ORTHOPAEDIC PHYSICAL THERAPY PRACTICE

THE NEWSLETTER OF
THE ORTHOPAEDIC SECTION, APTA

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ORTHOPAEDIC SECTION
1974 - 1999
25
AMERICAN PHYSICAL THERAPY ASSOCIATION - CELEBRATING 25 YEARS

APTA
American Physical Therapy Association

AAOMPT 1999- FIRST CALL FOR ABSTRACTS
October 22-24, 1999

The 5th Annual Conference of the American Academy of Orthopaedic Manual Physical Therapists will be held in the Fall of 1999. Interested individuals are invited to submit abstracts for presentation in slide or poster format. The abstract and four photocopies, must be received by the AAOMPT research committee chairman by **June 1, 1999.** Abstracts received after this date will be returned. You will be notified of the acceptance/rejection of your abstract in July, 1999. If you have any questions call the research committee chairman at (210) 221-8410 or email at: ltc.timothy.flynn@cs.amedd.army.mil

CONTENT. The Academy is soliciting all avenues of research inquiry from case-report and case-series up to clinical trials. The Academy is particularly interested in evaluating efficacy of intervention strategies using randomized-controlled clinical trials. The abstract should include 1) statement of the study's specific objectives; 2) statement of methods; 3) a summary of results; 4) a statement of conclusions.

PUBLICATION. The accepted peer-reviewed abstracts will be published in ***The Journal of Manual & Manipulative Therapy*** which has readership in over 40 countries.

SUBMISSION FORMAT. The format for the submitted abstracts is as follows:
The abstract should fit on one page with a one inch margin all around. The text should be typed as one continuous paragraph.
Type the title of the of the research in ALL CAPS at the top of the page followed by the authors' names. Immediately following the names, type the institution, city, and state where the research was done. Please include a current email address where you can be contacted.

PRESENTATION. The presentation of the accepted research will be in either a slide or poster session. The slide session will be limited to 15 minutes followed by a 5 minute discussion, this session will be primarily for research reports and randomized clinical trials. The poster session will include a viewing and question answer period and will be primarily for case report/series.

ABSTRACT AWARD. The author of the abstract deemed of the highest quality of those submitted will be awarded the Annual AAOMPT Excellence in Research Award. This award will consist of an award certificate and reimbursement of the conference registration fee.

SHIPPING. To prevent damage, insert cardboard backing in the envelope with the abstract and copies. Mail to the AAOMPT research committee chairman at: **LTC Timothy W. Flynn, PhD, PT, OCS, U.S. Army-Baylor Program in Physical Therapy**
Academy of Health Sciences- PT Branch, ATTN: MCCS-HMT (AAOMPT Research), 3151 Scott Road, Room 1303, Fort Sam Houston, TX 78234-6138
To receive notice that your abstract was received by AAOMPT, please enclose a self-addressed and stamped postcard with the abstract or preferably an email address where you can be reached. Your abstract will be assigned a number and you will be notified electronically or via the postcard.

ORTHOPAEDIC PHYSICAL THERAPY PRACTICE

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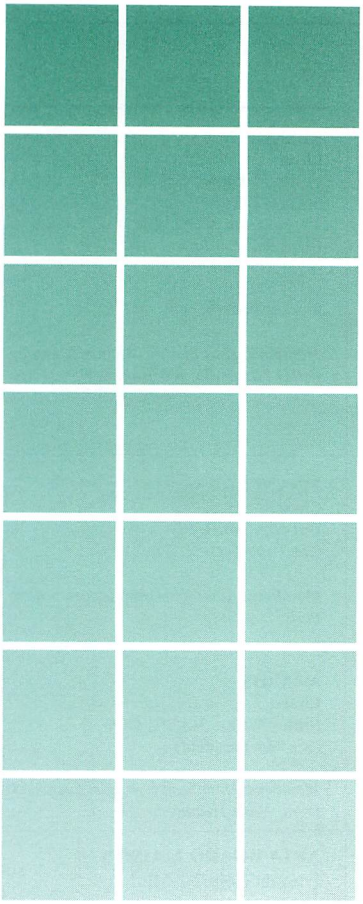

IN THIS ISSUE

REGULAR FEATURES

The mission of Orthopaedic Section of the American Physical Therapy Association is to be the leading advocate and resource for the practice of orthopaedic physical therapy. The Section will serve its members by fostering high quality patient care and promoting professional growth through:

- Advancement of education and clinical practice,
- Facilitation of quality research, and
- Professional development of members.

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Robert H. Deusinger, PhD, PT, 1985-87
Jan K. Richardson, PhD, PT, OCS, 1987-92
Z. Annette Iglarsh, PhD, PT, 1992-95

Editor's Message

A Quarter of a Century

Welcome to a New Year—the last one of this millennium. While we are beginning a New Year, we are also ending a century. As we prepare for the next century, I imagine that plenty of changes are in store for us all, as well as a few surprises. I hope the New Year's resolutions and goals you set are accomplished by Y2K—without any of the dreaded technology bugs! One change for the New Year I hope you will notice is a new look for *OP*. We have changed our cover to reflect an anniversary.

In 1974, an ambitious group of physical therapists gained approval from APTA to form the Orthopaedic Section. This year, 1999, marks the 25th Anniversary of the founding of the Section. Over the past quarter-century, both our membership and budget have grown tremendously. We remain the largest section of the APTA, with just under 14,000 members. Over these past 25 years, our voice has become louder, deeper, and more recognized. Increasingly, Orthopaedic Section members have been called upon to serve as spokespersons and experts for both APTA and external organizations. We have blossomed, and we have much to celebrate! In each issue of *OP* during 1999, we will be celebrating our history, with special articles that illuminate our past and challenge us for the future. Please be sure to read the first article of our special series, written by Dr. Stanley Paris and Dorothy Santi.

As we celebrate the growth and development of the Section, I am reminded of the "maturity continuum" described by Stephen Covey.[1] This continuum describes development from the level of complete dependence, to that of independence, and then to interdependence. This continuum can serve as a good model as we reflect on our past and look forward to our future as a Section.

The continuum begins at birth, when we are completely dependent on others for our existence. A child (or an idea) is born and provided for by others with the means to direct and nurture its growth. In infancy, responsibility is placed on others. As we grow and develop, we become more independent, until we can take care of ourselves. At this stage, we take responsibility for ourselves and become self-directed and self-reliant. We may even take responsibility for others. Independence is a highly valued milestone in our society. However, teamwork, communication, and cooperation with others are also necessary.

As we continue to mature, we learn the value of our relationships with others and the meaning of the concept of teamwork. This interdependence is based on the idea that we can accomplish much more working together than we can working independently. Those who come to the table of interdependence are independent thinkers who see a greater good and can combine their talents and abilities to accomplish great things. When we have reached this stage, we can be most effective.

The Orthopaedic Section was borne out of common interests among physical therapists. The founding members took responsibility for development of the organization. I suspect their individual practices and employers also contributed (knowingly or unknowingly) by providing copies, funds, phone calls, postage, etc. to cover start-up costs during that formative period. With formal recognition from APTA, the Section grew very quickly and continued its development. We grew to the largest Section, became financially independent, and the leader among sections.

The Orthopaedic Section continues to lead the way. We have a very talented staff in La Crosse that takes care of day-to-day operations. Please be sure to meet them at CSM in Seattle and thank them for all that they do for us. We also have a very hard-working group of volunteers in elected and appointed positions to direct the business of the Section. We continue to lead in our advocacy efforts for the protection of our right to practice as described in the *Guide to Physical Therapist Practice.*

We recognize our interdependence with other Sections as well. We foster professional development of our members by offering affordable continuing education opportunities, both through home study and at various locations across the country. We offer joint programming at CSM with other Sections to not only provide learning opportunities, but also to highlight our common ground. In addition, we publish journals, newsletters, and home study courses for other Sections as well.

We can safely say that in the past 25 years, we have done a little growing up. Along the way, we have been reminded that things can't always be our way. We have learned that both patience and compromise are often required to achieve common goals. We must continue to work with and through APTA to further develop and nurture both our profession and our specialty.

This issue of *OP* is special because it kicks off our 25th anniversary year. It is special for another reason as well. The theme of this issue is "Evidence-based Practice." The articles in this issue were submitted by members of the North American Orthopaedic Rehabilitation Research Network, and were originally published in the Canadian Physiotherapy Association Newsletter, the *Orthopaedic Division Review*. Jill Binkley has provided us with a guest editorial for this special issue. She has offered all of us a challenge. Consider accepting that challenge. The authors of these articles help us begin to make the concept of evidence-based practice more real by identifying ways to bridge the gaps between researchers, educators, and clinicians. As we continue to grow and develop as both a profession and as a specialty, we must continue to prove ourselves. We must provide evidence that our physical therapy interventions are effective. I hope you enjoy this issue of *OP* and accept the challenges that this New Year will bring.

Happy 25th Anniversary!

1. Covey SR. *The Seven Habits of Highly Effective People: Powerful Lessons in Personal Change*. New York: Simon & Schuster; 1989:48-52.

Susan A. Appling, MS, PT, OCS
Editor, *OP*

President's Message

Milestone Anniversaries
Orthopaedic Section, APTA

1999 marks the 25th birthday of the Orthopaedic Section. In recognition of this anniversary and all who have contributed to the organization, we have established a Section archives which chronicles our rich and colorful history. Joe Farrell, Carolyn Wadsworth, and Linda Weaver coordinated this 1998 initiative. The archives will give just recognition to the handful of visionaries who spearheaded the formation of the Section as well as to the hundreds of individuals who have followed our founders' footsteps. The commitment and dedication exhibited by these volunteers are the cornerstone of the foundation upon which our organization currently thrives.

This year we will publicize our past through a variety of venues. This issue of *Orthopaedic Physical Therapy Practice* marks the first of four to be published in 1999 that will highlight a specific chapter of our 25-year history. We are also video taping interviews of individuals who have played key roles in the Section's evolution. These video tapes will be on display at our national meetings and at our office in La Crosse, WI. Also in La Crosse, we have organized and safely preserved all important documents and photographs from the past.

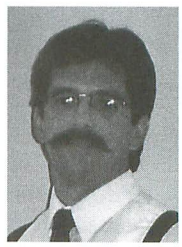
The motivation to organize our archives is not solely related to displaying our history for all to see. As we continually prepare to face the challenges that lie ahead, our past can provide an important guiding light. The current Section Board of Directors is dedicated to move your organization in a direction that would make our founder's proud.

Journal of Orthopaedic and Sports Physical Therapy

1999 also marks a significant anniversary of a vital cog of the Orthopaedic and Sports Sections, the *Journal of Orthopaedic and Sports Physical Therapy* (JOSPT). This year JOSPT celebrates its 20th birthday. The new editorial board headed by Dr. Richard DiFabio will lead the journal into its next chapter. Building upon the efforts of previous editors, the late James Gould, George Davies, and Dr. Gary Smidt, the current editorial team will strive to advance the investigative efforts of our research and clinical communities. Success should be marked by an increasing number of high quality papers that advance the science and arts of orthopaedic and sports physical therapy. A hardy congratulations and thank you goes to all those involved in JOSPT activities over the past 20 years!

Etc.

1. Tragedy again strikes members of the Orthopaedic Section family. Bob Burles (past Treasurer) and Gaetano Scotece (the first President of the Section's Pain SIG) both passed away in 1998. We will miss them personally and professionally. Our condolences go to their families.
2. Thank you, Debbie Durham, for all of your essential behind-the-scenes contributions to JOSPT over the past 8 years!
3. Please join us for Combined Sections Meeting, 1999. I look forward to seeing all of you in Seattle.



William G. Boissonnault, MS, PT
President

It's Time to Celebrate!

Stand-up Comedian!

Prizes and Drawings!

ORTHOPAEDIC SECTION 1974 - 1999 25 AMERICAN PHYSICAL THERAPY ASSOCIATION - CELEBRATING 25 YEARS

Vegas-style Casino!

Remembering the Past!

The Orthopaedic Section, APTA is celebrating its 25th Anniversary!
Plan to attend our anniversary reception during the Combined Sections Meeting in Seattle!
*Sheraton Hotel * February 6, 1999*

Orthopaedic Section Awards Ceremony: 6:15 - 7:30 PM, Room: "East B"
Orthopaedic Section Anniversary Reception: 7:30 - 11:00 PM, Room: "Grand A"

We hope to see you there!

In Memory of Robert E. Burles, PT

1943-1998

The physical therapy profession, nationally and especially in Oregon, recently lost one of its more illustrious members - Bob Burles. After battling an aggressive brain tumor, diagnosed in July of this year, Bob died on October 25, 1998. He was born on February 18, 1943, in Portland, Oregon and grew up in Coos Bay, Oregon.

As an undergraduate, Bob attended Willamette University in Salem, Oregon, where he received his degree in 1966. While at Willamette, Bob was a two-time All-American in football, a three-time All-American in track and field, and the NAIA National Champion in the 400 meter hurdles during his senior year. When Willamette University established an Athletic Hall of Fame in 1991, Bob was inducted into it for his achievements.

Although he was actively recruited by several professional football teams, Bob decided to pursue a career in physical therapy upon his graduation from Willamette University. He entered the program at Stanford University and earned his Certificate in Physical Therapy in 1967. He then joined the United States Army and served for two years as a physical therapist at Madigan Hospital in Ft. Lewis, Washington. After completion of his tour of duty, Bob and his wife, Marion, settled permanently in Portland, Oregon, where Bob entered private practice in the office of Dan Jones, PT. In 1971, Bob started his own practice focusing on orthopaedic and sports physical therapy. In 1975, Vinton Mougey, PT, joined Bob and became a co-owner of the clinic. After the clinic was sold in 1995, Bob became an executive for HealthSouth Corporation; most recently serving as Regional Vice-President.

