In Defence of All-Source Evidence

Introduction

Orthopedic Manual Physical Therapy and probably the other areas of our profession are in the midst of a paradigm shift. It is generally believed that the shift is from non-evidence based to evidence-based practice but this is not so. It is difficult to comprehend how modern physical therapy can be anything but evidence-based even if that evidence is an experienced practitioner telling an experienced one which treatment works best for a given condition. Admittedly the level of evidence is considered by the purists to be low but it is still evidence and if the tyro takes that advice then he/she is practicing evidence-based physical therapy. No, the paradigm shift is not the shift from non-evidence to evidence-based practice it is a shift from evidence-based practice to research-evidence-based practice.

Evidence Based Practice (EPR)

This from Wikipedia (<https://en.wikipedia.org/wiki/Evidence-based_practice>)

*An****evidence-based practice****(****EBP****) is any practice that relies on scientific*[*evidence*](https://en.wikipedia.org/wiki/Evidence)*for guidance and decision-making. Practices that are not evidence-based may rely on*[*tradition*](https://en.wikipedia.org/wiki/Tradition)*, intuition, or other unproven methods. Evidence-based practices have been gaining ground since the formal introduction of*[*evidence-based medicine*](https://en.wikipedia.org/wiki/Evidence-based_medicine)*in 1992, and have spread to the*[*allied health professions*](https://en.wikipedia.org/wiki/Allied_health_professions)*,*[*education*](https://en.wikipedia.org/wiki/Evidence-based_education)*,*[*management*](https://en.wikipedia.org/wiki/Evidence-based_management)*,*[*law*](https://en.wikipedia.org/wiki/Evidence-based_legislation)*,*[*public policy*](https://en.wikipedia.org/wiki/Evidence-based_policy)*, and other fields.*[*[1]*](https://en.wikipedia.org/wiki/Evidence-based_practice#cite_note-1)*In light of studies showing problems in scientific research (such as the*[*replication crisis*](https://en.wikipedia.org/wiki/Replication_crisis)*), there is also a movement to apply evidence-based practices in scientific research itself. Research into the evidence-based practice of science is called [metascience](https://en.wikipedia.org/wiki/Metascience%22%20%5Co%20%22Metascience).*

*The movement towards evidence-based practices attempts to encourage, and in some instances to force, professionals and other decision-makers to pay more attention to evidence to inform their decision-making. The goal of evidence-based practice is eliminate unsound or outdated practices in favor of more effective ones by shifting the basis for decision making from tradition, intuition, and unsystematic experience to firmly grounded scientific research.*[*[2]*](https://en.wikipedia.org/wiki/Evidence-based_practice#cite_note-2)

If this was actually what was happening then there could be no argument but it is not. There is a movement to force research evidence as the only type of evidence with any credibility and while the proponents of EBP are likely to deny it, most if not all practicing clinicians would say that feel the pressure to avoid using experience and intuition in making diagnosis and planning treatments.Fortunately Solely esearch EBP seems to have been a fad that has run its course and we seemed to have returned to a more sane method of practice that is now called Evidence Informed Practice.

Evidence Informed Practice (EIP)

This is paraphrased from <https://www.cna-aiic.ca/-/media/nurseone/page-content/pdf-en/evidence-informed-decision-making-and-nursing-practice.pdfCanadian>

*Evidence-informed practice is the ongoing process that incorporates evidence from research, clinical expertise, client preferences and other available resources to make nursing decisions about clients.*

Relatively recentlty, say in the last 10-15 years, there has been an accelerating trend in physical therapy for evidence-based practice. Even more recently that trend has taken an extreme turn down the path of research-evidence-based practice where there is slight regard by many academics and researchers for other forms of evidence as justification in orthopedic manual therapy (OMT). Even our body of knowledge is rarely mentioned and it is this body of knowledge that pretty much all there is available to clinicians and students when it comes to defining our scope of practice. It is the position of this paper that this disdain for other forms of evidence and non-criterion validity and the over-emphasis on research evidence and criterion validity is detrimental not only to the practice of OMT but also to ongoing development of clinical practice by clinician based innovation which is the absolute requirement for meaningful research. The position of the author of this paper is not that a return to authoritarian evidence or disregard of research evidence is best or even optimal but that all sources of evidence must be considered when practicing OMT and often not only are other forms of evidence and validity the only existing means of determining practice but often they are superior to the poorer research studies even those these supposedly have higher levels of validity.

