



Original Article

Availability, usage, and factors affecting usage of electrophysical agents by physical therapists: a regional cross-sectional survey

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Abstract. [Purpose] The aim of this study was to investigate the availability, usage, and factors affecting usage of electrophysical agents by physical therapists in Nagano Prefecture, Japan. [Subjects and Methods] Questionnaires were sent to all 1,571 physical therapists working in 245 institutions within Nagano Prefecture. A total of 1,110 questionnaires were returned, out of which 1,099 (70%) questionnaires containing valid responses were analyzed. Frequencies and percentages were calculated for 22 modalities with regards to availability, usage, rate of usage, and confidence level in usage. Factors affecting usage and the relationship between rate of usage and confidence level (Spearman's rho) were also determined. [Results] The top three responses for the various outcome measures were as follows: (1) hot packs (88%), low frequency stimulators (76%), and ultrasound (68%) for availability; (2) hot packs (72%), ultrasound (61%), and cold packs (59%) for usage; (3) hot packs (75%), cold spray (49%), and ultrasound (44%) for confidence in usage; and (4) equipment availability (80%), past experience (79%), and research evidence (78%) for factors affecting usage. There was a significant positive relationship between confidence and usage for all modalities, except for ultraviolet radiation, iontophoresis, and magnetic field. [Conclusion] Usage was strongly correlated with confidence, with the top three used modalities also being the ones with the highest confidence in usage.

Key words: Physical modalities, Availability, Usage

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INTRODUCTION

Physical modalities or electrophysical agents (EPA), defined as the “use of electrophysical and biophysical energies for the purposes of evaluation, treatment and prevention of impairments, activity limitations, and participation restrictions”¹⁾, are being used by physical therapists (PTs)²⁾, occupational therapists^{3, 4)}, athletic trainers⁵⁾, and even some nonmedical personnel in the fitness and wellness industry⁶⁾, among others. Some of these users have little to no formal training or education in the use of EPA, and this may compromise treatment outcomes, putting the public at risk of complications⁵⁾ and perhaps even tarnishing the professional image of EPA⁶⁾.

While it is generally acknowledged that EPA is one of the core competencies of PTs⁷⁾, many have argued that the teaching⁸⁾ and usage⁹⁾ of EPA needs to be reevaluated based on factors such as evidence for its effectiveness^{10, 11)} or lack thereof^{12, 13)}, as well as usage trends⁸⁾.

While there have been no longitudinal surveys to date, cross-sectional surveys have been performed over the past few decades in countries such as Australia^{14–16)}, Papua New Guinea¹⁷⁾, India¹⁸⁾, Israel¹⁹⁾, United Kingdom^{20, 21)}, and USA⁴⁾, among others. The results from these surveys demonstrates that EPA is still available and being used, albeit not as much as before²⁾.

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In Japan, the PT profession started around 1966²²⁾ and is relatively young compared with those in most Western countries. A literature search revealed 10 cross-sectional surveys on the availability and usage of EPA since 1966^{23–32)}. Six of these studies did not report the exact percentages for availability and usage^{25–28, 30, 32)}. Of the remaining four, two were from biased samples: outpatient departments of small regional hospitals²⁹⁾ and members of the Japanese EPA Association³¹⁾. Of the remaining two, one was a 1989 national survey on thermotherapy²³⁾, and the other was a 1994 regional survey (Kyoto Prefecture)²⁴⁾. Most of these studies were more than 10^{28, 29)} or 20 years ago^{23–27)}, and factors that affect the usage of EPA were not being investigated or discussed.

Therefore, the objective of this study was to conduct a cross-sectional regional survey to investigate the availability, usage, and factors affecting usage of EPA by PTs in Nagano Prefecture, Japan. The results from this survey will have implications for educators in identifying redundancies or gaps in the EPA curriculum, for managers of physical therapy departments in efficiently allocating financial resources to maintain or purchase necessary equipment, and for researchers in determining research priorities in EPA.

SUBJECTS AND METHODS

This observational study employed a cross-sectional postal questionnaire survey of all practicing PTs working in Nagano Prefecture, Japan. Ethical approval was obtained from the Graduate School of Medicine, Shinshu University (Approval No. 2661).

