Journal of Physiotherapy 65 (2019) 119–120

AUSTRALIAN PHYSIOTHERAPY ASSOCIATION

Journal of PHYSIOTHERAPY

journal homepage: www.elsevier.com/locate/jphys

Editorial

DiTA: a database of diagnostic test accuracy studies for physiotherapists

Mark A Kaizik [a], Mark J Hancock [b], Robert D Herbert [c]

[a] School of Medical Sciences, University of New South Wales, Sydney; [b] Faculty of Medicine and Health Sciences, Macquarie University, Sydney; [c] Neuroscience Research Australia (NeuRA), Sydney, Australia

In healthcare, diagnostic tests are conducted to confirm the presence or absence of a pathology.[1] The objective of testing is to increase the certainty about whether a particular pathology is present or absent.

Diagnostic tests can be differentiated from other types of clinical tests because they are used to determine the presence or absence of specific pathologies. Non-diagnostic clinical tests include tests that assess impairment, assess function, or monitor progress. Examples are muscle strength tests and range of motion tests. Other non-diagnostic clinical tests aim to predict conditions or symptoms in the future, or stratify people by expected response to treatment. An example is the STarT Back Tool for prognosis and stratified care of low back pain.[2]

Diagnostic tests are widely used in physiotherapy. An example of a diagnostic test used in the subdiscipline of musculoskeletal physiotherapy is the Lachman's test of the anterior cruciate ligament;[3] an example in cardiorespiratory physiotherapy is the use of lung ultrasound to identify pneumonia;[4] and an example from the continence and women's health subdiscipline of physiotherapy is the supine stress test of intrinsic urethral sphincter dysfunction in women.[5] Accurate diagnoses may help physiotherapists structure appropriate management plans.[6]

Often there are several diagnostic tests that could be used to test for the same pathology. In musculoskeletal physiotherapy, one example arises when a physiotherapist aims to confirm the presence or absence of a meniscal lesion following an acute knee injury. Some of the diagnostic tests a physiotherapist could use to assess for meniscal lesions include McMurray's test, joint line tenderness, Apley's test, Payr's test, the Thessaly test, and patient reports of locking of the knee joint.[7–9] Another example from cardiorespiratory physiotherapy arises when a physiotherapist aims to confirm the presence or absence of chronic obstructive pulmonary disease. Some of the diagnostic tests a physiotherapist could use to assess for chronic obstructive pulmonary disease include auscultation, lung ultrasound, peak expiratory flow measurements, particular findings from a patient's history, or a variety of questionnaires.[10–16]

The choice of a diagnostic test is influenced by many factors. Selection of a diagnostic test should be based, at least in part, on empirical evidence of the test's accuracy in determining whether a pathology is present or absent. That evidence can be found in primary studies of diagnostic test accuracy and systematic reviews of primary studies of diagnostic test accuracy.

Primary studies of diagnostic test accuracy measure the accuracy of diagnostic tests by comparing the results of the index test to those of a reference standard applied to the same subjects. Accuracy can be quantified in many ways, but it is most often quantified in terms of sensitivity and specificity, or likelihood ratios. The index test is the diagnostic test that is evaluated in the study. The reference standard (sometimes called a 'gold standard') is another diagnostic test applied to the same subjects to classify whether they really do or do not have the target pathology. Ideally the reference standard provides a perfectly accurate (error-free) diagnosis. In practice there are few, if any, perfect reference standards so, instead, the reference standard is usually the best available diagnostic test.[17] Although the reference standard will generally be more accurate than the index test, clinicians may prefer to use the index test in clinical practice, provided the index test is sufficiently accurate, because the index test may be safer or easier to use, cheaper to administer, or more readily available than the reference test.[18]

