A Pilot Study of the Theoretical and Technical Competence and Appropriate Education for the Use of Nine Physical Agent Modalities in Occupational Therapy Practice

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Key Words: education, continuing • physical disabilities, occupational therapy

Objective. This study described occupational therapy practitioners’ perceptions about the content and method of training or education necessary for gaining theoretical and technical competence in the use of nine physical agent modalities (PAMs).

Method. A survey was developed and sent to 543 members of the Physical Disabilities Special Interest Section of the American Occupational Therapy Association who had identified their primary area of practice as hand therapy. One hundred and fifty-one completed surveys (28% response rate) were returned.

Results. The respondents indicated that theoretical and technical expertise necessary for competent use of PAMs varied according to the type of modality being considered. Continuing education courses were identified as the best method for gaining theoretical and technical competence for the use of deep thermal agents, such as ultrasound and electrical stimulation agents, whereas entry-level professional education and on-the-job training were identified as most appropriate for superficial thermal agents, such as paraffin bath and hot and cold packs.

Conclusion. The results suggest that considerations regarding the type and amount of education necessary for gaining theoretical and technical competence in the use of PAMs depend on the type of modality being addressed. These differences should be considered in the future development of competency objectives for the use of PAMs.

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The use of physical agent modalities (PAMs) by occupational therapists in the treatment of physical dysfunction has been debated within the profession. Some occupational therapy practitioners and educators believe that the use of PAMs is inconsistent with the philosophical base of occupational therapy because patients often take a passive role in this type of treatment. Those opposed believe that physical agents do not incorporate the patient’s mind, body, and environment in the performance of occupation. Advocates of PAM use argue that in early stages of rehabilitation, PAMs can be used to enhance performance in purposeful activity.

The 1991 American Occupational Therapy Association (AOTA) Physical Agent Modalities Task Force defined physical agents as those modalities having “properties of light, water, temperature, sound, and electricity to produce a response in soft tissue” (AOTA, 1991a, p. 6). AOTA’s official Position Paper on PAMs (AOTA, 1992) states that physical agents can be used by occupational therapy practitioners as preparation for, or in conjunction...
with, purposeful activities. According to the Position Paper, PAMs should only be used by those practitioners who possess the theoretical knowledge and technical skills necessary for the integration of PAMs into treatment programs.

**Background**

Taylor and Humphry (1991) found that of the 629 members of AOTA's Physical Disabilities Special Interest Section (PDSIS), only 23% reported having never used the nine PAMs addressed in the survey. These nine PAMs were hot packs, cold packs, paraffin bath, fluidotherapy, contrast bath, ultrasound, whirlpool, functional electrical stimulation/neuromuscular electrical stimulation (FES/NMES), and transcutaneous electrical nerve stimulator (TENS). Respondents reported using superficial thermal agents, such as paraffin bath, hot packs, and cold packs, more often than ultrasound and identified on-the-job training as the most common method of obtaining training in the use of PAMs. Few respondents reported receiving training in the use of PAMs in either their academic programs or their fieldwork placements.

Respondents to the Taylor and Humphry survey (1991) who were educators felt less strongly than those who were clinicians that PAMs should be included in academic curricula. Additionally, educator respondents in other surveys strongly disagreed with the use of PAMs in occupational therapy practice (AOTA, 1991a; Vogel, 1991) and did not consider their use to be an entry-level skill (AOTA, 1991a).

PAMs used without adequate knowledge and training can result in injuries. For example, Great Britain's Chartered Society of Physiotherapy received 63 complaints related to negligent practice in 1986 to 1987. Of those complaints, 27 were related to burns sustained from PAMs during treatment (“Burning a Patient,” 1988). In addition, third-party payers may deny payment for treatments involving PAMs rendered by occupational therapy practitioners if it is determined that the use of those agents is not within the scope of occupational therapy practice as defined by a practitioner's state practice act. Furthermore, in some states, the use of PAMs by occupational therapy practitioners may be in violation of state licensure laws (Eliason & Gohl-Giese, 1979). For these reasons, it is important that specific guidelines be established regarding occupational therapy practitioners’ use of PAMs.