Six months before the study period, a small survey was conducted at a clinical supervisors' meeting attended by 34 major teaching hospitals within the region to determine the content validity of the proposed questionnaire. The attendees were asked to confirm the availability of 24 modalities and to suggest others not covered on the list. Consequently, a total of eight modalities were identified as being unnecessary (ice pack, ice massage), covered under other terminologies (medium frequency current, pulse current, silver spike potential stimulator), or not considered EPA (hydrotherapy pool, whirlpool, and Hubbard tank). At the same time, six modalities were identified and added to the list (iontophoresis, microcurrent, electromyography biofeedback, pressure biofeedback, magnetic field therapy, ultrasound imaging) bringing the final total to 22 modalities, which were grouped into six categories as follows:

1. Thermotherapy (6): hot packs, paraffin bath, infrared radiation, ultrasound, shortwave diathermy, microwave
2. Cryotherapy (2): cold packs, cold sprays
3. Phototherapy (2): ultraviolet radiation, lasers
4. Mechanotherapy (2): traction, continuous passive motion (CPM) devices
5. Electrotherapy (6): low frequency current, interferential current, iontophoresis, transcutaneous electrical nerve stimulation (TENS), neuromuscular electrical stimulation (NMES), microcurrent
6. Others (4): electromyography (EMG) biofeedback, pressure biofeedback, magnetic field, ultrasound imaging

Following this, a questionnaire was drafted (in Japanese) based on modification of a similar questionnaire developed by Chipchase et al¹⁶⁾. The questionnaire consisted of three sections with a total of 10 items. Section 1 consisted of seven items concerning basic demographic information, section 2 consisted of two items concerning the availability and usage of each of the 22 modalities and what factors influenced their choice to use EPA, and section 3 consisted of one item concerning confidence in using each of the 22 modalities. The draft questionnaire was pilot trialed with five PTs to ensure that the instructions were clear and that all questions were unambiguous.

The Japanese Physical Therapy Association (JPTA) estimates that there are approximately 130,000 PTs currently licensed to work within Japan, across 47 prefectures³³⁾. Therefore, a national survey would be impractical and financially not possible given our present resources. However, professional registration is centralized at the national level, and the education and clinical practice of physical therapists within each of the 47 prefectures are considered to be similar. Therefore, the sampling frame was limited to one prefecture, i.e., Nagano.

The Nagano branch of the JPTA maintains a yearly database of all the PTs working at the various institutions within the prefecture. From its latest 2013 database, there were 1,571 PTs working in 245 institutions within the region. Due to privacy concerns, their personal information (e.g., name and home address) could not be divulged. However, the number of PTs working at each of the 245 institutions was not considered a privacy issue and was made available to us upon request. Therefore, our survey population consisted of the entire 1,571 PTs working in the 245 institutions within Nagano Prefecture. PTs who were not working in 2013 were excluded from the survey.

A mailing list was created with the addresses of the 245 institutions. One week before the start of the survey period, a postcard was sent to the chief PT to inform them of the aim and period of the survey and to obtain their informed consent by giving them the opportunity to opt out of the study by return email. Individual consent was also obtained in the instructions at the beginning of the questionnaire, which clearly stated that participation was strictly voluntary.

At the beginning of the one-month survey period (1–31 July 2014), a package was sent to each of the 245 institutions. Each package contained the number of questionnaires corresponding to the number of PTs working there. The survey package also included one self-addressed return envelope for the completed questionnaires to be returned in bulk at the end of the study period. While the return envelope did not have any identifying features, there was an optional space for the return address. As this was common practice when sending items through the postal mail system in Japan, we were able to identify

all the institutions from their return address. One week after the end of the survey period (6 August 2014), another postcard was sent to all the remaining nonresponsive institutions to give them an extension of another three weeks and to appeal to them to return the questionnaires by the extended dateline (31 August 2014).