Diagnostic test accuracy studies are different to other studies of diagnostic tests such as reliability studies or randomised controlled trials of diagnostic tests. Often, in studies of the reliability of a clinical test, multiple clinicians apply the same test to the same subjects. The data are then used to calculate the concordance of the tests conducted by different raters (inter-tester reliability).[19] Alternatively, clinicians may apply the same test to subjects on more than one occasion. These data are used to quantify how well clinicians can reproduce a test result (intra-tester reliability). In a typical randomised controlled trial of diagnostic tests, patients suspected of a pathology are randomised to two or more arms of the trial. Each arm of the trial is assigned a different diagnostic test or process. Comparison of the outcomes of patients in the two arms of the trial provides an estimate of the effect of using the diagnostic test or process.[20] Randomised trials of diagnostic tests are harder to conduct than studies of diagnostic test accuracy but they are potentially more useful, because even if a diagnostic test is accurate, use of the test might not improve clinical outcomes.[21] Neither reliability studies nor randomised controlled trials of diagnostic tests provide estimates of the accuracy of tests.

Systematic reviews of diagnostic test accuracy studies can provide more precise estimates of test accuracy than a single diagnostic test accuracy study. The extra precision is obtained by pooling data from multiple studies. In addition, systematic reviews of diagnostic test accuracy studies can establish whether the accuracy of a test varies substantially across contexts.[22] Typically, systematic reviews of diagnostic test accuracy studies use similar methods to systematic reviews of interventions. These methods include the articulation of a clear research question, pre-specification of a review protocol, conduct of a comprehensive search for primary studies, retrieval and selection of all or nearly all relevant studies, assessment of study quality, and meta-analysis to summarise the data if appropriate.[23] Narrative reviews are also used to summarise research evidence but, because they lack a systematic and transparent methodology and do not follow a pre-specified protocol, may be more prone to bias than systematic reviews.[24]

https://doi.org/10.1016/j.jphys.2019.05.006

Ideally, clinicians, researchers and patients would be able to find primary studies of diagnostic test accuracy and systematic reviews of studies of diagnostic test accuracy with little difficulty. That would be facilitated by a purpose-designed database. The ideal database would: provide a comprehensive listing of primary studies and systematic reviews of studies of diagnostic test accuracy; be freely accessible to all; and be easy to use.

Existing databases satisfy some, but not all, of these criteria. PubMed, for example, is an extensive database of biomedical literature and is freely available. However, PubMed indexes over 28 million studies of many types – not just diagnostic test accuracy studies – and it covers all areas of healthcare. It is not easy to find evidence on diagnostic test accuracy using PubMed.[25] There are other databases that index diagnostic test accuracy literature, including the excellent Clinical Queries sub-site of PubMed, but the vast majority of the studies indexed in these databases are not relevant to physiotherapy. So using these databases to find evidence of the accuracy of diagnostic tests relevant to physiotherapy is difficult. The Cochrane Collaboration publishes a freely accessible database of systematic reviews which can be filtered to search for reviews of studies of diagnostic test accuracy, but this database is limited to Cochrane reviews and only a few Cochrane reviews of diagnostic test accuracy are relevant to physiotherapy.

Next month we will launch DiTA, the **Di**agnostic **T**est **A**ccuracy database (dita.org.au). DiTA is designed to enable clinicians, researchers and patients to easily access information on the accuracy of diagnostic tests used by physiotherapists. DiTA is built on the same platform as the PEDro database (pedro.org.au). Unlike PEDro, which indexes evidence of the effects of physiotherapy interventions (randomised trials and systematic reviews), DiTA indexes evidence (primary studies and systematic reviews) of the accuracy of diagnostic tests relevant to physiotherapy. DiTA will be freely accessible to all and, we hope, easy to use.

