Larsen K, Littlewood C, Lomas D, Saad M. Reliability of physical examination tests used in the assessment of patients with shoulder problems: a systematic review. *Physiotherapy.* 2010;96(3):179-190. doi: 10.1016/j.physio.2009.12.002. Epub 2010 Mar 29.
 41. May S, Littlewood C, Bishop A. Reliability of procedures used in the physical examination of non-specific low back pain: a systematic review. *Aust J Physiother.* 2006;52(2):91-102.
 42. Reiman MP, Loudon JK, Goode AP. Diagnostic accuracy of clinical tests for assessment of hamstring injury: a systematic review. *J Orthop Sports Phys Ther.* 2013;43(4):223-231. doi: 10.2519/jospt.2013.4343. Epub 2013 Jan 14.
 43. Reiman MP, Goode AP, Hegedus EJ, Cook CE, Wright AA. Diagnostic accuracy of clinical tests of the hip: a systematic review with meta-analysis. *Br J Sports Med.* 2013;47(14):893-902. doi: 10.1136/bjsports-2012-091035. Epub 2012 Jul 7.
 44. Smith TO, Clark A, Neda S, et al. The intra- and inter-observer reliability of the physical examination methods used to assess patients with patellofemoral joint instability. *Knee.* 2012;19(4):404-410. doi: 10.1016/j.knee.2011.06.002. Epub 2011 Jun 28.
 45. Fredericson M, Yoon K. Physical examination and patellofemoral pain

- syndrome. *Am J Phys Med Rehabil*. 2006;85(3):234-243.
46. Rodeghero JR, Denninger TR, Ross MD. Abdominal pain in physical therapy practice: 3 patient cases. *J Orthop Sports Phys Ther*. 2013;43(2):44-53. doi: 10.2519/jospt.2013.4408. Epub 2013 Jan 14.
 47. Smith KL, Tichenor CJ, Schroeder M. Orthopaedic residency training: a survey of the graduates' perspective. *J Orthop Sports Phys Ther*. 1999;29(11):635-651; discussion 635.
 48. Rodeghero J, Wang YC, Flynn T, Cleland JA, Wainner RS, Whitman JM. The impact of physical therapy residency or fellowship education on clinical outcomes for patients with musculoskeletal conditions. *J Orthop Sports Phys Ther*. 2015;45(2):86-96. doi: 10.2519/jospt.2015.5255. Epub 2015 Jan 10.
 49. Croskerry P. From mindless to mindful practice--cognitive bias and clinical decision making. *N Engl J Med*. 2013;368(26):2445-2448. doi: 10.1056/NEJMp1303712.
 50. Croskerry P, Tait G. Clinical decision making: the need for meaningful research. *Acad Med*. 2013;88(2):149-150. doi: 10.1097/ACM.0b013e31827b258d.
 51. Croskerry P, Singhal G, Mamede S. Cognitive debiasing 1: origins of bias and theory of debiasing. *BMJ Qual Saf*. 2013;22 Suppl 2:ii58-ii64. doi: 10.1136/bmjqs-2012-001712. Epub 2013 Jul 23.
 52. Croskerry P, Singhal G, Mamede S. Cognitive debiasing 2: impediments to and strategies for change. *BMJ Qual Saf*. 2013;22 Suppl 2:ii65-ii72. doi: 10.1136/bmjqs-2012-001713. Epub 2013 Aug 30.
 53. Davenport TE, Kulig K, Sebeliski CA, Gordon J, Watts HG. *Diagnosis for Physical Therapists: A Symptom Based Approach*. Philadelphia, PA: FA Davis; 2012.
 54. Podbregar M, Voga G, Krivec B, Skale R, Pareznik R, Gabrscek L. Should we confirm our clinical diagnostic certainty by autopsies? *Intensive Care Med*. 2001;27(11):1750-1755.
 55. Landefeld CS, Chren MM, Myers A, Geller R, Robbins S, Goldman L. Diagnostic yield of the autopsy in a university hospital and a community hospital. *N Engl J Med*. 1988;318(19):1249-1254.
 56. Berner ES. Ethical and legal issues in the use of health information technology to improve patient safety. *HEC Forum*. 2008;20(3):243-258. doi: 10.1007/s10730-008-9074-5.
 57. Aiken AB, McColl MA. Diagnostic and treatment concordance between a physiotherapist and an orthopedic surgeon--a pilot study. *J Interprof Care*. 2008;22(3):253-doi: 10.1080/13561820801984134.
 58. Desmeules F, Toliopoulos P, Roy JS, et al. Validation of an advanced practice physiotherapy model of care in an orthopaedic outpatient clinic. *BMC Musculoskelet Disord*. 2013;14:162. doi: 10.1186/1471-2474-14-162.
 59. Marks D, Comans T, Thomas M, et al. Agreement between a physiotherapist and an orthopaedic surgeon regarding management and prescription of corticosteroid injection for patients with shoulder pain. *Man Ther*. 2016;26:216-222. doi: 10.1016/j.math.2016.10.001. Epub 2016 Oct 5.
 60. Wainner R, Flynn T, Whitman J. Spinal and extremity manipulation: the basic