Once established in Portland, Bob became active in the profession. During his long and distinguished career he served the profession both locally and nationally. As a member of the Oregon Physical Therapy Association (OPTA), Bob worked on the Peer Review Committee; was the representative to the Multnomah Foundation Professional Standard Review Organization; chaired the Reimbursement Committee; represented physical therapists at Worker's Compensation hearings; chaired the Practice Committee; was a member of the Legislative Committee; and at different times served as OPTA's Treasurer, Vice-President, and at the end of his life, as President.

Bob loved physical therapy and he was always available to consult, explain, advocate and represent physical therapy interests to governmental and other health care organizations. Based on his work with Worker's Compensation, he was asked to participate in the development of the Oregon Medical Assistance Program (the first managed care program in the country for Medicaid clients). Additionally, he served on the Health Technology Assessment Committee reviewing anterior cruciate ligament reconstruction for the Oregon Medical Association and was President of Oregon Physical Therapists in Independent Practice from 1990 to 1996. Bob also served as a consultant to Intracorp for outpatient physical therapy chart review.

On the national level, Bob was a very active member of the Orthopaedic Section of the American Physical Therapy Association. He served as its Finance Committee chair for eight years and treasurer for five years. Reflecting his passion for computers, Bob was very instrumental in assisting the staff of the Orthopaedic Section in setting up a computerized data base system.

Bob was also an active supporter of physical therapy education and professional development. He was one of the founders of the Orthopaedic Study Group of Oregon. He sponsored as well as taught many orthopaedic continuing education courses and served on an OPTA Committee to raise funds for the establishment of the School of Physical Therapy at Pacific University, Forest Grove, Oregon. After the school was founded in 1975, Bob gave freely of his time and skill to teaching physical therapy students, both in his clinic and at the school. He did this without any thought of personal compensation other than the joy he experienced contributing to the development of new, young professionals.

Bob and Marion were married on November 25, 1966, and subsequently raised three children: Cathy, Michael and Mark. After his illness set in, one of Bob's goals was to walk Cathy down the aisle at her September wedding. He achieved that goal as he had achieved many others.

Bob was an avid basketball player and he participated several times in the Over-50 tournament in St. George, Utah. Bob loved the outdoors and enjoyed hiking, climbing mountains (Mt. Hood 13 times, most recently in May of this year), hunting, and skiing with family and friends.

We remembered and celebrated Bob's life on October 31, 1998, at the Rolling Hills Community Church in Tualatin, Oregon. We were extremely fortunate to have had Bob as our friend and colleague.

John M. Medeiros, PT, PhD

Paris Distinguished Service Award 1999

Dorothy Santi, this year's recipient of the Paris Distinguished Service Award, developed an early and enduring interest in physical therapy. Dorothy traces that interest back to her high school days, during which she volunteered to help in a swim program for children with cerebral palsy in Omaha, Nebraska. Upon graduation from high school, Dorothy enrolled in the University of Nebraska where, since there was no physical therapy program, she majored in pharmacy.

After completing her first year at the University of Nebraska, financial circumstances dictated that Dorothy return to Omaha, where she took a full-time job. But a career in physical therapy remained her goal. At that time, the early 1950s, there were only about 14 physical therapy programs in the United States, one of which was in Denver. Dorothy hoped to move to Denver someday, become a resident of Colorado, and then continue her education in her career of choice. Instead, in 1955 she married her high school sweetheart and put her education on hold.

Seven years and 2 children later, Dorothy's husband was transferred and Dorothy did, indeed, move to Denver. After establishing residency, Dorothy enrolled in the University of Colorado. But a final, seemingly insurmountable, hurdle was placed in her path. Competition for space in the physical therapy program was keen, and even though she passed the psychometric tests, met the GPA requirements, and completed all other requirements for entrance, Dorothy's application was turned down, while some less-qualified students were granted admission to the program. "Why would a happily married woman with two children want to go to physical therapy school?" Dorothy's husband discussed the situation with his instructor at a law seminar he was attending. The instructor was outraged and offered to take the case fee gratis. Shortly thereafter, Dorothy was admitted to the program.

Although hers was a circuitous route strewn with obstacles, Dorothy overcame each impediment placed in her path and in 1970 earned her Bachelor of Science in Physical Therapy and passed the state boards. Her dream had become reality, a dream that she believes could not have been fulfilled had it not been for the patience, encouragement, and support of the high school sweetheart she had married 15 years earlier.

Dorothy got involved immediately. She joined APTA in 1970 and the Private Practice Section in 1971. In the ensuing years, Dorothy served on various committees and in 1978 was elected Secretary. In 1989 she was elected to the Nominating Committee and served as its Chair in 1991. When Dorothy first joined the Private Practice Section, there were perhaps 4 female members. This close-knit group mentored, shared business experiences, and taught her about private practice. With their encouragement, Dorothy opened her first private practice in 1973. Since this clinic was supported primarily by orthopedic surgeons whose ultimate desire was to own their own physical therapy clinic, Dorothy elected to relocate and to market her services to family practice physicians, who had little knowledge of physical therapy and, more importantly, no interest in owning their own physical therapy clinic. Rocky Mountain Physical Therapy was opened in 1978. There were 5 private practices in Denver at that time, and in a cooperative effort they designed a brochure, purchased a booth, and exhibited at state family practice meetings. In April of 1990, Dorothy assumed ownership of a clinic that had been owned by a group of orthopedic surgeons who wanted out of the physical therapy business, naming it Central West Physical Therapy.

It is the Orthopaedic Section's good fortune that Dorothy's service to physical therapy extended far beyond her initial memberships in APTA and the Private Practice Section. In 1971 Dorothy took a manual therapy course from Stanley Paris and became an active proponent of manual therapy. She was also one of the enthusiastic founders of the Orthopaedic Section, which was formed in 1974. She served on the Board of Directors as Secretary in 1978, served on the Judicial Committee, and eventually served on the Finance Committee. She was elected Treasurer in 1992 and was elected to a second term in 1996. The Orthopaedic Section is now the largest section within the APTA.

As a result of the formation of this Section, other special interest groups wanted to become sections and be recognized by the APTA. The national office was concerned that too many sections would splinter the national association. As a solution to this problem, the Combined Sections Meeting (CSM) was initiated. Dorothy served on the national committee whose task it was to plan the program and business meetings so as to afford therapists affiliated with more than one section the opportunity to participate in each. Dorothy also presented a lecture on fracture management at a CSM.

Service to the profession at the state level, too, has commanded Dorothy's attention, whether as organizer, as advocate, as speaker, or as representative. She founded the first Orthopedic Study Group in Colorado and chaired it for the first 2 years. She chaired a committee on unionization at a time when unions in Denver hospitals proposed to group physical therapists with nurses aides and orderlies. She served as guest speaker at 2 state annual meetings, presenting topics relating to the utilization of mobilization in rehabilitation of the knee and the spine. She presented 2 courses sponsored by the American Academy of Orthopedic Surgeons. She independently planned and presented a 30-hour workshop on evaluation and mobilization of the spine, as well as a 28-hour workshop on evaluation and mobilization of the extremities. Both workshops were repeated for several years. Dorothy served the Colorado Chapter as delegate to the APTA House of Delegates from 1973 through 1985, serving as Chief Delegate in 1984 and 1985.

Dorothy has served the profession in less formal ways, as well. Perhaps inspired by her own early interest in physical therapy, Dorothy has mentored many physical therapy "wannabes"—many of

(Continued on page 13)

History of the Orthopaedic Section: The 1970s

Stanley V. Paris, PhD, PT
Dorothy Santi, PT

At the upcoming combined Sections Meeting in Seattle, WA (February 4-7, 1999) the Orthopaedic Section will proudly celebrate its 25th Anniversary. The Section's History Committee has planned a four-part series of articles depicting the key events in our founding, growth, and progression. The articles, authored by Stanley Paris, PhD, PT, Dorothy Santi, PT, Carolyn Wadsworth, MS, PT, CHT, OCS, Nancy White, MS, PT, OCS, and Joe Farrell, MS, PT, will appear quarterly during 1999.

The articles represent our attempt to initiate a written history, not only to record important events, but to rekindle the memories of long-time members about the vast amount of energy and work that went into organizing the Section some 25 years ago. We also hope the articles will give our newer members an appreciation of the Section's evolution so that they will continue to work to ensure that our organization remains committed to promoting clinical research, quality education, and excellence in patient care. Both the Section's Board of Directors and History Committee sincerely hope that you enjoy the articles, and we wish you the best in 1999!!

Joe Farrell, MS, PT
Director, Orthopaedic Section
Board Liaison, History Committee

In 1967, physical therapist Stanley Paris approached Eugene Michaels, then the president of APTA, about the feasibility of establishing a section for American Physical Therapy Association (APTA) members whose primary interest was manual and manipulative therapy. Paris was laboring under a two-pronged disadvantage: First, President Michaels was not receptive because he feared that such a section would be too specialized and that if such a section were allowed, therapists in other areas of specialization such as ultrasound might too request their own section. Michaels clearly wished to avoid fragmentation of the national organization into a disparate collection of sections. Second, and perhaps more importantly, at that time manipulative therapy was not widely accepted within the physical therapy profession.

But Paris would not be dissuaded. That same year, 1967, a group of physicians—Dr. John Mennell and Dr. Janet Travel among them—formed the North American Academy of Manipulation Medicine. Paris wrote to the Academy requesting full membership for physical therapists, but Travel, the group's first president, replied that "manipulation [was] a diagnostic and therapeutic tool to be reserved for physicians only." Another brick wall.

Paris again persisted. He set about forming the North American Academy on Manipulation Therapy, with a formation meeting held in Boston on 28 August 1968. In attendance were invited representatives of both the APTA and the Canadian Physiotherapy Association (CPA). Also present were Mennell from the United States and Cliff Fowler and John Oldham from Canada.

Interest in manipulation therapy was growing. In 1971, Paris and Oldham invited Freddy Kaltenborn to the United States and to Canada. Now, in addition to courses being taught by Paris, enthusiastic therapists interested in expanding their manipulation skills and knowledge base could participate in courses offered by Kaltenborn. The North American Academy on Manipulation Therapy presented a series of seminars, and physical therapists were eager participants.

By 1974, the Academy could boast of 942 members, mostly American. It met the growing needs of its members by publishing a newsletter and by conducting seminars and conferences. Even in the face of the Academy's success, many physical therapists held to the lingering sentiment that manipulation treatment was merely a fad. Academy leadership, however, saw that the Academy's goals could be met by forming an orthopaedic section within the APTA and a special interest group within the CPA. The foundation having been laid over the course of seven productive years, the time had come for organization-building within the mainstream professional bodies.

In early 1974 a constitutional conference was called in Chicago, at which time bylaws were approved and officers elected. In June of 1974, over seven years after Stanley Paris first approached the APTA to request section status, the Orthopaedic Section was approved and Paris was elected its first president. Sandy Burkhart was elected vice president, Peter Edgelow, secretary, and Stan Schlacter, treasurer. Also in 1974, Mariano Rocobado appeared on the scene. Rocobado's contributions, in conjunction with the continued activities of Freddy Kaltenborn, served to further advance the breadth and depth of manual therapy.

Dr. John Mennell, a strong proponent of physical therapists employing manipulation techniques, was the featured speaker at the inaugural banquet in June 1975. The topics of several position papers presented at that meeting presaged vital questions and controversies that the Section would face in the years to come: certification for specialization, chiropractic, and osteopathy. Coming challenges aside, 1975 marked the year in which our national body recognized mobilization as a valid treatment procedure, with the first APTA-sponsored course in joint mobilization preceding the meeting. At the meeting, plans also were made for the first Combined Sections Meeting to be held in Washington, D.C., in February 1976.

Orthopaedic Section leadership quickly recognized that its mandate extended beyond manual and manipulative therapy, and they began to address other issues in Section publications. Paris briefly served as the first editor of the Bulletin, succeeded by James Gould in the summer of 1976.

Threats to the physical therapist's right to practice joint mobilization were met head-on in 1976. Members voted to establish a legal fund to defend that right, the money to be raised by assessing $2 in addition to the $10 membership dues. This action was necessitated by challenges posed by two groups. First, chiropractors voiced their opposition to physical therapists practicing manipulation. Chiropractors were becoming better organized and they were upgrading their curriculum by adding courses similar to those being taught in the typical physical therapy program. Second, athletic trainers in Pennsylvania substituted "athletic trainer" for "physical therapist" in their practice act and added, "to treat without physician referral." This was defeated. The

APTA House of Delegates approved treatment without physician referral in 1974 but rescinded it in 1978. These events, plus the fact the physical therapists could no longer practice chest physical therapy without sitting for the inhalation therapist examination, rendered the need to develop certification for specialization more urgent than ever. Further, the membership felt that an exam or a certificate of competency for teachers, too, should be developed. Recalling the seven years it took to become recognized by the APTA as a Section, members realized that the immediacy of the problem demanded that the push for certification come from within the sections.

The Task Force on Clinical Specialization held its first meeting in Washington, D.C., with representatives from all sections plus two members-at-large in attendance. The Task Force worked out a tentative plan for Advanced Clinical Competencies to be presented to the 1978 House of Delegates. At the 1978 meeting of the House of Delegates, the concept of specialization was approved, and 1978 saw significant progress toward establishing competencies for specialization in orthopaedic physical therapy.

There were several other events of note in 1978. Florence Kendall was awarded "Honorary Membership to the Orthopaedic Section" for her work in helping the Section develop its by-laws. The Bulletin was converted to a Journal. Section by-laws were updated. The Acupuncture SIG requested that the Section BOD consider their becoming a "subsection." And Section membership stood at 3,000—up from 1,800 just one year before, despite a 1977 dues increase to $12.

