The place of electrophysical agents in Australian and New Zealand entry-level curricula: Is there evidence for their inclusion?

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The place of electrophysical agents in Australian and New Zealand entry-level curricula: Is there evidence for their inclusion?

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A recent editorial by the Heads of the Australian and New Zealand Schools of Physiotherapy described tensions created in entry-level physiotherapy programs by the need to achieve more within the constraints imposed by limited time and resources (Crosbie et al 2002). At its simplest, the argument was that curricula content has increased, expectations of entry level physiotherapists are higher and contemporary graduates are possibly not as well prepared as previous graduates. No evidence was provided to substantiate these statements but, anecdotally, they are intuitively appealing. Solutions proposed in the editorial were to "judiciously prune dead wood" within the current curricula, to consider decreasing the clinical education component, and to consider structured internships for new graduates, a limited form of initial registration (Crosbie et al 2002).

The present editorial considers the place of electrophysical agents in entry-level physiotherapy curricula in Australia. Some may argue that this area requires judicious pruning given the apparently limited evidence of effectiveness, and the significant safety issues for students and, later, patients. Crosbie et al (2002) explicitly mentioned electrophysical agents in the context of physiotherapy being part of a global community. Their question was whether "specific electrotherapy techniques" no longer commonly used in Australia (or New Zealand) should still be taught because they are part of the global range of practices.

Three issues are discussed. The first is whether the existing evidence justifies the continuation of electrophysical agent teaching in entry-level physiotherapy programs. The second issue concerns the extent of use of electrophysical agents in clinical practice and whether we wish to retain the high level of knowledge of our new graduates. The third issue concerns safety and the curricula weighting that the physiotherapy community should place on patient and practitioner safety.

Evidence, databases and electrophysical agents

The move towards evidence-based practice in the current health care climate has put a spotlight on all forms of physiotherapy management. An implicit criticism made of electrophysical agents in the Crosbie et al (2002) editorial ("there is no evidence for its use") is a generalisation that suggests a limited knowledge of research in the electrophysical agents field. Whilst the advent of highly regarded databases of evidence such as the Cochrane Library and PEDro undoubtedly is of benefit to the profession, clearly they are not yet as comprehensive as they need to be. For example, the 332-plus systematic reviews in the PEDro database address only some clinical physiotherapy questions (Moseley et al 2002). As in other areas of physiotherapy, there are too few high quality studies to answer many questions about electrophysical agent usage in clinical practice, and a sustained research effort is needed (Wright and Sluka 2001). Caution is therefore advised when basing decisions on an apparent lack of evidence for certain electrophysical agent techniques or modalities.

The Research Committee of the Victorian Branch of the Australian Physiotherapy Association (Research Committee APA Victorian Branch 1999 p. 168) commented that "lack of experimental evidence is not evidence of ineffectiveness but should alert us to the need to direct research efforts to test unsubstantiated interventions". Indeed, rigorous physiotherapy research is a relatively recent phenomenon and despite the "exponential growth" (Moseley et al 2002) of randomised controlled physiotherapy trials, the extent of our lack of evidence and its dubious quality in all areas of physiotherapy practice is becoming obvious as our focus on it grows.

What factors limit the quality of evidence in the electrophysical agents literature? Methodological and definitional limitations found in all types of clinical research are apparent with research into electrophysical agents. Such problems include obtaining sufficient and homogenous subjects, randomisation and stratification, and subject and assessor blinding (Moseley et al 2002). Some studies ask unanswerable research questions; others are unable to answer the questions asked, as the data collected are inappropriate. Still others expect improbable benefits from using a modality. Many systematic reviews of electrophysical agent usage comment on the lack of existing methodologically acceptable research and we are advised to await further research before making conclusions about a modality. In some circumstances, existing research does not support the use of a modality for particular conditions at certain dosing parameters but this should not be interpreted as a blanket notion that electrophysical agents do not work.

Rigorous research into electrophysical agents is fraught with particular difficulties. For example, much confusion arises from the many dosing possibilities of all electrophysical agent modalities. Consider therapeutic ultrasound. Dosage ranges from 0.5W/cm^2 to 3W/cm^2 (spatial average temporal average) have been advocated to manage similar problems (Robertson 2002). Ultrasound can also be pulsed, and at different frequencies, multiplying many-fold the possible dose combinations. Add to this inter-patient variation in tissue depth and distribution, and selecting appropriate dosage for investigating the clinical effectiveness of ultrasound becomes even more complex.

The question of whether there is evidence links integrally with the statement espoused by some in the profession that "it doesn't work". It would be possible to counter this statement with the question "Why doesn't it work?" The answer probably depends on what we are asking an electrophysical agent to do. Low level laser therapy (LLLT) is a typical example. Evidence from cellular and animal studies supports the use of LLLT in the stimulation of tissue healing and factors associated with pain relief (Bolton et al 1990, Lubart et al 1993 and Steinlechner and Dyson 1993). Some point to these studies as firm evidence that LLLT will assist in treating similar conditions in humans in a clinical setting. Indeed, in a systematic review of the efficacy of laser therapy for musculoskeletal and skin disorders, Beckerman et al (1992) found that on average, the efficacy of laser therapy was greater than for placebo treatment. However, in conditions with a mixed aetiology, the results are conflicting and largely dose-dependent. With tennis elbow, for example, depending on which data set the user accesses when referring to "evidence", it would be possible to be equally convinced that LLLT works (eg Vasseljen et al 1992), or that it does not (Lundeberg et al 1987).