The returned questionnaires were checked to ensure that all sections were answered, and non-completion of any section was considered to render them invalid. However, some of the remaining valid questionnaires that were analyzed had missing data, and the total number of valid questionnaires (N) was adjusted to exclude the missing data, where appropriate. The adjusted N values were used to calculate all the percentages.

Data input was performed with spreadsheet software, Microsoft Excel for Mac 2011 v14.5.3 (Microsoft Corporation, Redmond, WA, USA), by one researcher (YA) and checked by another researcher (KM). Frequencies and percentages were calculated for all ordinal data, and means and standard deviations were calculated for all interval and ratio data. These calculations were performed with the Excel software. The Spearman rank correlation coefficient was calculated using the IBM SPSS Statistics version 22.0 (IBM Corporation, Armonk, NY, USA). The level of significance was set at $p < 0.05$.

RESULTS

None of the 245 institutions chose to opt out of the study. At the end of the one-month survey period, a total of 673 questionnaires from PTs working in 110 institutions were received. At the end of the extended dateline, a total of 1,110 questionnaires from PTs working in 171 hospitals were received. Of these 1,110 returns, 11 questionnaires were excluded due to non-completion of either Section 1 or 2. Therefore, the total number of valid questionnaires (N) that were analyzed was 1099 from 170 institutions. This represented a valid response rate of 70% of the PTs from 69% of the institutions.

The mean (\pm SD) age and years of working experience of the respondents were 31.8 (\pm 8.4) and 8.6 (\pm 7.9) years respectively. Sixty percent of the respondents were males (655/1,091), and 70% (766/1,090) of all respondents were educated outside the Prefecture. Their qualifications ranged from diplomas (712/1,092, 65%) to associate degrees (109/1,092, 10%) to degrees (271/1,082, 25%). There were no PTs that specialized in women's health or occupational health and safety. These two specialties were therefore excluded from all further analysis.

The results regarding the availability for each of the 22 modalities are summarized and ranked in Table 1. Above 50% availability was reported for six modalities: hot packs, low frequency current, ultrasound, traction, cold packs, and CPM. Conversely, below 10% availability was reported for four modalities: ultraviolet radiation, pressure biofeedback, iontophoresis, and magnetic field.

Table 1. Availability of electrophysical agents

| Modalities | Ranking | Available n (%) | Not available n (%) | Unsure n (%) | Adjusted N* |
|------------------------|---------|--------------------|------------------------|-----------------|-------------|
| Hot packs | 1 | 968 (88) | 118 (11) | 10 (1) | 1,096 |
| Low frequency current | 2 | 817 (76) | 212 (20) | 50 (5) | 1,079 |
| Ultrasound | 3 | 736 (68) | 324 (30) | 25 (2) | 1,085 |
| Traction | 4 | 700 (65) | 362 (33) | 24 (2) | 1,086 |
| Cold packs | 5 | 602 (56) | 408 (38) | 67 (6) | 1,077 |
| CPM | 6 | 587 (55) | 446 (41) | 45 (4) | 1,078 |
| Interferential current | 7 | 535 (50) | 445 (41) | 97 (9) | 1,077 |
| TENS | 8 | 450 (42) | 537 (50) | 89 (8) | 1,076 |
| Microwave | 9 | 383 (36) | 539 (50) | 147 (14) | 1,069 |
| NMES | 10 | 331 (31) | 597 (56) | 146 (14) | 1,074 |
| Infrared radiation | 11 | 318 (30) | 651 (61) | 104 (10) | 1,073 |
| Paraffin bath | 12 | 301 (28) | 724 (67) | 52 (5) | 1,077 |
| Ultrasound imaging | 13 | 262 (24) | 688 (64) | 127 (12) | 1,077 |
| Lasers | 14 | 210 (20) | 748 (70) | 110 (10) | 1,068 |
| Shortwave diathermy | 15 | 203 (19) | 708 (66) | 155 (15) | 1,066 |
| Cold spray | 16 | 187 (17) | 744 (69) | 143 (13) | 1,074 |
| EMG biofeedback | 17 | 168 (16) | 773 (72) | 134 (13) | 1,075 |
| Microcurrent | 18 | 151 (14) | 738 (69) | 183 (17) | 1,072 |
| Ultraviolet radiation | 19 | 63 (6) | 869 (81) | 137 (13) | 1,069 |
| Pressure biofeedback | 20 | 62 (6) | 861 (80) | 150 (14) | 1,073 |
| Iontophoresis | 21 | 25 (2) | 892 (83) | 154 (14) | 1,071 |
| Magnetic field | 22 | 19 (2) | 903 (84) | 148 (14) | 1,070 |