As the Section grew, a concomitant need for increased information emerged. The Journal had been doing double duty—disseminating news of Section business as well as publishing scientific articles. Section leadership quickly realized that the competing and burgeoning demands of both Section business news and scholarly articles for Journal space could not be reconciled within a single publication. Dues were increased to $20, and as it had earlier, the Section again began publishing a Bulletin for news, this time in addition to the Journal. Journal subscriptions stood at 3,572 for Orthopaedic Section members, 1,794 for Sports Section members, and 2,387 for nonsection members. The needs of Section members—as well as nonsection members—were being met.

The Orthopaedic Section had quickly become the largest APTA section and, as such, recognized its capacity to effect change within the profession by virtue of its dominant position within the national organization. But it also recognized the need to exercise restraint. A quotation from the Summer 1978 issue of the *Bulletin* expressed the sentiment of the times very well:

> We in Orthopaedic Physical Therapy are in a position to take the lead role in changes that will occur in our profession, i.e., certification of the specialist. We must work within the system. Remember we are Physical Therapists first and Orthopaedic Physical Therapists second. Our strength lies in being strong and active members in the APTA and its respective chapters and sections, rather than only our section.

The accomplishments of the Orthopaedic Section in its first six years resonated throughout the entire physical therapy community: in a profound transformation, the technicians of the 1960s and early 1970s were becoming skilled clinicians capable of evaluating and treating without specific physician referral. Physicians were beginning to respect the assessments and treatments their patients were receiving and started to include physical therapy as an integral component of their treatment of musculoskeletal problems. Orthopaedic physical therapy was coming of age.

Guess who these people are? Answers are on page 45.

Manual and manipulative therapy continued to grow internationally, eventually resulting in the establishment of the International Federation of Manual Therapy (IFOMT), which is the first clinical subsection of the World Confederation of Physical Therapy (WCPT). Only organizations, not individuals, can be members of IFOMT. In order to become a member, an organization's members must each, as individuals, meet IFOMT standards. Within the APTA, there was not and is not a mechanism whereby such a select group can be formed because any APTA member is free to join any section. Thus, once again there emerged a need to form an Academy—this time the American Academy of Orthopaedic Manual Physical Therapists. The Academy successfully applied for IFOMT membership in 1993 and has since established solid ties with the Section. The president of APTA is the official liaison between the Academy and the APTA.

Guest Editor's Message

A View of the Ivory Towers...

Last fall I ventured into the world of rowing and took a beginner class offered at the former Olympic site on Lake Lanier, Georgia. I recently had the opportunity to row in my first race. Each of the nine people in our boat contributed a unique and critical element individually. Just to move the boat along the race course, let alone at a respectable pace, required extremely precise teamwork. Complete cooperation, attention, and effort was expected from every team member, novice to experienced. The analogy to what is needed in the profession of physical therapy is clear. In the past few years, there has been increasing animosity expressed between clinicians, researchers, and educators in our profession. At the heart of the issue is the often less than scientific manner in which we approach the practice of our profession and a perception on the part of clinicians that much of the research done is not clinically applicable. When I first graduated as a physical therapist in 1979, this schism did not seem so apparent. I was initially disheartened with what seems to have brewed into an even hostile battle between clinicians and researchers. Upon reflection, however, I realize that crossfire from our respective ivory towers is better than the previous decades of silence between the factions.

The term ivory tower is usually applied to academicians and implies a world which is isolated and elitist. Typically some sort of dues are required to get in the door, such as a Ph.D. There is a sense that those in an ivory tower spend their time on esoteric projects and lack understanding of the real world of clinical practice. Academics may maintain their ivory tower position by studying and publishing research that lacks clinical relevance and by failing to bridge the gap between complex methodology and analysis and implementation of results into clinical practice. I would suggest, however, that for every academician in an ivory tower, there is a clinician in one too. The clinical ivory tower is an elitist culture which is isolated from scientific evidence, and requires some sort of admission ticket, such as a clinical certification or advanced course work. Clinicians may maintain their ivory tower position by continuing to support continuing education courses which do not include scientific evidence for the content presented and by discrediting research findings with statements such as "how would they know anything about studying end-feel, they haven't seen a patient in years!"

I believe that it is time to move on to a new stage, that is to come down from our ivory towers and climb into the boat of evidence-based physical therapy practice together. There are too many patients to be seen, too much research to be done and too many students to be taught to have less than complete cooperation and effort from every member of our profession. We need the expertise of our clinicians to improve the function and well-being of our patients and guide our research questions, the expertise of our researchers to lead us in scientific endeavor to improve our patient care, and the expertise of our educators to assist in teaching us how to meld clinical practice and science together in undergraduate and continuing education. We must value each of these areas of expertise and somehow find a method by which the contributions from each area are shared. This is evidence-based practice. It involves practice which has a theoretical body of knowledge, uses the best available scientific evidence in clinical decision making and standardized outcome measures to evaluate the care provided. It necessitates a team approach to the practice of physical therapy.

The following is a checklist for each team member to evaluate your contribution to the practice of evidence-based physical therapy. Are you pulling your weight?

If you are primarily a researcher:

1. Do you seek out clinicians in your area to assist in developing clinically relevant research questions?
2. Do you publish your methods, analysis, and results in a format to be useable for clinicians in addition to traditional presentations?
3. Have you considered teaming up with expert clinicians to publish clinical papers and teach clinically-oriented courses which incorporate your research findings?

If you are primarily a clinician:

1. Do you consider the evidence which supports the clinical tests, diagnosis, and intervention and utilize a valid measure of outcome for every patient?
2. Do you seek out continuing education courses which include scientific evidence as part of the content?
3. Have you arranged efficient access to literature searches and to acquiring journal articles and read one or more journal articles per week?

If you are primarily a physical therapy manager or clinic owner?

1. Is your clinical culture supportive of evidence-based practice, allowing clinicians time and resources to implement evidence-based practice?
2. Do you provide and support continuing education which is evidence-based?
3. Is job performance based on exhibiting the characteristics of an evidence-based clinician?

If you are an educator at the undergraduate and/or continuing education levels:

1. Do you incorporate clinical and scientific evidence into all of your courses?
2. Do you role model evidence-based practice?
3. Do you provide students with criteria for selecting evidence-based continuing education and employment opportunities?

If you are a leader in our professional association (national, local, or section levels):

1. Do you sponsor and promote only courses which include scientific evidence for the content presented?
2. Are you promoting clinical specialization programs which combine clinical expertise and expertise in the skills and knowledge to be an evidence-based clinician?
3. Are you promoting a team approach by clinicians and researchers to forward the scientific basis of the profession?

If you are an editor of a professional newsletter or journal:

1. Do you publish the levels of evidence which support the courses and equipment you are advertising?
2. Do you attempt to publish information which is both scientifically sound and clinically meaningful?
3. Do you have a minimal standard for evidence for publishing papers?

This edition of *Orthopaedic Practice* features articles by members of the

North American Orthopaedic Rehabilitation Research Network. ‡The contributors to the newsletter are all network members and it is of note that two of the articles are written by clinician-research teams, several by clinicians who practice evidence-based practice and the remaining by researchers who are attempting to put their research results into a clinically useable format. The research network is an association of Canadian and American physical therapists, 5 of whom are primarily researchers and 32 of whom are primarily clinicians. The goal of the network is for clinicians and researchers to work together to develop and complete research projects applicable to clinical practice. The network has completed two projects to date, the first has been accepted for publication and the second is in the data analysis phase. We are excited about the enthusiastic response by clinicians and researchers who are finding the following benefits to this type of team approach: enhanced professional satisfaction, opportunity to participate in clinical research, facilitation of data collection, access to others in the network as clinical and research resources and increased collegiality. This approach to evidence-based practice may be useful for others to consider as a model.

The news in this *Orthopaedic Practice* and in the literature in general is exciting; we have an increasing number of validated outcome measures and clinical trials to support an evidence-based approach to orthopaedic physical therapy. Rather than getting caught in the crossfire, let's spend our time working as a team to incorporate existing evidence into physical therapy practice. In cases where there is no peer-reviewed literature available to support an approach, team members must strive to be cautious with claims, carefully document patient outcomes with appropriate outcome measures and actively support research to validate the approach. So, it's time to come down from our ivory towers and climb into the professional boat of evidence-based physical therapy practice together....all of the contributors to this edition of *Orthopaedic Practice* will tell you that the water is fine!

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Make the Most of Your Charitable Giving!

Recent studies show that people make charitable contributions primarily because they want to make a difference. But whether they support educational foundations, medical research, or humanitarian programs, 95% of contributors feel they lack the knowledge that is essential to maximize the effectiveness of their gifts.

Like most people, you're probably familiar with donating cash and tangible goods such as clothes, furniture, and food. But you may be less familiar with other avenues for giving that could provide even more benefits, to you as the giver, as well as to the charities you choose.

One increasingly popular method for donating to charity is through a charitable trust. A charitable trust not only provides a sizable donation to a charity you choose, but gives you a current income tax deduction, income for yourself or beneficiaries, and provides a way to avoid paying capital gains taxes on highly appreciated property. A charitable trust can also solve various estate planning problems.

There are several different types of trusts available and one can be tailored to suit your individual needs and goals. For additional information on how to make this work for you, contact Terri DeFlorian of the Orthopaedic Section.

Evidence Express
News and Updates for the Evidence-Based Clinician

Long-term Benefits of Exercise for Patients with Chronic Low Back Pain

In a randomized controlled clinical trial, Frost et al examined the effectiveness of exercise in 81 patients with LBP for more than 6 months referred for PT.[1,2] The exercise group participated in 8 exercise classes over 4 weeks (strength, stretches, aerobic) plus home exercise and back school. The control group received home exercise and back school. The study demonstrated a significant improvement in the exercise group over the control group in Oswestry scores (function), pain (sensory and affective), self efficacy, and walk test measures. This difference was maintained in Oswestry scores at 2 year follow-up.[1]

1. Frost H, et al. A fitness programme for patients with chronic low back pain: 2 year follow-up of a randomised controlled trail. *Pain*. 1998;75:273-279.
2. Frost, H et al. Radomised controlled trial for evaluation of fitness programme for patients with chronic low back pain. *Brit Med J*. 1995;310:151-154.

Free Literature Search on the Internet!

www.ncbi.nlm.nih.gov/PubMed/medline.html

Loansome Doc, a service to order publications through a regional medical library in Canada and the United States is also available through this site. Instructions for registering for this service are straightforward-just look up an article and indicate that you want to order it, the Loansome Doc registration information is automatically pulled up.

Rules of Evidence

It is recognized that in physical therapy, while there is an increasing amount of evidence to support our interventions, clinicians may be faced with a lack of evidence to support an intervention. The following Rules of Evidence may assist clinicians in judging the level of evidence which exists: (Sackett, DL. Rules of Evidence and clinical recommendations. *Can J Cardiol*. 1993;6:487-489)

Level I: Large randomized trials with clear-cut results and low risk of error

Level II: Small randomized trials with uncertain results and moderate to high risk of error (often this error is related to low numbers in groups, leading investigators to conclude no difference when one may truly exist; another common uncertainty is no difference due to poor classification of patients to appropriate treatment groups)

Level III: Non-randomized contemporaneous controls.

Level IV: Non-randomized historical (retrospective) controls.

Level V: No controls, case series or reports only.

Clinicians can learn more about determining the quality of effectiveness studies through reading or continuing education courses on critical appraisal of the literature. A good place to start is the *Canadian Medical Association Journal* series in 1983 or the *Journal of the American Medical Association* Series in 1993 on reading and appraising medical literature.

Research to Solve the Problem of Low Reliability of Manual Spinal Stiffness Assessment

A Report from Christopher Maher, PT, PhD, Senior Lecturer, School of Physiotherapy, Faculty of Health Sciences, The University of Sydney, Lidcombe NSW Australia.

In attempt to solve the low reliability of manual judgements of spinal stiffness we have conducted a range of research activities. We firstly worked with engineers to develop instruments to accurately measure the stiffness properties of the spine. Once we had developed these instruments it became apparent that the spine's response to posteroanterior (PA) forces is quite complex and we have now enlisted the help of a rheologist to quantify the viscoelastic properties of the spine. At the same time we built a model spine that could mimic the mechanical properties of the spine and we enlisted a psychologist into our research team to conduct perceptual studies. The joint conduct of both biomechanical and perceptual studies was important because we were able to establish whether a feature in the protocol for manual stiffness testing affected measured PA stiffness, perceived stiffness or both. The disassociation between measured and perceived stiffness was very interesting. For example, we found that when subjects tested stiffness stimuli with their eyes closed, the same stimulus felt much stiffer than when their eyes were open. We have used this research to develop a new protocol for manually rating PA spinal stiffness, which has more acceptable reliability. The protocol requires therapists to control factors in the clinical environment that affect measured or perceived stiffness and to rate the stiffness of the spine relative to reference stiffness stimuli. In the future we aim to refine the protocol to hopefully improve its criterion validity and to develop protocols to rate other attributes of the spine such as viscosity. In this regard we have been assisted by a recent research project conducted with Maureen Simmonds from Texas exploring the meaning of descriptors physiotherapists use to describe the feel of the spine when they use the PA pressure.