Policy 1.25, regarding practitioners and their use of modalities, was adopted in 1983 by AOTA’s Representative Assembly (AOTA, 1983). The policy stated that practitioners who were able to document their qualifications and competence; were in compliance with federal and state law; and were in compliance with AOTA ethics, standards of practice, and philosophical base were qualified in the administration of specific treatment modalities. Although the policy does not define competency, it stated that competence in the use of modalities could be acquired through either accredited educational programs, specific certifications, or work experience.

The Physical Agent Modality Task Force was developed to address compliance with the philosophical base of occupational therapy, appropriate skill level (i.e., entry-level, advanced), third-party reimbursement policies, and education for occupational therapy practitioners as well as the nine PAMs themselves (AOTA, 1991a). The task force concluded that the use of PAMs in occupational therapy practice is in accordance with the philosophical base when used as a precursor to or in conjunction with purposeful activity in order to enhance functional performance. Additionally, the task force concluded that the use of PAMs should not be considered an entry-level skill, suggesting that practitioners who choose to use PAMs should be familiar with the fundamentals of physics and chemistry. Currently, accredited professional and technical occupational therapy programs are neither required to nor prohibited from including PAMs in their curricula.

On the basis of its findings, the task force recommended to the 1991 Representative Assembly that a policy specific to PAMs be developed, that specific competency standards be established for each PAM, and that AOTA offer continuing education courses on the use of PAMs in practice. Policy 1.25 was therefore revised to state that “registered occupational therapists, certified occupational therapy assistants, and students shall only use modalities when the individual has received the theoretical and technical preparation necessary for safe and appropriate integration of the intervention into an occupational therapy treatment program” (AOTA, 1991b, p. 1113). The policy continues to address modalities in the broad sense but is revised to include theoretical and technical preparation, making experience alone inadequate as a method for gaining competence in the use of modalities.

The Position Paper, *Physical Agent Modalities* (AOTA, 1992), identifies the criteria necessary for the skilled use of PAMs. It indicates that the criteria vary according to the specific modality and emphasizes the importance of having a comprehensive understanding of the selected modality, including the risks, expected outcomes, effects, characteristics of equipment, appropriate treatment planning, and intervention. The quality of competency is described in Principle 2 of the *Occupational Therapy Code of Ethics* (AOTA, 1988), which establishes ethical guidelines for competent practitioner intervention. According to this principle, occupational therapy practitioners must have the necessary credentials for providing services. They should only provide services within their domain of com-
petence, and continuing education should be pursued to both increase and maintain such competence. Furthermore, the principle indicates that practitioners should refer patients to the appropriate professionals when needed services are beyond their expertise. After the 1992 Representative Assembly adopted the Position Paper, AOTA’s Commission on Education prepared a report, *Educational Preparation for the Use of Physical Agent Modalities in Occupational Therapy* (Commission on Education Physical Agent Modalities Task Force, 1993), which it sent to the Intercommission Council (ICC). The ICC synthesized the information from previous documents that addressed the preparation of practitioners in the use of PAMs. This report, *A Guide for the Preparation of Occupational Therapy Practitioners for the Use of Physical Agent Modalities* (The Education Guide) was accepted by the 1994 Representative Assembly (AOTA, 1994).

The Education Guide describes three levels of knowledge, preparation, and experience for competent use of PAMs across the career continuum, from entry-level education to advanced practice. The first level includes familiarity with AOTA documents regarding occupational therapy practice in general as well as the use of PAMs within practice. It also includes familiarity with state laws and regulations related to the use of PAMs. The content in this level is considered a component of entry-level education, such as, should be possessed by practitioners across the career continuum. The second level identifies the theoretical background necessary for the competent use of PAMs. According to the guide, this background should include courses in human anatomy and physiology; principles of chemistry and physics related to specific properties of light, water, temperature, sound, and electricity; the physiological, neurophysiological, and electrophysiological changes that occur as a result of the application of each modality; and the response of normal and abnormal tissue to the application of each modality. This level is not considered to be a required component of entry-level education, although an awareness that the use of PAMs requires this theoretical base is considered essential. The acquisition of an adequate knowledge base about the theoretical background related to PAMs is required for all practitioners before using them in their practice. The third level is one in which the practitioner develops practical experience and technical expertise. The career continuum described for this level ranges from entry-level therapists using PAMs with supervision to experienced therapists providing supervision, training, or both for less experienced personnel.