This paper offers up five axioms which are self-evident but often forgotten and a sixth point that is debatable. The axioms are:

1. That research is only valuable if it results, directly or indirectly, in improved patient care
2. That an equal partnership between clinician and researcher is essential if research is to be valuable
3. That clinical speculation based on the construct of our body of knowledge which includes anatomy, pathology, physiology, biomechanics, assessment and treatment techniques and meaningful valid research is essential for the ongoing development of our practice and our research
4. That in the absence of better evidence the best evidence is the only meaningful means of designing assessment and treatment technique and improved models of our practice and should not be critized for being developed from a lower level of evidence
5. That currently there are few research studies that allow as useful utilization of our knowledge as what comes from non-research based evidence.
6. That the dumb down tendency of orthopedic physical therapy in the name of research based evidence (such as clinical prediction rules that capture only a small percentage of the patient population) will lead to decreased ability to treat the patients who do not conform to the average and also to a lessened ability of the clinicians to innovate and speculate based on non-research based evidence.

In order to discuss this issue in a more informed manner a few terms will be discussed so that common ground can be established between the authors and the readers.

Language

First it is worth noting that many words used in science have a different connotation for the scientist than that of common usage. A good example is theory. Common usage over the word “theory” means an idea that has not been proven, an opinion, speculation and similar idea. It is often meant perjoratively as in “He has a theory that life began when spaceships landed on earth 3 billion years ago.” or as in “it’s only theoretical” or “theoretically that could happen”. Even when used constructively the implication is that it can be wrong. In all of these cases the meaning is that theory simply means an unsubstantiated idea and as such it is about equivalent to hypothesis. But to the scientist it means exactly the opposite, a theory is an over-arching logical or mathematical explanation of phenomena that has been repeatedly tested and found to be true in every test. A theory supercedes a physical law which it may incorporate and accurately predicts the behavior of a system and is always tentative because it is vulnerable to falsification. Newton’s law of gravity that was supreme for about 4 hundred years was incorporated into Einstein’s theory of relativity which in turn is likely to be an approximation of an even broader theory that will encompass the very large and the very small. It is obvious that the “harder” the science the more robust the theory. In physics all theories are tested mathematically as well as experimentally in the “softer” sciences such as pschology, mathematical testing is really not possible so observation is mathematized using statistics to augment experiment. In physical therapy we have little in the way of over-arching theories and there is very little at attempting to string observations or proven hypotheses together to even produce a model let alone a broad theory of why what we do works. This may not be the job of the researcher, who necessarily has a very narrow view, but of the clinician as it is the clinician who sees the broad picture on a daily basis and so is best able to encompass all of these observations into the broad brush strokes of a model that may, one day, be translated into theory by experiment.

It is, therefore, important to take care when using a word that has different meanings depending on the context to mean what you say as well as say what you mean. The term “mere semantics” actually means “it’s only meaning” and how this can be “mere” is beyond the authors. In this paper the authors will strive to use the correct term in the correct context and when this does not happen please excuse us, we made a mistake.

Facts, Evidence and Validity

There is obviously an intimate relationship between facts, evidence and validity to the point where they are sometimes considered to the same thing, however, they are not. Facts and evidence are precursors to validity in as much as it is only by building up evidence that the “truth” of a particular subject can be determined.

Fact may be defined as;

*“a thing that is indisputably the case”*

*“information used as evidence or as part of a report*”(Oxford English Dictionary: AskOxford.com)

*something that actually exists; reality; truth* (dictionary.com)

It seems common ground that the word “fact” means a real thing, however, as we have seen, common and specialized usage may bend these definitions. Dictionary.com has the following to say about the “fact”:

Fact has a long history of usage in the sense "allegation of fact," as in "This tract was distributed to thousands of American teachers, but the facts and the reasoning are wrong" (Albert Shanker). This practice has led to the introduction of the phrases true facts and real facts, as in The true facts of the case may never be known. These usages may occasion qualms among critics who insist that facts can only be true, but the usages are often useful for emphasis