Effectiveness of Methods of Stretching Hamstrings Investigated

Bandy et al, in several studies have investigated the most effective method to stretch hamstrings.[1-3] Results of earlier studies suggested that a 30 second sustained stretch 5 days per week for 6 weeks was more effective than shorter durations and as effective as longer and repeated stretches. [1,2] A recent study compared the effects of dynamic range of motion stretching (DROM) with static stretch on hamstring flexibility.[3] Dynamic range of motion stretching using a contraction of the antagonist (quadriceps) muscle to stretch the hamstrings and has recently been advocated as a new and superior method of muscle stretch. Fifty-eight subjects with limited hamstring flexibility (defined as 30 degrees loss of knee extension measured with the femur held at 90 degrees of hip flexion), were randomly assigned to one of three groups. One group performed DROM 5 days a week by lying supine with the hip held in 90 degrees of flexion. The subject then actively moved the leg into knee extension (5 seconds), held the leg in end range knee extension for 5 seconds, and then slowly lowered the leg to the initial position (5 seconds), repeated 6 times. The second group performed one 30-second static stretch, 5 days per week. The third group served as a control group and did not stretch. Before and after 6 weeks of training, flexibility of the hamstring muscles was determined in all three groups by measuring knee extension range of motion (ROM) with the femur maintained in 90 degrees of hip flexion. The results of this study suggest that, although both static stretch and DROM will increase hamstring flexibility, a 30-second static stretch was more effective than the new technique, DROM, for enhancing flexibility.[3]

1. Bandy WD, Irion JM, Briggler M. The effect of static stretch and dynamic range of motion training on the flexibility of the hamstring muscles. *J Orthop Sports Phys Ther*. 1998;27:295-300.
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Evidence-Based Practice

Beverley Padfield, PT, FCAMT and Sue Ann Lott, PT

Evidence-based practice is defined as practice which has a theoretical body of knowledge, uses the best available scientific evidence in clinical decision making and standardized outcome measures to evaluate the care provided. Whether your clinic is located in a large urban center or a remote rural setting, it is a challenge to use evidence- based practice in your clinical decision making when dealing with clients. These challenges come in many different forms and combinations regardless of your clinic location and size. A few of the more common ones include the willingness to dedicate personal and professional time to identify and critically appraise the evidence as well as the more technological aspects of accessing the information.

The alternative to evidence-based practice is practice based on anecdotal clinical observation and unsubstantiated descriptive material and techniques gleaned from written material, colleagues or continuing education courses. No clinician practices entirely in one manner or the other, at issue is the balance between evidence-based practice as described above, and anecdotally-based practice. The ideal clinician practices with clinical experience guiding one hand and scientific evidence guiding the other. The dangers of a practice guided only by clinical experience and observation are numerous: quality of patient care suffers, and professional ethical and legal accountability are at a risk.

Evidence-based practice has provided us with the confidence to treat and educate our clients. We have experienced the opening of alternative marketing venues. Our referral sources, reimbursement agencies and other customers are enticed by the quality, and often, the cost-saving benefits which result through evidence-based practice. Sharing with our colleagues, be it within the confines of our clinic or through other communication avenues, has fostered a sense of community and unification in our endeavors to provide evidence-based physical therapy. Our students are incorporated into this program and begin to form sound practice patterns as we mentor them in this form of practice.

With these benefits in mind, what are some ways to initiate an evidence-based practice?

Define the present resources. For the last few years, thanks to the advancement of technology with computers, teleconferences and electronic-mail, the task of locating resources has become more user friendly to all North American clinicians. There are several avenues that we have used in our clinical experiences to obtain the best possible available scientific knowledge. Services offered through university and hospital libraries to search and retrieve requested articles has been extremely useful at minimal cost. Today, MEDLINE searches through the Internet have helped relieve some of that dependence. Membership in the Orthopaedic Division/Section has facilitated easier access to articles of interest and scientific results.

Formulate an action plan to access more resources. In fulfilling our objectives as life long learners, attendance at various courses has always been paramount in our growth as Orthopaedic clinicians. A variety of courses ranging from practical "how to" courses to analyzing research articles has been the type of post graduate learning we have attended. Sharing the course content upon returning to the clinic and teaching coworkers has aided in our continued learning. Case presentations with fellow physical therapists have helped to improve treatment outcome. Sharing clinic information through the use of video has been used in our clinics. This method is helpful in analyzing clients with unique presentations which otherwise would not occur due to travel restrictions.

Establish a working relationship with a clinical researcher or group of researchers. Linking with university programs is another resource we have to utilize to maintain strong evidence-based practices. Working with researchers in data collection, suggesting suitable topics for studies and mentoring students are a few ways that teaching facilities and clinics can help in each others professional growth. For example, the use of standardized outcome measures has evolved over the last five years. It has been a challenge to select appropriate measurement tools which are not too time consuming for therapists and clinicians and yet produce useful data for treatment planning and third party payers. Networking with knowledgeable researchers in this field has been a definite plus for our clinical practice and has aided in the interpretation of appropriate measurement tools. We believe that our care for the clients has improved because we focus on their functional goals such as putting on their shirts rather than shoulder internal rotation. Communication with clients has improved because they realize we are concerned about their functional limitations and will attempt to positively affect those areas. Physical therapists have improved their clinical decision-making regarding a client's change in condition and continuation or discontinuation of a treatment procedure. The physical therapist also takes notes of an increase in their work satisfaction. The message that physical therapists care about quality of care and simultaneously provide the outcome of the interventions sent to payers and referral sources is very positive.

Develop practice parameters from these discussions. As a result of ongoing review of the literature our clinics have established several practice parameters. For example, in our clinics, we measure outcome in our patients using functional outcome measures which are clinically efficient and have been shown to be reliable, valid and sensitive to change. On each patient we administer the Patient Specific Functional Scale and an appropriate condition specific scale at admission and weekly intervals thereafter. We use these scales to establish functional goals for our patients. Another example is the validation of our practice by incorporating the use of exercise, including strengthening, flexibility and fitness for patients with chronic low back pain.[1,2] While this approach was utilized to some extent prior to the availability of the scientific evidence for its long term benefit, we now have evidence to support it and an expectation that it will be included in the plan of care for these patients.

Identify relevant topics to explore and commit to a regular time of discussion weekly, biweekly or monthly. Set aside time to evaluate the results. For the last ten months, since collecting workload and outcome measures on all outpatients at Four Counties General Hospital, we are pre-

paring to analyze practice patterns. We have the capability of using the Patient Specific Functional Measure Scale and the Visual Analogue Scale to compare therapist's time efficiency and client improvement using two outcome measures with specific diagnoses. This type of information is useful for staff morale as well as third party payers and, in the future, to establish critical pathways. Consider analyzing your practice patterns by functional outcomes of patients with similar disabilities, number of treatments given per occurrence, cost analysis, etc.

As the health care system continues to evolve and often times produces more chaos than comfort and confidence, conscientious therapists must use both individual clinical expertise and the best available external evidence in clinical decision making. One cannot exist without the other. Evidence-based practice appears to be the tool to offer stability and consistency in today's clinical environment.

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Sue Ann Lott, PT is owner of Appalachian Physical Therapy, Clinical Professor at North George College and State Univesity, Dahlonega, GA. Sue Ann is a full member of the Society of Orthopaedic Medicine, London, England.

Paris Distinguished Service Award

(Continued from page 6)

whom eventually became physical therapists—by hiring them as aides or by accepting them as volunteers. Through her clinics, she has provided clinical affiliations for students in physical therapy programs, primarily from Colorado University and Regis University in Denver, but occasionally from out of state, as well.

In her "spare" time, Dorothy has volunteered at local health fairs, doing postural screening and fitness evaluations. She has taught fitness as an instructor in the Jefferson County Adult Education system. And she also has served as guest speaker for various organizations outside the profession, including the Colorado Nurses Association and the Cornhuskers Christian Group, occasions which she uses to underscore the importance of exercise to good health.

The Paris Distinguished Service Award recognizes those whose leadership and years of tireless effort on behalf of the Orthopaedic Section have enriched us all. We proudly add the name Dorothy Santi to this exclusive list.

Measurement of Functional Status, Progress, and Outcome in Orthopaedic Clinical Practice

Jill Binkley, PT, MCISc, FCAMT, FAAOMPT

Introduction

Physical therapists are routinely challenged to determine whether a patient's condition has changed following one treatment or a series of treatments. Change may be detected as a decrease in pain on a pain scale, increased range of motion or a patient stating that they are able to do something which they were previously unable to do. We use this information to make decisions about continuing, discontinuing or changing our intervention. Information regarding the outcomes of our interventions is used to guide future clinical decision-making on an informal basis and, in some cases, on a more formal basis through systematic data collection, such as part of a quality assurance program. In addition, measurement of outcome is a critical component in formal clinical studies comparing interventions. The selection of appropriate measures of patient progress and outcome is critical. There is little in the literature, however, to assist clinicians in evaluating and interpreting the variety of self-report health status and functional scales available.

In clinical practice, we measure patients' status through informal inquiry "how are you doing today, are the stairs any easier?" and through measures of impairment, such as pain, range of motion and strength. Impairment measures alone are not adequate measures of outcome for several reasons. There is evidence that measures of impairment are not always strongly related to patients' functional capacity, which is often the critical goal of physical therapy intervention. An example is an athlete with a minor reduction in range of motion resulting in a major functional limitation such as inability to perform their sport. Poor correlation between impairment measures such as pain intensity, lumbar range of motion, strength and neurological findings and patients' functional ability has been documented in the literature.[1-4] In many cases, a suitable measure of impairment does not exist for documenting patient change. Consider a patient presenting with patello-femoral pain after running greater than 5 miles. There may be no pain to measure during the assessment and no other suitable impairment measure to document the change which is anticipated during the period of physical therapy intervention. An appropriate measure of function may be the only outcome measure with which to document change in this patient. The final reason to measure function in our patients routinely is that our patients' goals are typically to increase their level of function (eg, able to sit, run, comb hair, or go to work). It makes sense, therefore, to measure *functional outcome* in our patients. While impairment measures remain important in planning intervention and as part of measuring outcome, measures of function are a critical component of the outcome package.

What are the benefits of using functional status measures in clinical practice?

There are many benefits of incorporating standardized functional outcome measurement into practice. The first and most important is enhancement of patient care by focussing on functional goals which are of critical importance to the patient. Patient-clinician communication is improved as patients perceive your comprehension of their functional limitations. Clinical decision-making regarding continuation, change or discontinuation of treatment is improved. Finally, there is clear communication with referral sources and payers regarding patients' functional level and the functional goals and outcomes of physical therapy. This provides evidence as to the quality of physical therapy intervention provided to patients. Payers not only appreciate but are beginning to demand documentation of functional level, at a given point in time as well as functional goals and outcome.

What are the methods of measuring function in orthopaedic patients?

There are two principal categories of measures used to evaluate function in orthopaedic patients: self-report health status and functional scales and observed functional performance measures. Self-report functional scales vary from one page to many pages and are filled out by patients in the clinic or through phone survey. Examples of these are the SF-36 health status scale and the Roland-Morris back pain questionnaire.[5-7] Functional performance measures are observed by the physical therapist and may be a simple one-task test, such as timed walking, or a more complex battery of tests, such as functional capacity evaluations for patients with low back pain. Although there is an important role in physical therapy clinical practice for functional performance testing, self-report functional scales are recommended as the basic measure of functional status and outcome. This recommendation is based on the following factors: 1) the increasing number of scales with documented measurement properties suited to orthopaedic physical therapy practice, 2) functional scales are efficient and economical to implement in clinical practice. Self-report functional scales will, therefore, be the focus of this paper.

What are the types of self-report functional status measures for orthopaedic patients?

Self-report functional status measures, where patients respond verbally or with pen-and-paper to questions regarding their function are the easiest measures of functional outcome to incorporate into clinical practice. Functional status measures are classified as being:

1. *Generic,*
2. *Condition-specific, and*
3. *Patient-specific.*

Generic measures are designed to be applicable across a broad spectrum of diseases, conditions, and demographic and cultural subgroups.[8] Examples of generic scales are the Sickness Impact Profile (SIP)[9] and the SF-36.[6,7,10] Condition-specific health status measures are intended to assess disability and clinically important change in disability within a specific group (eg, patients with ACL deficiency, or low back pain). Examples of condition-specific scales are the Lysholm knee scale[11] and the Roland-Morris scale[5] for use with patients with low back pain. Health care policy mak-

ers and clinical researchers are interested in acquiring data on groups; clinicians are interested in obtaining information and making decisions concerning individual patients. Both generic and condition specific health status measures have been conceived with the former interest in mind. More recently, there has been a growing interest in using health status measures at the individual patient level.[12-17] In response to this need a third type of health status measure has emerged, the patient specific measure. The goal of patient specific measures is to aid clinicians in making decisions about the health or functional status of individual patients. Several patient specific measures such as the MACTAR,[13] MacKenzie[12] and Patient Specific Functional Scale (PSFS)[16-18] have been reported in the literature.

What are the criteria for selecting a functional status measure?

The following are suggested criteria when choosing a self-report functional status measure for use in clinical practice:

1. Scale developed using a systematic process of item selection, employs appropriate scaling, and item weighting, where applicable.[19]
2. Documented to be *reliable* in peer-reviewed format.
3. Documented to be *valid* in peer-reviewed format.
4. Documented to be *sensitive to valid change* in peer-reviewed format.
5. Easy to administer with respect to patient and clinician time. Easy to score.
6. Scales appropriate for wide application to patients in the clinical practice, including patients with different initial functional levels, conditions, diseases, problems and ages. This improves the compliance of clinicians in using the scales and simplifies the logistics of maintaining copies of scales in the clinic.

Development of a functional status measure which is scientifically sound and clinically useful is a complex process.[19] The initial step is item, or question, generation. This is usually carried out by interviews with expert clinicians, questioning of patients and review of existing scales, if applicable. Types of information included in scales is critical to its measurement properties. For example, some scales include questions which are clearly impairment items rather than function, such as range of motion, swelling or thigh atrophy.[11] In the case of the Lysholm knee scoring scale, for example, data such as thigh atrophy is converted from centimeters to a 3 point scale of atrophy. The inclusion of impairment data may impact the measurement properties of the scale where the reliability of the impairment measure is lower than that of the functional scale. In addition, functional change may be obscured in cases where thigh atrophy is not changing while function is improving. Finally, information is lost in converting continuous data (eg, cm or range of motion in degrees) to ordinal data (eg, 5 point scale).