The AOTA Position Paper states that the use of PAMs in occupational therapy practice is not considered an entry-level practice skill: “The specialized learning necessary for proper use of these modalities typically requires appropriate post-professional education, such as continuing education, in-service training, or graduate education” (AOTA, 1992, p. 1090). However, none of the AOTA documents discuss which type of postprofessional education would be most appropriate for developing competency in the use of PAMs in practice.

The purpose of this study was to describe occupational therapy practitioners’ perceptions regarding the content and method of training necessary for theoretical and technical competence related to the use of PAMs. Three categories were studied: superficial thermal agents (STA), deep thermal agents (DTA), and electric stimulation agents (ESA).

**Method**

**Sample**

The total population of occupational therapists who were members of the PDSIS and who had identified their primary area of practice as hand therapy (*N* = 543) were targeted for this study. The authors believed that this population would have the most experience with, and evaluation in, the use of PAMs.

**Instrument**

A survey was developed that focused on the nine PAMs: ultrasound, TENS, FES/NMES, hot packs, cold packs, whirlpool, contrast bath, fluidotherapy, and paraffin bath. The PAMs were grouped into three categories: (a) STA, which included paraffin bath, fluidotherapy, whirlpool, contrast bath, hot packs, and cold packs; (b) DTA, which consisted of ultrasound; and (c) ESA, which included FES/NMES and TENS.

Participants were asked to identify theoretical and technical content necessary for competent use of the PAMs in each category. Competency was defined as having the “theoretical and technical preparation necessary for safe and appropriate integration of the intervention into an occupational therapy treatment program” (AOTA, 1991b, p. 1113). They were also asked to rank order, from a provided list, the most appropriate educational methods for gaining theoretical knowledge as well as the education necessary for gaining technical knowledge about each PAM category. Options for appropriate education methods included continuing education courses, accredited occupational therapy programs (including fieldwork), higher education courses in physics and chemistry, on-the-job training, and in-service training.

For clarification of how to complete the survey matrix, a sample was provided on the use of ultraviolet light, a PAM that was not included in the survey (Hayes, 1993; Michlovitz, 1996). The survey also requested demographic information about number of years in practice, primary
professional role, primary caseload, education received on
PAMs, and type of employment facility. The survey was
pilot tested on clinicians and faculty members of the
occupational therapy curriculum of a Pacific Northwest
university, and appropriate adjustments were made on the
basis of their recommendations.

Procedure
After approval by the Institutional Review Board for the
protection of human subjects, the surveys were mailed to
the sample and replies were requested within 2 weeks.
One follow-up mailing was conducted. Data were taken
directly from the survey and entered in coded form into a
computer for statistical analysis.

Results
One hundred and fifty-one surveys were returned for a
28% response rate. The respondents' average length of
practice as registered occupational therapists was 13 years
($SD = 5.7$). Fifty percent worked in a private practice
setting, 42% in outpatient hospital-based settings, 9% in
inpatient hospital rehabilitation settings, 7% in acute hos­
pital-based inpatient settings, and 2% in long-term-care
facilities (multiple work settings by some respondents re­
sulted in percentages totaling more than 100%). Adults
between the ages of 22 and 65 years were being treated by
90% of the respondents, adults more than 66 years of age
by 8%, and persons from birth to 21 years by 1%. The
primary role of the majority of respondents (86%) was
direct patient care, 6% fulfilled administration roles, 3%
had supervision roles, 3% had educator roles, 1% had
consultant roles, and 1% had unspecified roles. Ortho­
pedic and soft tissue trauma followed by cumulative trau­
amic injuries were the most common diagnoses treated by
the respondents (see Table 1). Table 2 shows the types of
PAM education respondents reported to have received.