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The above suggests that in common usage facts can be right or wrong, correct or incorrect but as the word is used in science a fact cannot be wrong because then it is not a fact. What is a real issue is how “facts” are used. To be a true fact it must be substantiated by proof otherwise it is an assumption, a presumption, a lie, a mispeak or any of the dozens of other synonyms that define a false fact. In addition a true fact should be complete and should not either be a half fact or be used to deliberately mislead. In science fact and truth are not necessarily the same. For example everybody knows “for a fact” that earth’s gravity pulls the apple towards it causing it to fall downward not upwards when it is dropped. But “in fact” relatively theory, of which Newton’s laws of gravity are only approximations, holds that gravity does not directly affect the apple but rather warps space so that the apple takes the path of least resistance when it is released and that path is towards the center of the earth. The only fact here is that an apple drops downwards when released. The rest is supposition because even the relativistic theory of gravity is a not necessarily the truth as it is open to vulnerable to being disproved and in addition the model is not universal as quantum theory talks of gravitons interacting between bodies and so does directly affect the apple. Given the above, another defintion of a fact is an observation that is generally believed to be a true one, rather than an illusion or hallucination. The only difference between an observation made by a clinician and a researcher is in the degree of formality with which the event is observed. The clinician generally makes the observation and records it informally while the researcher should make rigorous record of the observation. But an observation is an observation it is what is done with it that is important.

Not all facts are indiputedly true and are often open to interpretation. They are frequently the result of consensus rather than proof and usually have to be aligned with other facts to be considered evidence. Moreover, they can never, in and of themselves, produce an over-arching theory.

Evidence can be defined as any of the following:

“that which tends to prove or disprove something; ground for belief; proof that which tends to prove or disprove something; ground for belief; proothat which tends to prove or disprove something; ground for belief; proof” (dictionary.com)

“information or signs indicating whether a belief or proposition is true or valid” (Oxford English Dictionary: AskOxford.com)

It is not, therefore, required that evidence be the truth just that it tends to prove something. Additionally evidence does not have to be from a certain source nor does it need to be of a certain level of rigour to conform to these definitions simply that alone or with other evidence it tends to prove or disprove a belief. In physical therapy certain types of evidence are held by common wisdom to have more influence on a belief system than do other types. For example, research based evidence is believed to be more influential than experiential evidence and so on the face of it should replace experiential evidence when these two forms of evidence are in conflict, however, the simple fact that the evidence comes from research does not mean that the research is sufficiently stringent or without bias and two almost identical results can give completely different values for the worth of a test. For example, O’Brien’s test has been assessed using almost identical methods against identical gold standards yet one researcher (O’Brien, ) gave sensitivity and specificity values of 1.0 and .98, almost perfect while another (Stetson and Templin) 0.54 and 0.31 respectively, almost useless. It is a “fact” that O’Brien’s test will almost always be accurate in diagnosing a labral tear but it is also a “fact” that O’Brien’s test will almost always be inaccurate in diagnosing a labral tear. Although both are facts as they are reported it is patently obvious that both cannot be the truth and quite probably neither is true.

Validity is generally meant as truth in common usage but the Oxford English Dictionary defines it as “well based or logical” while Portnoy and Watkins (Foundations of Clinical Research, 2nd. Edition) define it as “a test is measuring what it is intended to measure” and while the word has been distorted by our science the Oxford English Dictionary definition should not be forgotten because certain forms of validity rely on logic and our information base rather than objective and measurable results from research also it must be remembered that usually the weaker forms of validity are the only types that the clinician posseses in the overwhelming absence of research-based evidence or criterion validity for our practice.

Validity like evidence is ranked according to a percieved but unproven hierarchy of rigor.

1. Criterion Validity
2. Concurrent Validity
3. Predictive Validity
4. Prescriptive Validity
5. Construct Validity
6. Content Validity
7. Face Validity

Generally speaking the hierarch is determined by how objectively measurable a type of validity is. Criterion validity is eminently measurable, it is known how well the gold standard (reference) performs and it can be measured how well the target test conforms to it.

Using Evidence

Evidence is used in clinical practice. It would be very difficult not to use some level of evidence when determing diagnosis and treatment. Evidence may be simply that the clinician heard that a particular technique works from a respected somebody and he/she has no evidence to make him/her believe that it does not. Granted this type of evidence is very low level, you could only go lower by believing somebody that you had no respect for, but nevertheless it is evidence and if there is no stronger evidence refuting it, it is best evidence. In fact this is the way most new graduates work. They learn many things in school, most of which have not been subjected to experimental verification, and in the absence of experience and the presence of respect for the teacher, they use the information. If this was not so, the physical therapy course would only last a very few months if everything taught had to have strong criterion validity.