Once items are determined, the initial version of the scale is pilot-tested by administering the scale to a group of appropriate patients. Items are then systematically reviewed for inclusion or exclusion in the final scale. A critical aspect in scale development is item scaling, which includes issues such as whether responses are dichotomous (eg, yes/no) or continuous (eg, a 7 point scale from 'unable to perform the task' to 'no difficulty'). The type of scale selected, number of scale points and labels for scale points are examples of factors which significantly impact the reliability, validity and sensitivity to change of a measure.

Reliability, validity and sensitivity to valid change are termed the measurement properties of a test or measure. Reliability refers to the repeatability of the measure and reflects the measurement error associated with a measure. For a test or measure to be reliable, it must remain stable when a patient has not changed.[20] Reliability is often assessed by administering a scale or test at two points in time when a change in a patient's condition is not expected. Validity addresses the extent to which a test or measure truly measures what is intended; in the case of a functional scale, its validity is the extent to which the scale captures the functional capacity of our patients.[20]

The capacity of a measure or tool to detect change in an individual patient or groups of patients has been termed responsiveness.[19,21,22] The term responsiveness, however, denotes a test's capacity to measure change but does not address the validity of the change, or whether the change measured truly reflects clinically important change. The term *sensitivity to valid change* encompasses both concepts of the capacity of a measure to detect change and the validity or meaningfulness of the change.[21] Examination of the validity of the change requires the use of an external measure, such as a patient/clinician rating of change or the use of construct in which there is evidence that one group will change at a different rate than another (eg comparison of patients with acute versus chronic conditions).

There are important clinical implications in selecting a tool which does not have established or acceptable measurement properties on the patient population in which it will be used clinically. For example, a clinician will be unable to detect true change in a patient's status from measurement error when using a functional scale which has poor reliability. Another example is when a measure shown to be sensitive to valid change in a particular population, for example patients with knee conditions, is used for patients with other conditions, such as foot and ankle conditions. The scale may not be as sensitive to change in the foot and ankle population. The risk of incorporating a health status measure into your practice without documented measurement properties is significant. It is possible that patients may be improving, but the scale is incorrectly designed and, therefore, not indicative of important functional improvement occurring in your patients.

It is critical that any scale selected for implementation into clinical practice provide the clinician with information regarding patients' functional status which is germane to clinical decision-making. Ease of administration and scoring are also critical. In cases where, for example, complex calculations or a computer is required to compute a score, functional scores may not be available to clinicians for day-to-day decision making. In situations where a scale is scored outside the clinic, such as through the utilization of a database, clinicians should be aware that the application of functional measures for establishing initial functional level and tracking progress and outcome on individual patients will be precluded.

How are self-report functional scales used to make comparisons between patient groups?

Measurement of health status and function in our patients serves 2 important and distinct purposes: 1) documentation of physical therapy outcome in *groups* of patients, for quality assurance, establishment of clinical standards and/or research purposes and 2) documentation of functional level, setting goals, measuring functional progress and outcome in *individual* patients.

Outcome assessment procedures to date typically focus on the process of measurement of health status and/or function at initial assessment and at discharge in order to answer the question "Has this group of patients' functional status changed during the intervention period?" This information provides clinicians, administrators and payers with information regarding physical therapists and clinic performance on groups of patients. Patients may be grouped by categories such as diagnosis, clinic, physical therapist, or demographic factors in order to draw conclusions regarding patient outcome in these groups. Where comparative data are available, such as in pooled databases, clinics and clinicians can compare outcomes to other groups of patients and clinics. When the goal of measuring functional outcome is to compare groups of patients within a clinic or between clinics with respect to health status and function, the critical measurement properties required are those described for all functional scales. Selected scales must have been demonstrated to be reliable, valid and sensitive to valid change in the population of patients for which you intend to use the scale. Condition-specific and generic measures are appropriate for between-group comparisons while patient-specific scales are not.

How can self-report functional scales be used to measure function and set goals for individual patients?

There is little in the literature to assist physical therapists to use available health status and functional scales to achieve the first purpose of documenting function, setting patient goals and measuring patient progress in individual patients. Often, self-report health status and functional scales are many pages, require detailed calculations to score and, are, therefore, not suitable for clinicians to elicit, score and interpret measures within the clinical setting on a regular basis. In order to use self -report functional scales to document function and change in function, scales must be easy to administer and score on a regular basis (for example, weekly) in the clinic. Once these criteria related to ease of administration of self-report scales are met, clinicians must also be armed with information regarding the reliability, validity and sensitivity to valid change of the tool being used. In this case, however, the information must be provided in a format to enable a clinician to answer the following questions: 1) What is the functional status of a patient at a given point in time? 2) Has a patient's functional status truly changed? and 3) Has a patient's functional status undergone an important change?

A self-report functional scale may be used to determine the functional status of an individual patient at a given point in time. In interpreting such a score, however, one must recognize that there is inherent variability in any clinical test or measure. This variability can be attributed to the patient, examiner, instrument, and measurement process. The variability in a test or measure is the test-retest reliability and is usually expressed as a reliability coefficient, such as an intra-class correlation coefficient. A reliability coefficient of, for example, R=.85, can be difficult to interpret, particularly as it applies to an individual patient. Thus, for decisions on individual patients, the expression of the error in the units of the scale, ie. scale points, is important in addition to a high reliability coefficient (ie., >.85). If the error for any given scale measure is expressed in scale points, with a given confidence associated with that error estimate, the clinician can apply this to a given measure on a patient. For example, if the error associated with a particular 100 point scale is 11 scale points, with a 90 % confidence interval, the interpretation of this is that given a score on a scale of, for example, 20/100, a clinician can be 90% sure that the patient's true score lies between 9 and 31. Each functional scale (and every measure we use!) has a particular error value associated with it.

In order to determine if true change has occurred in an individual patient's functional status between an initial and follow-up point in time, one must examine the change score between the two points. In this case, however, the estimate of the error of this change score must account for potential error at both initial and follow-up assessments. This error is termed the minimal detectable change (MDC) and is expressed as scale points.[23,24] If, for example, the MDC for a 100 point scale is 15, a change of 15 or greater in the scale is required to be confident that true change has occurred in your patient's functional status.

Finally, clinicians need to be aware of whether the change which has occurred in scale scores is an important functional change. In this case, one must be aware of the minimally clinically important difference (MCID) for the scale.[24] The MCID is estimated for a scale from studies examining sensitivity to valid change and is defined as the minimal change in a score or measure on a scale which is indicative of change in function which is important to a patient.

What are some condition-specific scales which meet the criteria for implementation in practice?

The following tables review several condition-specific functional scales relevant to general orthopaedic physical therapy practice which most closely meet the criteria above. It is acknowledged that there are additional functional scales, particularly related to sub-specialty areas such as condition-specific scales for the temporomandibular joint, arthritis scales, etc. which may be appropriate for incorporation into practice depending on the clinical setting.

It is of note that there are no condition-specific functional scales included in the tables for the upper extremity. Several scales have been reported in the literature which are applicable to the upper extremity, including the Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH),[25-29] the Shoulder Pain and Disability Index (SPADI)[30-32] and the Upper Extremity Function Scale (UEFS).[33] The DASH is a 3-page questionnaire which takes approximately 5-10 minutes to complete and about 5 minutes to score by hand. The SPADI and UEFS are 1 page and relatively simple to score. None of these scales meet all of the criteria for implementation into clinical practice at this time as the measurement properties of each have not been fully documented. The internal consistency of all 3 scales is acceptable: .86-.95 for the SPADI;[31] .96 for the DASH[25] and .83 for the UEFS.[33] Possible ceiling and floor effects have been reported for the SPADI.[30] The test-retest reliability of the SPADI has been reported to be moderate only (R = .63 to .66)[31] and has not been reported for the DASH or the UEFS. This makes application of these scales to individual patients difficult at this time as minimal detectable change is unusually high in the case of the SPADI (due to the low reliability reported) and not available for the DASH or UEFS. The SPADI has been reported to be more sensitive to change than the SIP in patients with upper extremity dysfunction.[30] Although there are initial reports supporting the construct validity of all three scales, further work is required to demonstrate adequate test-retest reliability, minimal detectable change, sensitivity to valid change and the minimal clinically important difference associated with each of these scales.

MEASURE AND CITATION	BACKGROUND	RATIONALE FOR SELECTING MEASURE
Patient Specific Functional Scale[16-18]	Developer of measure: Stratford, P Intended patient group: All patients with musculoskeletal dysfunction. Classification of measure: Self-report, patient-specific measure. Conceptual Framework: Conceived with individual patient decision-making in mind Time to complete (patient):Less than 5-minutes Time to score (clinician):About 10-seconds Possible scores:0 to 10 (average of individual Activity scores) Scale orientation: Higher scores represent less disability	1. Head-to head comparison studies have shown the PSFS to be better than or equal to the Roland-Morris, SF-36 and the NDI in patients with low back pain, knee conditions and cervical conditions, respectively with respect to reliability and sensitivity to change for individual patient decision-making. 2. Measurement properties are provided in a manner suitable for decision making at the level of the individual patient. 3. The PSFS can be completed by patients and scored by clinicians efficiently. 4. Since patients generate different activities, the PSFS is not intended for comparison between patients. It is, therefore, recommended for clinicians as an initial step in measuring functional outcome and/or as a complement to condition-specific measures to assist in measuring patient progress and outcome.
Roland-Morris Questionnaire[5,23,24,34-38]	Devloper of measure: Roland M, Morris R Intended patient group: Patients with low back Pain Classification of measure: Self-report, condition specific measure Conceptual Framework: Conceived with group decision making in mind Time to complete (patient): Less than 5-minutes Time to score (clinician): About 10-seconds Possible scores: 0 to 24 (whole numbers) Scale orientation: Higher scores represent more disability	1. Head-to head comparison studies have shown the RMQ to be better than or equal to competing self-report measures for patients with low back pain. 2. Measurement properties are provided in a manner suitable for decision making at the level of the individual patient. 3. The RMQ can be completed by patients and scored by clinicians efficiently.
Oswestry Questionnaire[35,39,40]	Developer of measure: Fairbank JC et al Intended patient group: Patients with low back pain Classification of measure: Self-report, condition specific measure Conceptual Framework: No other details provided Time to complete (patient): Less than 5-minutes Time to score (clinician): About 30-seconds Possible scores: 0 to 100 (whole numbers) Scale orientation: higher scores represent more disability	1. Frequently reported, however, the Oswestry's measurement properties do not appear to be as good as the RMQ. 2. The Oswestry can be completed by patients and scored by clinicians efficiently.
Neck Disability Index (NDI)[41,42]	Developer of measure: Vernon H, Mior S Intended patient group: Patients with neck pain Classification of measure: Self-report, condition specific measure Conceptual Framework: Conceived for all patients with neck pain.Fashioned after the Oswestry back questionnaire. Time to complete (patient): Less than 5-minutes Time to score (clinician): About 20-seconds Possible scores: 0 to 50 (whole numbers) Scale orientation: higher scores represent more disability	1. Principal pain related disability reported in literature for persons with neck pain. 2. Measurement properties have been computed in a manner suitable for decision making at the level of the individual patient. 3. The NDI can be completed by patients and scored by clinicians efficiently.
Lower Extremity Functional Scale (LEFS)[43]	Developer of measure: Binkley JM, Stratford PW, Lott SA, Riddle D Intended patient group: Patients with lower extremity disability Classification of measure: Self-report, condition specific measure Conceptual Framework: Conceived for all patients with lower extremity disability. Intended to be used on individual patients and groups. Time to complete (patient): Less than 5-minutes Time to score (clinician): About 20-seconds Possible scores: 0 to 80 (whole numbers) Scale orientation: lower scores represent more disability	1. Only condition specific measure validated on broad spectrum of lower extremity conditions 2. A head-to head comparison study has shown that the LEFS has a greater sensitivity to change fewer ceiling and floor effects than the SF-36. 3. Measurement properties are provided in a manner suitable for decision making at the level of the individual patient. 4. The LEFS can be completed by patients and scored by clinicians efficiently.

What are the Generic Health Status Measures applicable to orthopaedic clinical practice?

Several generic health status measures have been applied to a variety of patients with orthopaedic conditions, including the Sickness Impact Profile,[9] SF-36,[6,7,10,16,42,49,50] the SF-12,[44] the Functional Status Index (FSI)[45] and the Musculoskeletal Functional Assessment Questionnaire (MFA).[46-48] The SIP takes over 20 minutes for patients to complete and, therefore, will not be addressed here. The SF-36 and the MFA include a variety of physical and psychosocial dimensions of health and each take approximately 15 minutes to complete. Scoring of the SF-36 and SF-12 is relatively complex, while the mechanism of scoring of the FSI and the MFA is straightforward.

The SF-36 is a multidimensional generic health status instrument that includes eight health concept scales: 1) physical functioning; 2) role limitation (physical); 3) bodily pain; 4) general health; 5) vitality; 6) social function; 7) role limitation (emotional); and 8) mental health. In total, the instrument contains 36 items that represent a broad array of health concepts. All scales are linearly transformed to a 0 to 100 scale, with 100 indicating the most favorable health state. The measurement properties of the SF-36 have been well established on samples from diverse populations.[6,7,10,16,42,49,50] In orthopaedic conditions, the physical function and pain dimensions appear to be most relevant to patients, while the other scales pick up minimal dysfunction.[16,49,50] In addition, the SF-36 questions are more applicable to lower limb and low back problems with little relevance to neck and upper extremity problems.