*To account for missing data, "adjusted N" values (i.e., N: missing) were used to calculate all percentages

The results regarding usage for each of the 22 modalities are summarized and ranked in Table 2. The adjusted N values were based on the number of times “available” was reported for that modality (see Table 1), less missing values. Above 50% usage was reported for eight modalities: hot packs, ultrasound, cold packs, interferential current, low frequency current, microcurrent, NMES, and TENS. Conversely, below 10% usage was reported for only one modality: ultraviolet radiation.

The results regarding the rate of usage (at least once a day, week, month, or year) for each of the 22 modalities are summarized in Table 2 (shaded boxes). The adjusted N values were based on the number of times “used” was reported for that modality (Table 2). The top five modalities that were used daily or more than once a week were interferential current (156/304, 51%), hot packs (347/685, 51%), microwave (51/104, 49%), traction (116/250, 46%), and shortwave diathermy (13/37, 35%).

The rankings for factors affecting usage in general, based on the sum total of positive influences (i.e., influenced + definitely influenced), in descending order are as follows: equipment availability (859/1,081, 80%), past experience (858/1,083, 79%), research evidence (833/1,071, 78%), undergraduate training (714/1,081, 66%), clinical guidelines (691/1,077, 64%), textbooks (646/1,081, 60%), workplace protocols (636/1,080, 59%), and equipment demonstration (582/1,078, 54%).

The results regarding confidence in using each of the 22 modalities are summarized and ranked according to the sum total of positive confidence scores (i.e., confident + definitely confident) in Table 3. Only one modality had a positive confidence score greater than 50%, i.e., hot packs. Nine modalities had a positive confidence score of less than 10%: shortwave diathermy, EMG biofeedback, microcurrent, lasers, pressure biofeedback, ultrasound imaging, ultraviolet radiation, iontophoresis, and magnetic field.

Finally, the results regarding the relationship between rate of usage and confidence level (Spearman’s rho or p) for each of the 22 modalities, except for three modalities (ultraviolet radiation $\rho=0.165$, $p=0.22$; iontophoresis $\rho=0.390$, $p=0.07$; and magnetic field $\rho=-0.024$, $p=0.93$), showed that usage rate increased significantly as confidence level increased for the remaining 19 modalities (ranging from lowest [$\rho=0.206$, $p<0.01$] for cold spray to highest [$\rho=0.593$, $p<0.001$] for microcurrent).

DISCUSSION

The response rate of 70% for this study suggests that the results can be generalized to the region. In addition, Nagano Prefecture is similar to the rest of Japan in terms of its health care system and clinical practice environment. Furthermore, 70% of respondents were educated outside of the region. Therefore, it may also be possible to generalize our results to the rest of Japan.