It is apparent that in order to design, prove or disprove (that is increase or decrease confidence) a test, a treatment, a model the essential elements are:

1. Acceptable facts
2. An accumulation of evidence that is significantly stronger than contrary evidence
3. A valid argument based on the facts and the evidence that strongly outperforms competing arguments

For a technique or “model” experimental evidence is helpful but not essential. But for an over-arching theory to formulated a model’s predictions needs to be tested repeatedly and successfully. To go back to Einstein’s General Theory of Relativity, the model of gravity warping space was supported by rigorous mathmatical evidence and that these mathematics explained a long running problem with Mercury’s orbit, but it was Eddington’s observation of light distortion by gravity exactly predicted by general relativity during an eclipse three years after the General Theory of Relativity was published that proved the theory.

Research that refutes established practice or knowledge needs to be examined extremely carefully for flawsespecially when that practice is is embedded in our body of knowledge. It is more reasonable to first float the idea that the research is flawed rather than there is a case of mass delusion being present among the clinicians, although this is not unknown in even the hardest of sciences and occurs among experimenters as well as consumers of research (Blondiot and N-rays). It should also be understood that in addition to accidental bias researchers frequently have an agenda of their own that can color the direction that their research takes, the modifications to the research methodology that might help “prove” their position and the conclusions taken from the study. This has been demonstrated frequently in physics, chemistry and healthcare research and is not always or even usually a case of deliberate fraud but rather an overwhelming need to be right.

But every time the word “belief” is used in this context science takes a beating as it usually implies that it has not been proved. This is the case with evidence-based practice. It is believed by most, including the authors and the Institute of Manual Physiotherapy and Clinical Training (IMPACT), that evidence-based practice will produce better treatment results than non-evidence based practice all else being equal, but the two methods have never been compared and nor are they likely to as it would be very difficult to find anybody who is not practicing with evidence of some form as the basis for that practice, but I would enjoy being part of the research that compares results between research evidence based practice and all-sourced evidence based practice. But it is an interesting and ironic paradox that by the strictest intepretation of the word research, evidence-based practice cannot be deemed a proven method of practice and certainly research only evidence based practice has a long way to go before there is enough of it in our field to come anywhere close to being Its equal. It seems likely that it is better than simply random trial and error but although this has never been proven this paper will take it as an article of faith, a belief, that evidence-based practice is more effective than its counterpart. On the other hand research-based evidence can be compared with non-research-based evidence practice and despite the claims of some this has not be done so in a reasonable manner. It is the claim that research-based evidence practice as it stands today is better than other forms of evidence-based practice with which this paper takes issue.

It is interesting that consensus has reached a level of respectability with researchers and the establishment that it never reached with clinicians.

Recent research using a technique and comparing its use with experienced PTs and novices merely proves that two groups can perform a predetermined technique. The technique is neither specific nor are the researchers in this case know whether it was the SI or lumbar spine they manipulated. It does not assess the ability to perform the correct technique but rather a defined technique. It only proves that novices can perform general technique that produces an audible pop but does not really assess the difference between a novice or experienced physical therapist outside these narrow parameters. If the lack of specificity is an issue, then one must look at the unintentional and ongoing manipulations (adjustments) that chiropractors administer for months and sometimes continuously over years. There is relief but the patients have to continue getting adjusted. Perhaps if the dysfunction or pathology was addressed properly then repetitive long term and temporary relief giving manipulations would not be necessary.

Although Sackett discusses the importance of evidence based medicine, I believe he places a greater emphasis in evaluating the decision making or critical thinking process. The Flynn article while it is a good piece of research in terms of validity and sensitivity, it might be misguided in the way that it is being used. Moreover, its scope is so limited one could argue, that according to Deyo, if you do nothing the patient is better in 6 weeks anyways.

I fear that clinical decision making and critical reasoning may be discarded and we will be forced into making clinical decisions based on errant or biased interpretation of the evidence. You have to ask yourself, does this evidence apply to my patient population? Can evidence keep pace with experience and tried and true methods of treatment? Or are we to discard all of this in favor of this “evidence”?