The reliability, validity and sensitivity to change has been well documented for the SF-36.[6,7,10,16,49,50] While several of the SF-36 subscales have the capacity to measure change on patients with low back and lower extremity conditions, many of the subscales do not change in out-patient musculoskeletal conditions. For example, the mental health subscale of the SF-36 does not appear to measure important change in this patient population.[16,42,49,50] Although the SF-36 taps many aspects of health in a wide variety of patient populations, this can prove to be a disadvantage when attempting to measure change in orthopaedic out-patients with minimal levels of overall health dysfunction. For example, in a patient referred with Achilles tendinitis, questions such as "I lay in bed most of the day due to my condition" are not likely relevant to the patient's problem. For this reason, one must be aware of which of the subscales are sensitive to valid change in the patient group on which it is used, since many items in a generic health status measure will not be relevant to many patients in an out-patient orthopaedic practice. There is a risk of concluding that patients have not changed on many subscales of the SF-36, when in fact one would not expect these scales to pick up change which may be occurring in out-patients with orthopaedic conditions.

The SF-12 was designed as a shorter version of the SF-36 with the goal of reproducing the Physical Component and Mental Component summary scores of the SF-36.[44] In reporting on the reliability and validity of the SF-12, Ware and colleagues state that the SF-12 and SF-36 always reached the same statistical conclusions about group differences in physical and mental health status. The authors caution that since the SF-12 defines fewer levels of function and pools less reliable variance and should, therefore, be expected to yield less reliable assignments of individuals to those levels.[44] Ware et al conclude that "for large group studies (eg, n=500), the difference in measurement properties between the SF-12 and the SF-36 are not as important, because confidence intervals around group averages are determined largely by the sample size."[44] Thus, the SF-36 appears to be more appropriate than the SF-12 when group sizes are lower than 500, as is often the case with clinical and research data in physical therapy.

The FSI includes physical and social/role function activities and patients rank the degree of assistance required and the degree of pain and difficulty for each activity.[45] The FSI has been documented to be reliable and valid in patients with total hip replacement.[45] The sensitivity to change and application to other orthopaedic conditions has not been reported for the FSI. The MFA, a condition-specific measure designed for patients with upper and lower extremity musculoskeletal conditions, has been shown to have acceptable reliability for application to groups, but not adequate for use at an individual patient level.[45] Construct validity has been demonstrated for the MFA.[46-48] Both a ceiling (patients 'topping out') and floor effect (patients 'bottoming out') has been demonstrated for some patient groups and for several of the subcategorises of the MFA.[46-48] For example, 30% of all patients scored '0' (no disability) on self care and 40% of patients with rheumatoid arthritis scored '100' (maximum disability) on the employment/work category. The existence of these ceiling and floor effects as well as the single-group design used to demonstrate the tool's responsiveness are of concern in utilizing the MFA at this time.

When the intent of utilization of a scale is to document function and measure incremental change on an individual patient level, the reliability and sensitivity to change of a tool must be superior to the measurement properties traditionally considered acceptable for tools designed for group decision-making.[45,46] The generic scales reviewed here are excellent choices when the goal is group decision-making, but lack adequate reliability or sensitivity to change for individual patient monitoring. In addition, the most common scale used in orthopaedic practice and research, the SF-36 is time consuming to complete and score. It is most appropriate, then, to utilize generic scales at admission and discharge only, rather than as tools to measure incremental change on, for example, a weekly basis. Generic scales are most appropriate for use in groups of patients in whom overall health is expected to be impacted by their condition and by physical therapy intervention. An example may be in a group of patients with chronic low back pain.

How are patient-specific and condition-specific functional scales used to measure function, track progress and set goals for individual patients?

Clinicians can use a measure of patients' initial function, such as obtained with the RMQ, to set functional goals and track patients' progress. In order to set short and long term goals based on the RMQ score, the clinician must be aware of the clinical history and objective findings of the patient and set goals for change in the RMQ scores which are greater than the MDC for the scale. In addition, an estimate of change which is considered important will need to be made using the MCID. For example, consider a patient with an initial RMQ score of 15/24. The true initial score, based on the error associated with a single measure, is between 12 and 18. In setting a short term goal for a patient who you deem to be 'more chronic and likely to change slowly', one might select a 2 week time frame for a change in score just at the MDC and MCID, such as "RMQ less than or equal to 10/24". In setting a short term goal for a more acute patient who you predict to change quickly, a shorter time frame of, for example, one

week, with a greater change than this value may be selected. In this case, the goal may be "RMQ less than or equal to 7/24". On follow up, progress is determined by amount of change on the scale. In cases where improvement greater than the MDC and MCID occur, clinicians can be confident that true (MDC) and important (MCID) change has occurred. In cases where there is improvement that is greater than or equal to the MDC, but the change falls below the MCID, clinicians can be confident that true change has occurred, but that this may not be important change. Continuation of the intervention, or discharge if goals are met, would be justified in both the above scenarios. In cases where there is no change or change less than the MDC, clinicians may be confident that true change has not occurred. In this case, depending on the clinical picture and time frame since previous assessment, a change in intervention or discharge may be considered.

How would functional scales be incorporated into clinical practice?

The following case scenario is intended to illustrate utilization of the patient-specific functional scale (PSFS) and a condition specific scale (LEFS) to track patient progress, set short and long term goals and measure outcome:

Mrs. Q. is a 66 year old woman referred to physical therapy 2 weeks post right total knee arthroplasty. She was seen pre-operatively for 1 visit to familiarize her with postoperative routine and exercises, including the continuous passive motion machine (CPM). Mrs. Q was in the CPM machine as an in-patient for 3 days post-op (24 hours per day except when exercising and out of bed; setting 0 to 70 degrees). She was seen twice daily as an in-patient by physical therapy and given home exercises upon discharge.

Pain: Generalized achy pain after walking more than usual or sitting for long periods. Baseline pain 7/10.

Function: Retired, lives with husband who is well, in a single story home. Active home with homecare, gardening, caring for grandchildren. Walked regularly 1-2 miles per day prior to her knee problem. PSFS average 1.3/10. LEFS 20/80.

General Health: Hypertension (onset 3 years ago)

Medications: Antihypertensives, Tylenol for pain

Objective Examination:

Posture/Gait: Using walker for long distances and out of the house, cane in house. Decreased stance phase on right, decreased knee flexion during swing. Mild forward head posture, protracted shoulders, increased lumbar lordosis

Range of Motion:

Knee:	Active:	R = 25 to 70 deg.
		L = 0 to 123 deg.
	Ext:	R: lacks 10 deg (passive)
		L: to 0 deg. (passive)
Other Joints:		Hips and Foot/Ankle WNL.

Strength: 15 degree quads lag on R

Passive Mobility Testing: P-As femur on tibia restricted. Patellar mobility restricted in all directions.

The following functional goals and outcomes worksheet was developed to record patient specific activities and scores, condition-specific or generic scale scores as well as track impairment measures and goals on a weekly basis. The form is filled in to illustrate the use of functional scales to set goals and track patient progress for Mrs. Q. This form is kept in the front of all of our patients charts in our clinic for easy reference. The first column represents Mrs. Q's pre-operative functional scale scores, the second begins her post-operative course. Short and long term goals were set at the first post-operative visit and tracked on the same form. The goals were set to be greater than the MDC and MCID for the PSFS and the LEFS. The decision as to how much greater change than these minimal levels would be expected at 2-weeks and 4-weeks was based on clinical experience with the condition and the scales. The final goal of "LEFS score greater than 50/80" was based on clinical experience and data which suggests that this is a reasonable goal for patients following TKR.

How can functional status measures be incorporated into our practice efficiently?

Three issues affect the successful clinical implementation of self-report functional outcome measures: 1) effortless administration of the questionnaire; 2) easy interpretation of the result; and 3) efficient documentation in the medical record. It may be easiest to begin implementation of one scale initially. Many clinicians have found that the Patient Specific Functional Scale is a simple and efficient place to begin utilizing a standard measure of functional outcome. Once clinicians are familiar with setting goals and tracking progress on a regular basis using one scale, others relevant to your practice may be introduced.

To facilitate the administration of the measures, we keep a laminated copy of the Patient Specific Functional Scale and folders with condition-specific self-report scales in our assessment areas for easy access. In order to avoid the mounds of paper that can build up in a patient's chart, and for that matter to keep the cost of printing down, questionnaires can be kept in a plastic sleeve. Patients can respond directly on the plastic sleeve using a transparency-marking pen. Once the scale has been scored by the clinician, the transparency is wiped clean and is ready to be used again.

It is important that the scoring and subsequent transfer of functional scores to the medical record is efficient. The functional goal and outcome worksheet provides an efficient method of recording: 1) a patient specific measure 2) components of the physical assessment that are important to a specific patient (e.g., ROM measures, SLR angle); 3) a pain measure; 4) a condition-specific functional measure and, if desired, a SF-36 admission and discharge score and 5) short and long term goals. Having all of this information in one place in the medical record facilitates the use of functional scale scores for goal setting, determination of progress and tracking the achievement of treatment goals. In our experience regular weekly follow-up of all patients on these measures provides an efficient and comprehensive approach to documentation of patient progress and outcome.

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Functional Goal and Outcome Worksheet – Mrs. Q

Date and Score (weekly)

PATIENT SPECIFIC ACTIVITIES	Pre-op	Initial (Post op) 4/10/98	4/17	4/24	4/31	5/8/98
1. Walking	4	3	5	6	8	9
2. Weeding Garden	3	0	0	2	5	7
3. Standing doing kitchen work (cooking, dishes, etc)	3	1	5	8	8	9
AVERAGE: (/10)	3.3	1.3	3.3	6	7	8.3
ADDITIONAL ACTIVITIES:						
1. Up from chair	7	3	3	6	8	10
2. Into boat	8	2	6	9	9	10
PSFS PAIN QUESTIONS:						
PAIN LIMITATION SCORE: (No limitation=10)	5	2	4	9	9	9
PAIN INTENSITY SCORE:	5	7	5	2	2	1
CONDITION-SPECIFIC MEASURE: (LEFS /80)	29	20	25	42	52	57
IMPAIRMENT MEASURES:						
(EG. ROM, STRENGTH)						
1. Knee extension (passive)		-10	-3	0	0	0
2. Knee flexion (active)		70	82	93	101	106
3. Quads lag		15	0	0		
SHORT TERM GOALS: 2 Weeks						
1. No quads lag			✓			
2. Act & pass knee ext to 0 deg.				✓		
3. Knee flex 90 deg				✓		
4. PSFS 4/10				✓		
5. LEFS 35/80				✓		
LONG TERM GOALS: 4 Weeks						
1. Knee flex $\geq$ 100					✓	
2. PSFS $\geq$ 8/10						✓
3. LEFS $\geq$ 50/80					✓	

Use of Self-Report Disability Measures in Daily Practice: A Clinical Perspective

Michael J. Kelo PT, OCS and Daniel L. Riddle, PhD, PT

Introduction

Self-report disability measures have been used with increasing regularity in North America for approximately the past decade. The tremendous increase in the number of research articles designed to examine the measurement properties of self-report disability measures has no doubt lead to the increased usage of disability measures in clinical practice. Many papers have appeared in the literature espousing the use of disability measures as one of the most important instruments to document the effectiveness of care. In addition, many efficacy studies have appeared recently in the literature and most of these studies have used self-report measures of disability as the primary outcome measures.

Despite the abundance of literature supporting the use of disability measures by physical therapists, many clinics still resist using self-report measures regularly. We wrote this paper to describe some of our experiences in using self-report disability measures in several different practice settings. We have used self-report disability measures routinely for the past five years and have observed how patients and therapists deal, in various ways, with the implementation of these measures. Comments from patients and clinicians have helped us to understand how self-report disability measures can at times be perceived as an impediment to care as well as a useful guide for care. The purpose of this perspective is to describe the perceived strengths and weaknesses of using self-report disability measures on a regular basis. We reflect on comments made, both good and bad, by patients and clinicians. A second purpose is to use three case reports to illustrate how one self-report disability measure in particular, the Lower Extremity Functional Scale (LEFS) was used to guide clinical decisions.[1]

The LEFS is a region-specific disability measure developed by Binkley et al and designed for patients with disorders of the lower extremity. The LEFS is a 20-item scale with each item rated on a scale from 0 (extreme difficulty or unable to perform activity) to 4 (no difficulty). Scores on the LEFS can range from 0 (severe disability) to 80 (no disability). The reliability, construct validity, and sensitivity to change of the LEFS was examined in a recent study.[1] Binkley et al found that the reliability for the LEFS was excellent (ICC=.94) and the construct validity was supported based on comparisons with the SF-36 health status measure.[2] The minimal detectable change (MDC) is defined as the minimal change in score between one assessment and a subsequent assessment to be confident that the change is greater than the error associated with the change score. The MDC for the LEFS is 9 scale points. The minimal clinically important difference, defined as the minimal change on the scale required to indicate that a clinically important change occurred, was also found to be 9 LEFS scale points. Since the MDC and the MCID are both 9 scale points for the LEFS, the MCID will be the term focussed on for the remainder of this paper. In summary, one can be fairly confident that score changes of 9 points or less on the LEFS do not represent clinically meaningful changes in disability but changes greater than 9 points are considered to be clinically meaningful. The LEFS was used to monitor disability levels in the three case reports that conclude this paper.

Perceptions of the Usefulness of Self-report Disability Questionnaires by Clinicians and Patients

When introducing clinicians to self-report disability questionnaires there has typically been opposition expressed by clinicians who were involved in the data collection. Concerns of clinicians regarding these tools, in our experience, has revolved around the issues of excessive time required by both the clinician and the patient to complete the forms and whether the self-report questionnaire would enhance the clinician's ability to make clinical judgments or guide treatment decisions.