Indications for use, contraindications, and physiologi­
cal effects (both general and specific) were identified
most often as theoretical content necessary for all three
categories of PAMs. Reported less frequently in all three
categories were familiarity with background literature re­
lated to PAMs and the role of PAMs in promoting func­
tion in an occupational therapy treatment plan (see Table
3).

Specific techniques of application and evaluation of
treatment response were reported most frequently for all
three categories. Equipment setup and specific agent
selection was cited less frequently for STA and DTA, as
was patient evaluation and preparation for application of
DTA. Equipment maintenance was infrequently cited as
content necessary for technical competence for ESA (see
Table 3).

Table 1
Primary Diagnoses Treated by Respondents

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma (orthopedic and soft tissue)</td>
<td>91</td>
</tr>
<tr>
<td>Cumulative trauma</td>
<td>61</td>
</tr>
<tr>
<td>Central nervous system insults</td>
<td>23</td>
</tr>
<tr>
<td>Arthritis</td>
<td>12</td>
</tr>
<tr>
<td>Nerve impingement</td>
<td>6</td>
</tr>
<tr>
<td>Thermal injury</td>
<td>1</td>
</tr>
<tr>
<td>Neuropathy</td>
<td>1</td>
</tr>
<tr>
<td>Soft tissue contracture</td>
<td>1</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>1</td>
</tr>
<tr>
<td>Oncology</td>
<td>1</td>
</tr>
</tbody>
</table>

College-level knowledge of chemistry and physics
was identified as more necessary for DTA and ESA than
for STA in order to obtain a working theoretical and
technical understanding of these modalities. Respondents
also indicated that college-level chemistry and physics are
more important for gaining a competent theoretical un­
derstanding than for understanding the technical consid­
erations necessary for the safe use of PAMs (see Table 4).

Of the three broad categories of education listed in
the survey (i.e., entry-level education, on-the-job training,
continuing education courses), respondents consistently
identified continuing education as the most appropriate
way to obtain theoretical content, regardless of the type of
modality. Additionally, continuing education was most
often identified as the preferred method for gaining tech­
nical competence for each PAM category (see Table 5).

Discussion
The results of the present study support and often parallel
the guidelines set forth in The Education Guide (AOTA,
1994). Interestingly, none of our respondents identified
the importance to preparation for PAM use of being
familiar with AOTA documents or state laws and regula­
tions regarding the use of PAMs within occupational
therapy practice, yet AOTA considers these a fundamen­
tal component of the first level of preparation. However, a
small number did indicate that therapists should be famil­
iliar with theoretical background literature pertaining to
the different types of PAMs, which is also considered
basic information in the AOTA document. This finding
suggests that although therapists recognize the need to be
aware of the literature pertaining to the use of PAMs, few
are aware of the importance of being familiar with the
Association's position or the laws governing their use.

The theoretical background necessary for the safe and
competent use of PAMs, which AOTA identifies in the
second level of preparation, knowledge base, was exam­
inied in detail in the present study (see Table 3). Not sur­
sprisingly, the respondents identified knowledge of the
indications, contraindications, and general physiological
Table 2
Respondents’ Education on Physical Agent Modalities, Reported in Percentages