- skill set for physical therapists. Evidence In Motion. 2001.
61. Bialosky JE, Bishop MD, George SZ. Regional interdependence: a musculoskeletal examination model whose time has come. *J Orthop Sports Phys Ther.* 2008;38(3):159-160; author reply 160. doi: 10.2519/jospt.2008.0201. Epub 2008 Feb 28.
 62. Sueki DG, Cleland JA, Wainner RS. A regional interdependence model of musculoskeletal dysfunction: research, mechanisms, and clinical implications. *J Man Manipul Ther.* 2013;21(2):90-102. doi: 10.1179/2042618612Y.0000000027.
 63. Gunn CC, Milbrandt WE. Tennis elbow and the cervical spine. *Can Med Assoc J.* 1976;114(9):803-809.
 64. Gross A, Langevin P, Burnie SJ, et al. Manipulation and mobilisation for neck pain contrasted against an inactive control or another active treatment. *Cochrane Database Syst Rev.* 2015;(9):CD004249. doi: 10.1002/14651858. CD004249.pub4.
 65. Young JL, Walker D, Snyder S, Daly K. Thoracic manipulation versus mobilization in patients with mechanical neck pain: a systematic review. *J Man Manip Ther.* 2014;22(3):141-153. doi:10.1179/2042618613Y.0000000043.
 66. Cooper HJ, Walters BL, Rodriguez JA. Anatomy of the hip capsule and pericapsular structures: A cadaveric study. *Clin Anat.* 2015;28(5):665-671. doi: 10.1002/ca.22539. Epub 2015 Apr 14.
 67. Marshall PW, Patel H, Callaghan JP. Gluteus medius strength, endurance, and co-activation in the development of low back pain during prolonged standing. *Hum Mov Sci.* 2011;30(1):63-73. doi: 10.1016/j.humov.2010.08.017. Epub 2011 Jan 11.
 68. Nelson-Wong E, Gregory DE, Winter DA, Callaghan JP. Gluteus medius muscle activation patterns as a predictor of low back pain during standing. *Clin Biomech (Bristol, Avon).* 2008;23(5):545-553. doi: 10.1016/j.clinbiomech.2008.01.002. Epub 2008 Feb 20.
 69. Mendonca LD, Ocarino JM, Bittencourt NFN, Macedo LG, Fonseca ST. Association of hip and foot factors with patellar tendinopathy (Jumper's Knee) in athletes. *J Orthop Sports Phys Ther.* 2018;48(9):676-684. doi: 10.2519/jospt.2018.7426. Epub 2018 May 23.
 70. Piva SR, Teixeira PE, Almeida GJ, et al. Contribution of hip abductor strength to physical function in patients with total knee arthroplasty. *Phys Ther.* 2011;91(2):225- doi: 10.2522/ptj.20100122. Epub 2011 Jan 6.
 71. Khayambashi K, Mohammadkhani Z, Ghaznavi K, Lyle MA, Powers CM. The effects of isolated hip abductor and external rotator muscle strengthening on pain, health status, and hip strength in females with patellofemoral pain: a randomized controlled trial. *J Orthop Sports Phys Ther.* 2012;42(1):22-29. doi: 10.2519/jospt.2012.3704. Epub 2011 Oct 25.
 72. Coombes BK, Bisset L, Vicenzino B. Bilateral cervical dysfunction in patients with unilateral lateral epicondylalgia without concomitant cervical or upper limb symptoms: a cross-sectional case-control study. *J Manipulative Physiol Ther.* 2014;37(2):79-86. doi:

10.1016/j.jmpt.2013.12.005. Epub 2013 Dec 28.

73. Fernandez-Carnero J, Cleland JA, Arbizu RL. Examination of motor and hypoalgesic effects of cervical vs thoracic spine manipulation in patients with lateral epicondylalgia: a clinical trial. *J Manipulative Physiol Ther.* 2011;34(7):432-440. doi: 10.1016/j.jmpt.2011.05.019. Epub 2011 Jul 23.
74. Radwan A, Francis J, Green A, et al. Is there a relation between shoulder dysfunction and core instability? *Int J Sports Phys Ther.* 2014;9(1):8-13.
75. Garrison JC, Arnold A, Macko MJ, Conway JE. Baseball players diagnosed with ulnar collateral ligament tears demonstrate decreased balance compared to healthy controls. *J Orthop Sports Phys Ther.* 2013;43(10):752-758. doi: 10.2519/jospt.2013.4680. Epub 2013 Sep 9.