Regarding the concerns related to time utilization, we have been in clinical settings where patients have complained to the reception staff and therapists about the necessity of completing yet another form during the admission process. Yet we also have much experience in dealing with clinics that have never experienced any complaints regarding any of the forms to be filled out by either patients or clinicians. It is our observation that the method used to introduce the forms to patients is an important determinant in how the patient perceives the questionnaire and its importance in their care. Patients who are handed forms that are considered "extra" are very likely to express some level of dissatisfaction regarding the necessity of the questionnaire. This is typically based on the patients' belief that they must have already provided the answers to these questions on some already completed form. In our experience, when patients are asked to participate in data collection and are informed that it will assist the clinician in better identifying patient problems or will foster better understanding and communication between patient and clinician, patients have been quite pleased to assist.

Some therapists have complained about getting behind on their patient schedules. We have found that it is essential for patients to be told to arrive on time for their first appointment and that they are not told to "arrive early in order to fill out paperwork". We believe this statement already implies that something "extra" instead of essential is going to occur. When an examination needs to precede the initiation of data collection, which is often the case with research to determine if a patient is an appropriate candidate for a particular study, then we believe that the decision of when to introduce the questionnaire(s) is essential to the continued timeliness of the clinic. Our experience is that the clinics with the least amount of difficulty have patients fill out forms while patients are receiving modalities, performing an exercise that allows safe use of their upper extremities, or answer questions between exercise sets. It is also advisable to have clipboards and pens at each exercise area in a clinic.

We agree with the notion that a change in the daily routines of clinicians is generally a cause for concern and

opposition on their part. Therapists are routinely concerned that spending valuable examination or treatment time introducing, reviewing, and trying to make some useful sense of the responses of questionnaires is not a help but a hindrance in getting through their day. Although we have certainly observed this behavior, we have also experienced how some clinicians have benefited from and found that using self-report measures has made their clinical decision making easier. One example is in the use of global rating of change data. Whether done on a form or verbally, most clinicians have learned to habitually enter a treatment room and ask their patient ,"How are you doing today?" We then listen for the response and if it is "fine" or "a little better", or something similarly optimistic, then no suspicions are raised and we move onward with our treatment. But since the literature suggests that global rating of change is not a valid measure of change,[1] we may often miss the small but meaningful changes or the lack of beneficial changes in function(s) that a well designed self-report questionnaire will identify. Thus, the use of a reliable self-report disability questionnaire will enable a clinician to look for score changes that would accurately reflect whether a change in a treatment approach had the desired level of impact on function. Also, the lack of change or a decrease in a functional score may be a signal that a reassessment is necessary. In our experience, if self-report questionnaires are filled out weekly, they can be very useful in preventing excessive treatments.

We have also learned that if using self-report disability questionnaires is to be successful, it is essential to fully involve each patient in the understanding of the reasons why and how a questionnaire is useful. Regardless of which self-report questionnaire is used, every patient should be informed that following the completion of each form, the answers will be reviewed by the therapist, and then the patient and therapist will together, determine if the answers indicate whether or not progress is being made. Scores from the previous measures should be reviewed in order to make sound judgments. In our experience, most patients become quite enthusiastic and want to know if they have shown measurable improvement. Once patients see the benefit of using the forms, many seem to look forward to the completion of the forms and frequently come in for their next visit inquiring if it is time to complete the questionnaire again. We also encourage clinicians to use this involvement with patients to set short and long-term goals that relate to score changes on the questionnaires. This can help determine when to increase or decrease the frequency of visits and also assist in discharge planning. In regions of North America where health insurance companies determine whether physical therapy will continue, sending the scores to the insurer has been very helpful in communicating a patient's status. We have also used the scores to assist in communicating a patient's status with referring physicians. The case reports we provide further describe how self-report questionnaires, specifically the LEFS, have improved clinicians abilities to make sound decisions related to patient care.

Case Report 1

Patient history

The patient was a 42 year old male respiratory therapist referred for evaluation and treatment of left knee pain. He was referred by an orthopedic surgeon with a diagnosis of left patellofemoral malalignment. Radiographs showed lateralization of the left patella as compared to an expected normal position. His symptoms started 10 months prior to his physical therapy examination. The symptoms began when the patient was fully flexed at the left knee in what was described as a position of valgus with internal rotation, when transferring quickly from sitting to standing while on a beach. He received a Dexamethasone and Xylocaine injection into the left patellofemoral joint space 1 month prior to his therapy examination. The patient reported the injection was of minimal benefit.

His initial LEFS score was 59/80. He reported that he had difficulty running and hopping which were important and frequent occupational requirements for his job when responding to emergency codes. He had substantially increased pain and difficulty with routine daily household and recreational activities such as squatting, lifting objects from the floor, walking a mile, and standing or sitting for 1 hour. His goals were to perform the above mentioned activities and bicycling, playing with his 2 young children, and his job tasks without difficulty in a 4 week period so as to avoid further medical intervention. He had no previous history of other lower extremity injuries or complaints.

Examination

The left knee had no evidence of swelling. Tenderness to palpation was elicited over the area of the medial patellofemoral ligament/retinaculum, medial plica, infrapatellar bursa/fat pad, infrapatellar tendon, and the vastus medialis oblique. He demonstrated normal knee ROM in flexion and extension. Ober and reverse Ober tests were positive for lateral gluteal and iliotibial band (ITB) tightness. Medial patellar glide in a 30 degree knee flexed position was 1.0 cm on the left and 2.1 cm on the right. Each patella was 5.3 cm wide. Following a 1 minute hold of the left patella in the end range medial position while flexed 30 degrees, the patient reported his pain complaints were reproduced suggesting he had inflammation in the area of the lateral patellofemoral ligament/retinaculum. He had no evidence of patellofemoral joint crepitus during open or closed chain knee flexion and extension maneuvers. Passive posterior to anterior compressive force tests applied to the patella in a variety of knee flexion angles were negative. He did have reproduction of his infrapatellar pain with manually resisted isometric and isotonic quadriceps contractions between 0 - 90 degrees of flexion. Stooping and squatting reproduced pain as well. Observation of his gait pattern revealed an approximate 10 degree toe-in position during stance of the left lower extremity versus the right.

Hypothesis

We believed the patient had his left knee pain due to peripatellar soft tissue inflammation resulting from abnormal tissue length from a left patellofemoral malalignment or lateralization syndrome. Initial treatment strategies were to restore medial patellar glide in flexed positions, increase flexibility of the ITB, and due to the chronic nature of the complaint and progressive disability, increase power of the left quadriceps.

Treatment tactics

The patient was seen a total of 6 visits. He was treated with 1 and 3 MHz phonophoresis using an aquifer medium over the involved soft tissues. This was followed by passive medial patellar mobilization of the left patella with the knee flexed 30 degrees. This was done with the knee flexed so as to simulate the position of the patella in the trochlear groove when the patient was experiencing the faulty lateralization of the patella. Aggressive manual soft tissue massage techniques were performed over the area of the lateral retinaculum while the patella was held in an end range medial position. He was then asked to perform his independent ITB stretches while

weight bearing. This was followed by passive reverse Ober stretching which was done in a right sidelying position. In this same position, contract-relax stretching exercises were performed both with and without concomitant medial patellar mobilization. He was instructed in and given a written home program consisting of the ITB stretches standing and the right sidelying reverse Ober position to be done with the help of his wife. He was shown how to perform self medial patellar mobilization in progressively flexed angles. He was also exercised on the Cybex® in the last 40 degrees of extension in a position of hip internal rotation. This was done isometrically for 4 sets of 10 reps at 0, 20, and 40 degrees of flexion. Isometric quadriceps strengthening exercises were also started at home and work and were to be to be done with the hip internally rotated. Sets of 10-15 were considered acceptable and he was asked to do 5-10 sessions per day.

The patient completed the LEFS for the second time 1 week after his first session and improved from 59 to 66. This score change approximates the minimal clinically important difference for the LEFS. He reported that he could now stand and sit for up to 4 hours without pain and that while he continued to have pain, he no longer felt as if his knee would "give way". He also reported that heavy household activities and stair climbing as only mildly difficult. This was considered clinically important for two reasons. First, the patient had moderate to major difficulty with these tasks for several months and these limitations led to his seeking medical assistance, and secondly it meant that we might soon be able to use stair climbing or squatting exercises as part of his rehabilitation without exacerbating his condition.

For visits 2-5 he was treated with phonophoresis as described, with progressive knee flexion during the medial mobilization, continued ITB stretches both active while standing and with the reverse Ober position as described. Cybex® exercises were advanced to include isokinetics in the last 40 degrees of extension. This was done at 90, 60, and 30 degrees per second in progressive resistance exercise (PRE) model described by DeLorme.

At the beginning of his second week of therapy (his third session), he scored 70 on the LEFS. This change clearly indicated improvement since the first session. He no longer had major or moderate difficulty with any of the listed tasks on the LEFS. Hence, no items were scored with a 1 or a 2. His scores of 4, indicating no difficulty with a task, had gone from 7 items to 11 items. Due to these scores, we felt quite comfortable making the clinical decision to initiate the stair stepper and forward lunging exercises. He was required to do the stepper machine in interval fashion of aggressive climbing for bouts of 40 step sets that simulated a typical climbing requirement for his job. He was instructed to rest for 1-2 minutes between sets in order to allow for cardiovascular and biochemical recovery so he could continue each set with high power performance. The lunges and mini-squats were initiated with silver Theraband® resistance, since the patient did not own a set of weights or belong to a fitness facility.

During his third and last week of therapy he scored 71 on the LEFS. The one point change since he last completed the LEFS was considered to be statistically and clinically meaningless. He had little change in his performance as described both verbally and with the scores on the LEFS from the previous week. He was able to play with his children, perform all required lower extremity work positions and tasks without difficulty, and was now able to exercise for strength and fitness,(bike, walk, and hike) without limitation. Since his scores had not changed and he felt comfortable with his daily functional requirements both at home and at work, the LEFS was used to assist in the decision to discharge the patient from physical therapy. His final home program required him to maintain his quadriceps strengthening exercises, ITB exercises, and self performed medial patellar mobilization. He was asked to perform the ROM and mobilization exercises 1-3 times per day as a warm-up to his work day and cardiovascular fitness sessions.

Case 2

Patient history

The patient was a 56-year-old retired housewife who had a left total knee replacement two months prior to her outpatient physical therapy examination. She had experienced 15 months of increasing left knee pain and decreased function due to osteoarthritis (OA). Preoperatively, she was unable to stand for greater than 10 minutes, walk greater than 5 minutes, climb greater than 10 stairs, transfer in and out of a low chair or auto, squat to perform household chores, and bend her knee adequately to don and doff socks or shoes.

Following her surgery, she received 5 home therapy sessions that occurred over a 3 week period immediately following the surgery. The home treatments included hip strengthening with cuff weights in all planes and directions, heel slides, straight leg raises, and quadriceps setting exercises. Although her post-operative pain was dramatically decreased from pre-operative levels, the patient was concerned about progressive stiffness and difficulty regaining the use of her left leg. She was also concerned about her inability to don and doff lower extremity clothing, walk with her grandchildren, climb up and down stairs while carrying objects, transfer in and out of chairs and vehicles, perform bathroom activities, sit with her left knee bent, and sleep or roll in bed comfortably. These disabilities were reflected in her initial LEFS score of 16/80.

Examination

The patient had minimal swelling of the left knee. Her incision was well healed but the scar had fibrosed such that it was immobile and inflexible during palpation of the adjacent superficial soft tissues. Active ROM of the left knee was flexion 81 degrees and extension was -24 degrees. During PROM assessment, the patient had a firm end-feel for flexion and extension at the reported ranges of motion. Patellar mobility testing was hypomobile with proximal, distal, and medial glides. No proximal patellar glide was present when the left knee was in the end range -24 degree position. No patellar glide occurred when asking the patient to perform an isometric quadriceps contraction in this position. Similarly, no distal patellar glide was available when the patients left knee was flexed to 80 degrees. Accessory motion testing of the tibiofemoral joint revealed hypomobility with posterior glide assessment while anterior glides produced a small amount of tibial excursion with a firm end-feel. Observation of gait showed the patient to use a step-to gait pattern while ambulating with a standard walker. She landed on the left foot in a foot-flat position and was unable to heel strike due to the loss of left knee extension. This resulted in substantial left trunk side bending during stance on the left leg.

Hypothesis

The patient was two months status

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post left total knee replacement at the time of her physical therapy examination. Following the surgery she had good pain reduction, rated as between 1 and 4 on a 0 to10 scale, as compared to her pre-operative levels rated at 9 but did not regain the ability to perform her functional pre-operative goals. We hypothesized that her loss of function stemmed primarily from her decreased left knee ROM which prevented her from having the necessary amount of motion required for her to perform her functional goals. We also believed that she would need treatment to improve quadriceps force production in the end range positions to achieve her functional goals. Thus, it was believed that her physical impairments were directly related to her disabilities. Based on the examination findings, it was believed that her decreased ROM was a result of the shortened scar and related anterior soft tissues and hypomobility of the patellofemoral and tibiofemoral joints. Subsequently, the initial treatment strategy was to increase ROM by performing treatment tactics that were consistent with the examination findings.

Treatment

After completing the examination, she was treated with 1 MHz ultrasound over the anterior left knee. This was done with the patient supine and the knee near end range extension and also with her sitting over the edge of the exam table with the knee at the end range of flexion. Soft tissue massage and scar mobilization techniques were then performed over the anterior knee with the patient in the same positions described for the ultrasound.