DiTA has been constructed in a systematic way. Studies are included in DiTA if they measure the accuracy of an index test a physiotherapist would perform themselves (rather than one they would order). In addition, studies are only included if they investigate both pathologies and patients that physiotherapists would normally assess in clinical practice. The studies included in DiTA are located by conducting sensitive searches of MEDLINE, EMBASE, CINAHL and the Cochrane Database of Systematic Reviews. The searches are conducted without any language restrictions. Staff with specific expertise in searching the physiotherapy research literature then filter the search results and, where necessary, examine full reports of individual studies, to identify relevant studies and extract bibliographic data for entry into the database.

As of 11 April 2019 there were 979 primary studies and 104 systematic reviews relevant to physiotherapy indexed on DiTA. These studies have been reported in 16 different languages. The earliest primary study currently included in DiTA was published in 1969[26] and the earliest systematic review currently included in DiTA was published in 1993.[27] Prior to 1990, evidence of the accuracy of diagnostic tests used by physiotherapists was sparse. However, the body of evidence has grown rapidly and is now substantial. A description of the studies identified during the development of DiTA will be published elsewhere.

We encourage physiotherapists to use DiTA to find evidence about the accuracy of the tests that they use in clinical practice, and to use that evidence to guide the selection and interpretation of the diagnostic tests they use. We welcome feedback on the database. All suggestions will be gratefully considered.

Ethics approval: N/A.

Competing interests: The authors declare that they have no competing interests.

Source(s) of support: Nil.

Acknowledgements: Nil.

Provenance: Not invited. Peer reviewed.

Correspondence: Mark A Kaizik, School of Medical Sciences, University of New South Wales, Australia. Email: m.kaizik@student.unsw.edu.au

References

1. Leeflang MMG, et al. *Ann Intern Med*. 2008;149:889–897.
2. Hill JC, et al. *Arthritis Rheum*. 2008;59:632–641.
3. O'Donoghue G, et al. *Physiother Ireland*. 2007;28:9–14.
4. Reali F, et al. *Respiration*. 2014;88:112–115.
5. Hsu TH, et al. *J Urol*. 1999;162:460–463.
6. Verhagen A, Alessie J. *Evidence based diagnostics of musculoskeletal disorders in primary care*. Houten: Bohn Stafleu van Loghum; 2018.
7. Ercin E, et al. *Knee Surg Sports Traumatol Arthrosc*. 2012;20:851–856.
8. Karachalios T, et al. *J Bone Joint Surg Am*. 2005;87:955–962.
9. Yan R, et al. *Swiss Med Wkly*. 2011;141:w13314.
10. Hill K, et al. *Can Fam Physician*. 2011;57:e51–e57.
11. Nelson SB, et al. *Chest*. 2012;142:358–366.
12. Oshaug K, et al. *Int J Chron Obstruct Pulmon Dis*. 2013;8:369–377.
13. Silva S, et al. *Chest*. 2013;144:859–865.
14. Stanley AJ, et al. *Prim Care Respir J*. 2014;23:92–97.
15. Straus SE, et al. *J Gen Intern Med*. 2002;17:684–688.
16. Yawn BP, et al. *Int J Chron Obstruct Pulmon Dis*. 2010;5:1–10.
17. Reitsma JB, et al. *J Clin Epidemiol*. 2009;62:797–806.
18. Leeflang MMG. *Clin Microbiol Infect*. 2014;20:105–113.
19. Shrout PE, et al. *Psychol Bull*. 1979;86:420–428.
20. Ferrante di Ruffano L, et al. *J Clin Epidemiol*. 2012;65:282–287.
21. Cartwright MS, et al. *Muscle Nerve*. 2015;52:746–753.
22. Reitsma JB, et al. *Clin Chem*. 2012;58:1534–1545.
23. Devillé WL, et al. *BMC Med Res Methodol*. 2002;2:9.
24. Cook DJ. *Ann Intern Med*. 1997;126:376–380.
25. Thiele RH, et al. *Postgrad Med J*. 2010;86:459–465.
26. Hepper NG, et al. *Arch Environ Health*. 1969;19:806–813.
27. Torèn K, et al. *Chest*. 1993;104:600–608.