Table 2. Usage and rate of usage (shaded boxes) of electrophysical agents

| Modalities | Ranking | Used n (%) | Daily n (%) | Weekly n (%) | Monthly n (%) | Yearly n (%) | Not used n (%) | Adjusted N* |
|------------------------|---------|---------------|----------------|-----------------|------------------|-----------------|-------------------|----------------|
| Hot packs | 1 | 685 (72) | 127 (19) | 220 (32) | 151 (22) | 158 (23) | 268 (28) | 953 |
| Ultrasound | 2 | 436 (61) | 33 (8) | 104 (24) | 129 (30) | 150 (34) | 282 (39) | 718 |
| Cold packs | 3 | 338 (59) | 35 (10) | 76 (23) | 99 (29) | 98 (29) | 241 (41) | 579 |
| Interferential current | 4 | 304 (59) | 63 (21) | 93 (31) | 58 (19) | 73 (24) | 214 (41) | 518 |
| Low frequency current | 5 | 460 (58) | 57 (12) | 98 (21) | 115 (25) | 153 (33) | 334 (42) | 794 |
| Microcurrent | 6 | 83 (56) | 4 (5) | 23 (28) | 27 (33) | 24 (29) | 65 (44) | 148 |
| NMES | 7 | 181 (56) | 9 (5) | 47 (26) | 52 (29) | 58 (32) | 143 (44) | 324 |
| TENS | 8 | 236 (54) | 18 (8) | 54 (23) | 68 (29) | 79 (34) | 204 (46) | 440 |
| CPM | 9 | 229 (40) | 28 (12) | 47 (21) | 45 (20) | 85 (37) | 346 (60) | 575 |
| Pressure biofeedback | 10 | 21 (38) | | 2 (10) | 8 (38) | 9 (43) | 34 (62) | 55 |
| Traction | 11 | 250 (37) | 52 (21) | 64 (26) | 35 (14) | 83 (33) | 434 (64) | 684 |
| Microwave | 12 | 104 (28) | 27 (26) | 24 (23) | 14 (14) | 33 (32) | 271 (72) | 375 |
| Lasers | 13 | 57 (28) | 7 (12) | 13 (23) | 16 (28) | 18 (32) | 149 (72) | 206 |
| Iontophoresis | 14 | 6 (27) | | 2 (33) | | 4 (67) | 16 (73) | 22 |
| EMG biofeedback | 15 | 44 (27) | | 4 (9) | 7 (16) | 26 (59) | 119 (73) | 163 |
| Shortwave diathermy | 16 | 37 (19) | 2 (5) | 11 (30) | 9 (24) | 12 (32) | 158 (81) | 195 |
| Infrared radiation | 17 | 59 (19) | 7 (12) | 13 (22) | 13 (22) | 23 (39) | 253 (81) | 312 |
| Cold spray | 18 | 32 (18) | | 2 (6) | 3 (9) | 27 (84) | 144 (82) | 176 |
| Ultrasound imaging | 19 | 43 (17) | 2 (5) | 9 (21) | 8 (19) | 19 (44) | 209 (83) | 252 |
| Paraffin bath | 20 | 38 (13) | 1 (3) | 7 (18) | 4 (11) | 25 (66) | 257 (87) | 295 |
| Magnetic field | 21 | 2 (12) | | | | 2 (100) | 15 (88) | 17 |
| Ultraviolet radiation | 22 | 3 (5) | | 1 (33) | | 2 (67) | 58 (95) | 61 |

*To account for missing data, “adjusted N” values (i.e., N: missing) were used to calculate all percentages

With regards to availability and usage of EPA, it was not possible to compare the results of our studies with previous studies^{23, 25-32} except for a similar regional study (Kyoto Prefecture) conducted by Kanzaki et al.²⁴ more than 20 years ago. In 1994, Kanzaki et al.²⁴ reported that the top five available modalities consisted of thermotherapy devices and traction, i.e., hot packs (92%), microwave (92%), lumbar traction (92%), cervical traction (92%), and paraffin (73%). In our study, the top five modalities available were more diverse, i.e., hot packs (88%), low frequency current (76%), ultrasound (68%), traction (65%), and cold packs (56%). Our results also showed that the availability of the paraffin bath, infrared radiation and microwave modalities, which were readily available 20 years ago, has now dropped considerably to 28% (vs. 73%)²⁶, 30% (vs. 83%)²⁵, and 36% (vs. 92%)²⁶ respectively (Table 1). Therefore, there is some evidence that the availability of some modalities has decreased over the past 20 years. On the other hand, the availability of some modalities such as hot packs and ultrasound has remained largely unchanged, at 88% (vs. 92%)²⁶ and 68% (vs. 63%)²³ respectively (Table 1). While there were no comparative data from previous studies, our results also showed that the availability of the majority of modalities (more than 85%) was restricted to hospitals (acute, subacute and chronic). This may be because Japanese PTs do not have direct access to their patients, and there are no private PT clinics in Japan, unlike Australia¹⁴⁻¹⁶, United Kingdom^{20, 21}, and USA⁴.