Electrophysical agents research ideally has both basic and applied research stages. Both contribute to the development and evaluation of modalities (Baker et al 2001, Bélanger 2002, Laakso et al 1994, Robertson and Ward 1996 and 1997). Without understanding how an electrophysical agent works, establishing when it is appropriate to use it and what dose parameters might be effective becomes guesswork. A chain of evidence including basic and clinical research is possibly ethically more acceptable and allows us to target those conditions likely to be affected by the specific energy forms available for clinical use. Given this, clinicians and producers of systematic reviews and databases need to make explicit statements about the inclusion and exclusion of animal and cellular-based research. PEDro, for example, uses only clinical trials, excluding many of the studies that are part of the evidence chain justifying the initial clinical testing of a modality and later, perhaps, its clinical usage.

Despite the barriers, there are some positive, high quality systematic reviews supporting the use of electrophysical agents in clinical practice and justifying the continued inclusion in entry-level curricula (eg Flemming and Cullen 2002, Osiri et al 2000). Obviously there is a need for considerably more funding of clinical electrophysical agents studies, especially large multicentre studies, to permit us to say with more certainty what works and how much, using which parameters, and under what conditions.

Clinical practice and use

The research evidence available at present is insufficient to answer all questions about electrophysical agents. Issues of the clinical efficacy, extent of clinical use and globalisation bear upon the continued inclusion of electrophysical agents in entry-level curricula.

Consider the anecdotal claim that "no-one uses it any more". All forms of electrophysical agents continue to be used in Australia (Robertson and Spurritt 1998). The decline in the use of modalities such as shortwave diathermy may reflect perceptions that such modalities take too much time to apply. Although difficult to prove perhaps, as in other areas of physiotherapy practice, learned proficiency with all types of electrophysical agents (even if it takes a few extra minutes of time) may result in better patient outcomes. Also, criticisms of shortwave diathermy appear to overlook the APA's own Neck Pain Position Statement (1999), which confirms the use of pulsed electromagnetic therapy as part of an evidence-based approach to treatment.

A lack of knowledge about electrophysical agents in recent years may reflect the amount of time now apportioned to their teaching in Australia. Already, the teaching of some electrophysical agents (such as iontophoresis) has been reduced in many Australian curricula. Many physiotherapists are now unaware of the possible uses of iontophoresis. This is despite iontophoresis having a large supporting evidence base and continuing to be used in the USA (Bélanger 2002). Given our expectation that students be internationally registrable, the teaching of this type of treatment must be seriously reconsidered. Similarly for shortwave diathermy, the effective and safe use of this electrophysical agent requires, at the very least, a sound understanding of the way in which electromagnetic fields are generated. Given that iontophoresis and shortwave diathermy continue to be used in Australia (albeit not as commonly as they once were) accreditation of physiotherapy programs should continue to require schools to teach their safe use.

An important factor affecting the clinical outcomes from using an electrophysical agent is its method of application. Accurate targeting of a lesion is fundamental to whether an electrophysical agent "works" and how well. Just placing TENS electrodes in the general region of a painful joint is not sufficient. Anecdotal reports of ultrasound users and occasional sightings on television suggest that not all present users are proficient. Any reductions in electrophysical agent teaching time should therefore be quite a concern!

All modalities and techniques used in physiotherapy will have their critics and proponents. The fact that electrophysical agents are expensive to purchase and can be potentially dangerous has made them a target for greater scrutiny than other less expensive, hands-on and less potentially dangerous techniques. And, somewhat like statistics, physiotherapists may know how to run a statistical test but not the assumptions that underlie each test. For these reasons the profession should continue to apply funds and its highest standards to the teaching of the safe use and application of electrophysical agents and to further research into its clinical effectiveness. Physiotherapists have traditionally had expertise in using a range of electrophysical agents. As a profession would we wish that to change? Other health practitioners appear increasingly to recognise the possible contribution of electrophysical agents to patients' outcomes. It would seem shortsighted to consider reducing our use while we collect sufficient reliable evidence to make decisions.

Safety issues

Significant safety issues are integral to the application of electrophysical agents. There are a variety of serious adverse side effects, some potentially life threatening, associated with the inappropriate application of some electrophysical agents and lack of user-knowledge. As a profession we err on the conservative side, repeating some historically accepted consensus opinions on contraindications and precautions in the absence of acceptable evidence (Robertson et al 2001, p. 3). Are we prepared to let our new graduates treat patients without sufficient education in the practice and theory underlying electrophysical agent uses to ensure the safety of an unsuspecting and increasingly litigious population? While debates about contraindications may never be resolved due to ethical limitations on research, all physiotherapy graduates must have a clear understanding of the dangers of electrophysical agents and methods of avoiding them.

Conclusion

In conclusion, there is much to learn about electrophysical agents. We believe there is, however, sufficient evidence to justify their continuing inclusion as a major study area within entry-level curricula. As evidence accumulates, the profession will have a better basis for decisions regarding the weightings within entry-level curricula teaching for different electrophysical agents and the methods of using them.

The issues of limited time and resources are clearly important drivers of entry-level physiotherapy programs in Australia (and New Zealand). Broad discussion is required of the options for resolving the tensions created by these shortages. Decreasing the electrophysical agent content is an obvious and easy solution, appealing to many because of easily identified cost implications and an apparently limited supporting evidence base. As discussed, however, such a "solution" ignores the actual and potential contribution of electrophysical agents in current clinical practice as well as the time it takes to ensure students can guard their patients' and their own safety. Ironically, one solution to help reconcile the problems of electrophysical agent resources and education probably lies in a far greater support and funding of electrophysical agent research.

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