<table>
<thead>
<tr>
<th>PAM Category</th>
<th>No Education</th>
<th>Entry-Level Professional Education</th>
<th>Level II Fieldwork</th>
<th>In-Service Training</th>
<th>On-the-Job Training</th>
<th>1- to 2-Day Workshop</th>
<th>3- to 4-Day Workshop</th>
<th>1- to 2-Week Short Course</th>
<th>Certification Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot packs</td>
<td>3</td>
<td>19</td>
<td>21</td>
<td>85</td>
<td>45</td>
<td>44</td>
<td>10</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Cold packs</td>
<td>2</td>
<td>19</td>
<td>20</td>
<td>84</td>
<td>44</td>
<td>44</td>
<td>9</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Paraffin bath</td>
<td>3</td>
<td>20</td>
<td>23</td>
<td>80</td>
<td>41</td>
<td>42</td>
<td>9</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Fluidotherapy</td>
<td>65</td>
<td>8</td>
<td>12</td>
<td>73</td>
<td>40</td>
<td>38</td>
<td>9</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Contrast bath</td>
<td>3</td>
<td>12</td>
<td>15</td>
<td>75</td>
<td>40</td>
<td>34</td>
<td>9</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Whirlpool</td>
<td>9</td>
<td>6</td>
<td>11</td>
<td>73</td>
<td>40</td>
<td>34</td>
<td>9</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>DTA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultrasound</td>
<td>9</td>
<td>4</td>
<td>5</td>
<td>65</td>
<td>57</td>
<td>60</td>
<td>16</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>ESA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TENS</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>71</td>
<td>65</td>
<td>57</td>
<td>16</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>FES/NMES</td>
<td>6</td>
<td>10</td>
<td>10</td>
<td>68</td>
<td>64</td>
<td>62</td>
<td>17</td>
<td>6</td>
<td>13</td>
</tr>
</tbody>
</table>

Note: N = 151. DTA = deep thermal agents; ESA = electrical stimulation agents; FES/NMES = functional electrical stimulation/neuromuscular electrical stimulation; PAM = physical agent modality; STA = superficial thermal agents; TENS = transcutaneous electrical nerve stimulator.

Effects of all three categories of PAMs as most necessary for their competent use. Although respondents were asked to identify the important theoretical considerations for each category, the result of no difference among the categories indicates that the respondents believed that it was just as important to understand the indications, contraindications, and general physiological effects of STA as it was for ESA and DTA.

Among the technical considerations necessary for the safe and competent use of PAMs (identified by the AOTA in the third and more advanced level of preparation), respondents most frequently cited technique of application of the agent followed by evaluation of response to treatment as the two most important considerations. The next most frequent responses were related to mechanical concerns, such as equipment maintenance, setup, and selection. Surprisingly, few respondents identified patient evaluation and preparation as important technical considerations, even though evaluation should be the primary step for determining the appropriate agent on the basis of the desired effects or location of the target tissue (Michlovitz, 1996).

The results about the purely technical considerations associated with the use of PAMs are revealing. One explanation for the finding that evaluation of response to treatment was identified more often for STA and DTA than

Table 3
Percentage of Theoretical and Technical Content Considerations for Competent Use of Physical Agent Modalities

<table>
<thead>
<tr>
<th>Content Considerations</th>
<th>STA</th>
<th>DTA</th>
<th>ESA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoreticala</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indications</td>
<td>61</td>
<td>66</td>
<td>67</td>
</tr>
<tr>
<td>Contraindications</td>
<td>77</td>
<td>78</td>
<td>67</td>
</tr>
<tr>
<td>Physiological effects (general)</td>
<td>61</td>
<td>66</td>
<td>44</td>
</tr>
<tr>
<td>Physiological effects on tissue (i.e., muscle, bone)</td>
<td>23</td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td>Physiological effects on nervous system</td>
<td>15</td>
<td>3</td>
<td>31</td>
</tr>
<tr>
<td>Physiological effects on cardiovascular system</td>
<td>20</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Properties of heat transfer</td>
<td>42</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Inflammation and repair process</td>
<td>28</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Background literature</td>
<td>5</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Role of occupational therapy treatment program</td>
<td>15</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Anatomy</td>
<td>5</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Mechanics of physics</td>
<td>51</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Physics of electricity</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Thermal versus nonthermal</td>
<td>-</td>
<td>61</td>
<td>-</td>
</tr>
<tr>
<td>Phonophoresia</td>
<td>-</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>Iontophoresia</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Technicalab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment maintenance</td>
<td>31</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>Patient evaluation and preparation</td>
<td>20</td>
<td>14</td>
<td>27</td>
</tr>
<tr>
<td>Equipment setup and selection</td>
<td>11</td>
<td>14</td>
<td>34</td>
</tr>
<tr>
<td>Technique of application</td>
<td>77</td>
<td>97</td>
<td>92</td>
</tr>
<tr>
<td>Evaluation of treatment response</td>
<td>59</td>
<td>48</td>
<td>34</td>
</tr>
<tr>
<td>Precautions</td>
<td>18</td>
<td>19</td>
<td>18</td>
</tr>
</tbody>
</table>