With regards to usage of EPA, the top five most used modalities reported by Kanzaki et al.²⁴ were types of thermotherapy (hot packs, microwave), electrical stimulation and traction. Our results were similar (Table 2), showing that thermotherapy still accounts for the top two most used modalities (hot packs, ultrasound), with an apparent shift towards increased usage of electrical stimulation devices. While no previous data exists for Japan, our study shows that about two-thirds of EPA usage was confined to musculoskeletal (45%) and neurology (18%) specialists.

The factors that affect usage of EPA can be divided into two categories: external (equipment availability, research evidence, clinical guidelines, textbooks, workplace protocols, and equipment demonstration) and internal (past experience, and undergraduate training). No previous studies were found that examined the relationship between these internal and external factors or how they can affect usage of EPA.

The relationship between the external factors and usage is discussed next. Firstly, the relationship between equipment availability and usage seems obvious: availability may encourage usage, and conversely unavailability can only result in non-usage. Our data seems to support this assumption, based on three arbitrary cutoff points for availability and usage: low

Table 3. Perceived confidence in using electrophysical agents

| Modalities | (1) Definitely not confident n (%) | (2) Not confi- dent n (%) | (3) Neutral n (%) | (4) Confident n (%) | (5) Definitely confident n (%) | Adjusted N* | (4) + (5) n (%) | (4) + (5) Rank |
|------------------------|---|------------------------------------|-------------------------|---------------------------|---|-------------|--------------------------|-------------------------|
| Hot packs | 12 (1) | 35 (3) | 220 (21) | 660 (62) | 139 (13) | 1,066 | 799 (75) | 1 |
| Cold pack | 50 (5) | 145 (14) | 350 (33) | 437 (41) | 84 (8) | 1,066 | 521 (49) | 2 |
| Ultrasound | 80 (8) | 211 (20) | 306 (29) | 400 (38) | 69 (7) | 1,066 | 469 (44) | 3 |
| Low frequency current | 87 (8) | 218 (21) | 325 (31) | 384 (36) | 50 (5) | 1,065 | 434 (41) | 4 |
| CPM | 150 (14) | 208 (20) | 355 (33) | 290 (27) | 63 (6) | 1,066 | 353 (33) | 5 |
| Traction | 157 (15) | 250 (24) | 312 (29) | 313 (29) | 34 (3) | 1,066 | 347 (33) | 6 |
| Cold spray | 90 (8) | 182 (17) | 466 (44) | 286 (27) | 42 (4) | 1,066 | 328 (31) | 7 |
| Interferential current | 207 (19) | 276 (26) | 311 (29) | 228 (21) | 43 (4) | 1,065 | 271 (25) | 8 |
| Paraffin bath | 191 (18) | 299 (28) | 325 (31) | 218 (21) | 33 (3) | 1,066 | 251 (24) | 9 |
| TENS | 262 (25) | 301 (28) | 297 (28) | 178 (17) | 27 (3) | 1,065 | 205 (19) | 10 |
| Microwave | 242 (23) | 339 (32) | 315 (30) | 149 (14) | 21 (2) | 1,066 | 170 (16) | 11 |
| NMES | 357 (34) | 301 (28) | 260 (24) | 126 (12) | 21 (2) | 1,065 | 147 (14) | 12 |
| Infrared radiation | 229 (22) | 357 (34) | 358 (34) | 108 (10) | 14 (1) | 1,066 | 122 (11) | 13 |
| Shortwave diathermy | 274 (26) | 394 (37) | 323 (30) | 70 (7) | 5 (1) | 1,066 | 75 (7) | 14 |
| EMG biofeedback | 515 (48) | 273 (26) | 211 (20) | 57 (5) | 9 (1) | 1,065 | 66 (6) | 15 |
| Microcurrent | 525 (49) | 275 (26) | 200 (19) | 55 (5) | 10 (1) | 1,065 | 65 (6) | 16 |
| Lasers | 415 (39) | 353 (33) | 236 (22) | 56 (5) | 6 (1) | 1,066 | 62 (6) | 17 |
| Pressure biofeedback | 593 (56) | 262 (25) | 178 (17) | 27 (3) | 5 (1) | 1,065 | 32 (3) | 18 |
| Ultrasound imaging | 611 (57) | 274 (26) | 148 (14) | 27 (3) | 5 (1) | 1,065 | 32 (3) | 19 |
| Ultraviolet radiation | 422 (40) | 367 (34) | 253 (24) | 21 (2) | 3 (0) | 1,066 | 24 (2) | 20 |
| Iontophoresis | 557 (52) | 291 (27) | 210 (20) | 7 (1) | 0 (0) | 1,065 | 7 (1) | 21 |
| Magnetic field | 672 (63) | 242 (23) | 148 (14) | 2 (0) | 1 (0) | 1,065 | 3 (0) | 22 |