Note: STA = superficial thermal agents; DTA = deep thermal agents; ESA = electrical stimulation agents.
a n = 74 for STA; n = 64 for DTA; n = 68 for ESA.
b n = 71 for STA; n = 63 for DTA; n = 67 for ESA.
for ESA may be that adverse reactions are perceived to more likely occur from treatment with STA and DTA than from ESA. This finding raises concern because often, patient response to treatment is the primary way of assessing the effectiveness of PAMs. For example, the effectiveness of TENS can only be determined by the patient’s self-report of pain relief. Perhaps the use of the term technical considerations may have been too narrow or confusing to some respondents who believed that it only concerned equipment safety and maintenance rather than evaluation of treatment response.

The finding on equipment setup and selection frequently identified as a technical consideration for ESA may be related to the wide variety of ESA equipment available today. Equipment maintenance may have been more frequently cited as a consideration for STA rather than the other two categories because this equipment must be maintained regularly for sanitation and temperature control. Although electrical equipment must be maintained as well, it is more often the responsibility of the manufacturer than of the clinician.

Clinicians in Taylor and Humphry’s (1991) study agreed that the use of PAMs in treatment must be followed with purposeful activity to be considered occupational therapy. The Physical Agent Modality Task Force also indicated the importance of including the effects of PAMs on functional task performance in continuing education curricula (AOTA, 1991a). However, in the present study, only a small percentage of the respondents indicated the effects of PAMs in promoting functional activity in an occupational therapy treatment program. This may be because the survey was only designed to assess competent use of PAMs and made no mention of their role in the total occupational therapy process.

The results suggest that the level and type of education necessary for gaining competence in the use of PAMs may vary depending on the type of agent being addressed. For example, the more frequent citing of the need for chemistry and physics for understanding the theory related to DTA and ESA rather than for STA (see Table 5) suggests that respondents believed that competence in the use of STA does not require the same level of preparation or prerequisite knowledge as that needed for DTA and ESA. In addition, some respondents indicated that only those properties of chemistry and physics that relate directly to a specific physical agent were necessary to gain an understanding of theoretical and technical content.

Similarly, the knowledge-base level of the AOTA document implies that it is adequate to include only those principles of physics and chemistry that apply directly to the use of PAMs. However, the American Physical Therapy Association (APTA) maintains that college-level chemistry and physics are necessary prerequisites for the competent use of all PAMs. For example, physical therapy educators who teach PAM content assume that students enter their courses with knowledge of physical principles such as heat transfer, which is necessary to understanding how heat reaches and affects different tissues in the body. Similarly, an understanding of basic electrical principles such as resistance and capacitance, which are taught in physics, is important to understanding the effects of electrical current on tissues such as nerve and muscle (APTA, 1995).

Continuing education was cited as the most appropriate way to obtain both theoretical content and technical expertise regarding the use of PAMs. On-the-job training and in-services, while frequently listed as appropriate avenues for obtaining information in both areas, were identified slightly more often with respect to technical considerations. However, this suggestion by the respondents should be interpreted cautiously because the theoretical and technical skills necessary for the safe and competent use of PAMs are often beyond the depth and quality of information that a company equipment representative or therapist providing the training is able to provide.