*To account for missing data, "adjusted N" values (i.e., N: missing) were used to calculate all percentages

(<25%), moderate (25% to 50%), and high (>50%). The six highest available modalities were also the most highly used (hot packs, interferential current, ultrasound, cold packs) or moderately used (traction, CPM). Conversely, six of the least used modalities were also the least available: ultrasound imaging, shortwave diathermy, cold sprays, ultraviolet radiation, EMG biofeedback, and magnetic field. Secondly, the relationship between research evidence and usage is a bit more complicated and controversial, with the ambiguity surrounding the evidence being cited by some as a reason why the usage of EPA has been decreasing over the past few decades². However, this argument ignores the fact that there are now more randomized controlled trials and systematic reviews that have demonstrated treatment effectiveness for patients with a variety of medical conditions such as urinary incontinence³⁴, neck³⁵ and knee pain³⁶, muscle weakness³⁷, and spasticity³⁸, among others, which seems to be in direct contradiction to its decreased availability and usage. Thirdly, the association between the other external factors (clinical guidelines, textbooks, workplace protocols, equipment demonstration) and usage may not be as important, since these factors were ranked among the lowest four out of the eight factors. This result may not be unexpected, since clinical guidelines and workplace protocols, which may be favored by clinicians over textbooks regarding the use of EPA, are almost nonexistent.

Regarding the relationship between internal factors (past experience, undergraduate training) and usage, we believe that these factors are directly related to the PT's confidence in using EPA. In other words, a comprehensive undergraduate training curriculum and adequate past experience will manifest in increased confidence. Our study suggests that confidence is a major factor in usage of EPA, with usage increasing as confidence level increases for almost all modalities. However, our survey respondents have all rated their confidence level very lowly, with only one modality having a positive confidence score greater than 50% (hot packs 75%, Table 3). This may suggest inadequacies with the EPA curriculum regionally, and possibly nationally, since 70% of respondents were educated outside the region, and this should be investigated further. Ironically, one of the strategies to address inadequate confidence, and hence encourage increased usage, is to increase the emphasis on correct teaching of EPA in undergraduate programs.

Our study had two limitations. Firstly, results from this study may not be generalized to other countries (due to differences in PT educational models, national health systems, and different study populations), and therefore, we have intentionally avoided any comparisons between our results and those from other countries. Secondly, the issue of privacy prevented us from sending the questionnaire directly to the respondents' home addresses. Instead, all questionnaires were sent to their institutions, and it is uncertain if the response rate and results would have been different if the questionnaires had been sent directly to the PTs.

In conclusion, EPA is still readily available in most hospitals within the region, although it appears to be confined to acute, subacute and chronic hospitals. However, availability for some modalities may have decreased compared with 20 years ago. Usage was not restricted to just one category, with thermotherapy, electrotherapy, and traction all being widely used. However, usage seems to be restricted to just 2 major specialties (musculoskeletal, neurology). Availability and confidence are external and internal factors, respectively, that may have the greatest direct influence on usage of EPA. While external factors may be less amenable to change or manipulation, internal factors may be influenced by education and training. However, the relationship between these internal and external factors is complicated and warrants further investigation in order to understand what is driving the change in the EPA area of expertise.

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