In Taylor and Humphry’s (1991) study, more occupational therapy practitioners reported using STA than...
using DTA or ESA. It is not surprising, then, that the respondents of this study also identified entry-level education as the most appropriate method for gaining the theoretical content for the use of STA. Although few occupational therapy programs currently teach the use of all PAMs as an entry-level skill, educators have identified that STA could be appropriately taught at that level (AOTA, 1991a). This may be because either the educators themselves are more familiar with STA than DTA or ESA or they believe that the physiological effects and applications of STA are more basic than the effects and applications of either DTA or ESA. In addition, educators may also recognize that students may not be familiar with the fundamentals of physics and chemistry, which are more necessary for understanding the theoretical underpinnings of DTA and ESA than for STA because those courses are not universally required as prerequisites to entry-level occupational therapy programs. Therefore, given the differences that exist among educators regarding preparation for teaching PAM content, coupled with AOTA's position that the use of PAMs is not considered an entry-level skill, supervising therapists should be aware that preparation of new occupational therapy graduates with regard to this content may vary considerably.

Limitations and Recommendations

There are three major limitations to this pilot study. The first is the low response rate of 28%. The reasons for the low rate may be twofold. First, even though the survey was sent to members of the PDSIS who identified hand therapy as their primary area of practice, perhaps those respondents who were not familiar or comfortable with using PAMs may have been reluctant to respond. Additionally, the open-ended nature of the items in the survey may have required more time and effort than the potential respondents were willing to spend completing the instrument. Although lower than desirable, the rate was 28% of the total defined population rather than of a sample of the population. Thus, it entirely avoided the problem of sampling bias. A respondent pool of 151 can be considered an adequate size to portray stable variability in responses (Sudman, 1976, pp. 16–17). However, the magnitude of response bias in the present study cannot be known. The extent of its possible influence, though, may be bounded by comparing the demographics of the group of respondents to the known demographics of the entire population. For example, in the current study, respondents had worked for a mean of 13 years, and in a randomly sampled survey of 147 hand therapists, with a 74% response rate (Malloy, Holm, & Ekes, 1996), the majority of respondents had worked 12 or more years as occupational therapists. Moreover, 76% of the respondents to the Taylor and Humphry (1991) study provided direct patient service, 11% were in administrative and supervisory positions, and 13% were in other types of positions. Similarly, the respondents of the current study mirror those of Taylor and Humphry, with 86% providing direct service, 9% being in an administrative or supervisory position, and 5% being in other types of positions. Furthermore, the respondents in the current study did not differ significantly ($U = 3.0$, $df = 1$, $p < .512$) in their distribution of practice from those respondents in the Taylor and Humphry study. Thus, the current respondents represented the population on several key professional demographic characteristics, thereby removing these variables as contributors to response bias. Although the response rate was low, the number of surveys returned constituted a sample size adequate for stable portrayal of the variability of responses and for further analysis.

A second limitation is that the results cannot be generalized to all occupational therapy practitioners who may be using PAMs as part of their practice. Finally, although the survey did ask about the types of education respondents had in the use of PAMs, it did not ask which, if any, PAMs were used in practice, which may have influenced the respondents' knowledge about competency considerations.

The results of this pilot study suggest that the background knowledge necessary to understand the relevant theoretical and technical considerations related to the use of PAMs, and, consequently, the appropriate methods of acquiring education for their use, varies depending on the type of modality being addressed. These differences should be considered in the future development of educational objectives in both entry-level programs and continuing education courses. To develop consistency of the content included in continuing education for PAMs, it is important that specific learning objectives be emphasized that coincide with the three levels of competency identified by AOTA. These objectives would ensure that all therapists have a similar level of preparation regardless of the educational method used for obtaining that knowledge. Moreover, future research into the development of learning objectives should represent each category of PAMs separately rather than as a whole. Finally, because The Education Guide (AOTA, 1994) recommends that all practitioners possess at least one basic information, it may be useful to provide some mechanism for assisting occupational therapy educational programs in ensuring that the content is covered adequately.

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References