Patellar mobilization was then performed, first with the patient supine and the knee extended to -30 degrees. Proximal glides were performed in sets of 30-40 repetitions interrupted by bouts of active isometric quadriceps extension exercises. The patient was instructed to pay closer attention to the method of exercise performance such that she was actually trying to get the knee extension angle to increase and to try to get the patella to move in what was described as a upward direction with each contraction. After repeating this treatment cycle 4 times the patient was able to extend the knee from -24 degrees pre-treatment to -15 degrees post-treatment. She was instructed to perform the isometric quadriceps contractions in sets of 5-10 each hour. It was also recommended that she keep the knee in a fully extended position for 5-10 minutes each hour.

She was then treated with distal patellar glides and posterior tibial glides while sitting on the edge of the exam table with the knee flexed to 70 degrees. Following 2 sets of 20 repetitions of distal patellar glides and posterior tibial glides the patient was able to flex the knee to 85 degrees. All knee flexion measures were performed with the patient supine in a heel slide position. She was then asked to sit in the same position again while four sets of both distal patellar and posterior tibial glides were again performed but in progressive angles of passively maintained flexion. Knee flexion was then measured at 94 degrees.

Her home program instructions for flexion were to perform heel slides several times per hour while either laying down or sitting. A friend attending the session was shown how to perform gentle patellar and tibial mobilizations and they were asked to try to get this done 1-2 times per day at 20-40 repetitions. She was also shown how to use the newly gained knee extension with gait training exercises aimed at emphasizing knee extension at heel strike.

She returned 4 days later for her second session and her LEFS score increased from 16/80 to 26/80. A score change of 10 exceeded the score change of 9 indicating a clinically important change had occurred. She had maintained all of the motion gained in flexion but lost 2 degrees of the extension to -17 degrees. She verbally reported that she was pleased with her initial gains. Her LEFS score objectively supported her statements of functional improvements. Her second treatment was delivered in the same manner as the first except more emphasis was placed on the extension mobilizations. This decision was made with the assistance of the data obtained on the LEFS. After the second treatment she had improved extension from -17 to -8 degrees. Her performance of heel strike with gait was again emphasized and she understood that the remainder of her home program was to continue as initially described.

During her second week of treatment, sessions 3 and 4, she made minimal gains in her ROM. Flexion had increased from 94 to 97 degrees and extension was unchanged at -8 degrees. Her LEFS score for the week reflected the lack of substantial change from 26/80 to 29/80. Discussing these issues with the patient, while not letting her see her previous forms, confirmed that little had changed.

We now had an apparent link between her functional scores and her ROM impairments as suspected at the time of the evaluation. This assisted the therapist in realizing that a reassessment of the patient was appropriate to try to determine if some other variable might have been unaccounted for. Reassessment confirmed that the proximal patellar glide was believed to be the limiting factor in gaining extension while the lack of posterior tibial glide was the limiting factor in the loss of flexion. A review of the patient's home exercise program assisted us in learning that the patient had decreased her home program frequency to 2-3 times per day for all activities and that her friend had stopped performing the mobilization exercise.

During her third week of treatment, we added some low load long duration stretching and performed the flexion joint mobilization with the patient at fixed positions of knee flexion while on the Cybex® machine. Prior to starting her next week of treatment, she had improved her LEFS score from 29/80 to 38/80. Her flexion increased from 97 to 110 degrees and active extension improved to -4 degrees. Her ability to don and doff shoes and socks, climb stairs, perform prolonged standing and sitting, lift and carry objects from the floor, perform prolonged standing and sitting were all within her requirements to consider her lifestyle normal. Her LEFS score was not expected to go too much higher due to right knee pain and the need for a right total knee replacement within the next 1-2 years. Also, her having a sedentary lifestyle, high blood pressure, and (OA) at other joints were factors likely to keep her from achieving higher scores on the LEFS.

Her only remaining complaints were of stiffness after having the knee motionless for prolonged time frames and experiencing difficulty squatting. Treatments remained the same while we added stair stepping exercises on a machine with gradually increased amounts of flexion, reciprocal motion strengthening on the Cybex®, anterior lunges, and squatting exercises with upper extremity assist for balance and safety. Although her stiffness subsided as flexion was increased to 114 degrees and extension was improved to -2 degrees her LEFS scores did not change the last week. This was due, in our opinion, to the fact that the LEFS is truly a measure of function and does not measure the impact of stiffness as long as functions are not limited by the stiffness. Her improved ability to squat over the next week was reflected by higher LEFS scores for squatting and lifting objects from the floor.

The patient was discharged from physical therapy after 10 sessions and asked to continue her ROM and strength exercises but we felt there was no need for her to perform the joint mobilization techniques as long as her motion remained comfortable and functional.

Case 3

Patient history

The patient was a 49-year-old male local government program coordinator and school board member referred for evaluation and treatment following surgical repair of his left quadriceps and infrapatellar tendon sustained in a fall 10 weeks prior to his physical therapy examination. He fell down a flight of 6 stairs and when he landed his left knee was fully flexed. He tried to forcefully control his fall by attempting to straighten the left knee. This was unsuccessful and resulted in the complete rupture of the quadriceps from the suprapatellar insertion and a partial tear of the distal patellar tendon. He also sustained an osteochondral fracture of the patella. The patient was immobilized in an extension lock system (ELS) brace for 6 weeks with the brace locked in a fully extended position. He was then allowed small incremental progressions into flexion over the next 4 weeks. At the time of his initial physical therapy examination, he had not been instructed in any exercises since his surgery.

His initial LEFS score was 25/80. He complained of a major lifestyle change and had significant difficulty walking, going up and down stairs and standing/sitting for long periods. He reported having a "popping" of his left "knee cap" which started occurring over the previous 3 weeks and was related to the movements of knee flexion and extension. He also started to experience right sided low back pain from what his wife attributed to a limp when ambulating. His goals were to return to a normal lifestyle without limitations, stiffness, or pain related to the above mentioned activities.

Examination

The patient had no observable swelling about the left knee. He had a six inch vertical scar over the anterior knee. The scar appeared to be tightly adhered to underlying structures when assessed with palpation to the scar and skin over the anterior portion of the left knee. The soft tissues of the distal quadriceps and infrapatellar tendon felt thick and fibrosed. Left knee flexion was 75 degrees and extension was normal. Accessory motion assessment of the left patellofemoral joint revealed good proximal mobility but hypomobility for distal and medial glides when he was flexed at 30 degrees or greater. The tibiofemoral joint was hypomobile for posterior glides but normal for anterior glides. An active straight leg raise showed an extensor lag of 32 degrees. When sitting at the edge of the exam table, he was unable to actively extend the knee to full extension. He attained a -24 degree extension angle with this maneuver.

Observation of gait revealed moderate left trunk side bending during left stance phase of gait. At the moment of left heel strike until midstance, the patient fully extended the left knee in order to maintain stability and decrease his concerns about falling from the knee "giving way".

Hypothesis

The patient was status-post surgical repair of a complete rupture of his distal quadriceps tendon and a partial tear of the infrapatellar tendon. This stemmed from a fall down a flight of stairs 10 weeks prior to his physical therapy examination. We hypothesized that his disabilities were a result of his decreased knee flexion ROM and his lower extremity muscular strength deficits related to the surgery and the long period of immobilization. The impairments that we believed caused his disability were decreased flexion to 75 degrees, and a quadriceps force production deficit. His LEFS score of 25/80 was consistent with his examination findings.

Treatment

The initial treatment strategies were to increase left knee flexion without disrupting the repair sites. We also believed it was important for him to immediately start working on enhancing the force production of the quadriceps but wanted to initially give him some exercises that would be of low risk for damaging the repair sites.

After his examination, the patient was treated using 1 and 3 MHz ultrasound over the repair sites and manual soft tissue massage in a 55 degree flexion angle. He was then treated with distal patellofemoral joint mobilization in series of 20 repetitions. His knee flexion was measured after each set of 20 repetitions. Following 4 sets of 20 repeats, his knee flexion measured 90 degrees. He was then treated with posterior tibial glides while resting in approximately 85 degrees of flexion. Again, mobilizations were performed in sets of 20 repetitions and after each set knee flexion was reassessed. Following 80 of the mobilization repetitions his knee flexion was measured as a comfortable 105 degrees. He was able to move into a painful 107 degrees.

He was sent home with instructions to avoid painful or uncomfortable flexion exercises. His initial home program consisted of heel slides in sitting and supine positions. These comfortable end range flexion exercise positions were to be held for 15-30 seconds or longer. The stretching exercises were to be performed 1-2 times each hour he was awake. He was also shown how to perform isometric quadriceps contractions and active straight leg raises as initial methods of enhancing force production of the quadriceps. He was to perform the strengthening exercises 2-3 times per day in sets of 10-20 repetitions. His wife was shown how to perform the initial soft tissue massage techniques so this could be done at least 1 time per evening prior to a stretching session.

The treatment strategies and tactics remained the same for the second session with the only changes being the addition of the stationary bike for advancing flexion and stopping patellofemoral joint mobilization since he could flex his knee to greater than 90 degrees. Prior to his third treatment session he was given the LEFS form which was completed while the patient received heat over his anterior knee which was resting in 90 degrees of knee flexion. His LEFS score was 38/80. This represented an increase of 13, a change that represented a clinically important improvement. Functionally, he was now able to climb onto and remain sitting on his lawn tractor, don and doff shoes and socks, perform sitting and standing for greater than one hour, and walk greater than 2 blocks with less difficulty. We added isometric knee flexion at various ranges between 0-90 degrees done on a Cybex® machine, and knee extension exercises between 0-45 degrees of flexion. Due to his having less difficulty with stair climbing we initiated exercise on a stair stepper machine. We gradually increased his stair step height as long as he could maintain a normal appearance of trunk and pelvic symmetry during the exercise. We also taught him how to use books to alter stair height in order to practice correct stair stepping mechanics while at home.

At the start of his fifth session and the third week of treatment, he had a LEFS score of 48/80, another clinically important change, and he could now flex his knee to 130 degrees. His open and

closed chain strengthening was progressed to gain greater flexion and also to perform greater force production with higher resistance training on the bike, Cybex®, and stepper. His gait asymmetry was observed to still be present and we were to start working on this variable during his next session.

At the beginning of his fourth week of treatment, the patient called to report that he had fallen down some stairs in the morning and was experiencing pain and swelling in the area of his anterior and medial left knee. He came into the office and stated that he thought the most recent fall occurred because he had forgotten about the injury and descended the stairs in a normal fashion and that this resulted in his left knee "giving way" as his heel contacted the bottom step. He landed in a slightly knee flexed position but did not try to forcefully straighten the knee during the fall. He was given the LEFS form and had a score of 39/80 which was the same as over 2 weeks prior and was 9 points below his most recent score. He was able to apply ice to his knee during his work day but some swelling remained present at the time of his visit. He was able to flex his left knee to 115 degrees and had normal extension. He was strong and mildly painful with a resisted concentric quadriceps contraction. Ligament stability testing was normal and painless. Palpation over the infrapatellar tendon and the distal medial quadriceps reproduced his primary complaints related to the fall earlier that day. He was treated with ice and electrical stimulation over the 2 areas with the limb elevated. Soft tissue massage techniques were then performed over the same areas. Heel slides were performed and knee flexion was measured to be 123 degrees. He did not perform any strengthening exercises during the next 2 sessions due to concerns regarding the apparent soft tissue damage that occurred during the fall.

Two weeks after the fall, the patient recorded his first LEFS score that was significantly higher than his score related to the second fall. His LEFS score was 52/80, a clinically important change from the scores of 39/80 recorded on the day of the second fall and 40/80 recorded 1 week after the fall. He had increased knee flexion to 137 degrees and was able to resume his pre-fall rehabilitation program. All knee flexion tasks had improved except squatting. His rehab program was progressed in duration and intensity of his strengthening exercises.

Over the next 2 weeks of therapy, his LEFS scores did not improve substantially even though his quadriceps, hamstrings, and gastroc-soleus complex muscle power production increased as measured on a Cybex® II dynamometer. His ability to perform increased force, duration, and speed on a stationery bike, step machine, and treadmill also improved. In an attempt to get his LEFS score to improve, we added more closed chain functional strengthening and coordination exercises (ie, BAPS® board, ambulation backward, crossover stepping laterally and backwards, and change of direction tasks). After 2 weeks of advanced functional activities his LEFS score was increased by 12 points to 64/80. He had no pain complaints and reported that all activities except hopping and running related tasks were not limiting to him. Following a discussion with the patient regarding the LEFS data, it was agreed upon by the patient and therapist that discharge from out-patient physical therapy was appropriate. He joined a local fitness center as instructed and we set up his final home program that was advanced through communication with the patient and the personnel at the fitness center.

Conclusion

This clinical perspective describes some of our experiences in using self-report disability measures routinely in practice. We have found that when patients understand why they are filling out these forms and when therapists understand how the information on the forms can assist clinical decision making, both patients and clinicians benefit. Our experiences have indicated that the benefits of using self-report disability measures far outweigh any liabilities associated with the use of these measures.

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Section Member in the News

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Helene Fearon, PT, was awarded the Burgess Gordon Award by the American Medical Association. This award, established in 1996 on the 30th anniversary of CPT, honors outstanding CPT Advisory Committee members who have gone above and beyond their responsibilities in supporting the goals of the CPT program. Congratulations, Helene!

Making Tests with Low Reliability Work for You

Karen W. Hayes, PhD, PT

The greater emphasis on research in physical therapy can be frightening to members of the profession. What if research showed that the measurements we use or the treatments we delivered were not effective? One focus of research is to gather evidence addressing whether the tests we use or the interventions we design actually do what they are supposed to do. Sometimes the results will suggest that our tests are unreliable or invalid or that our interventions are ineffective. Rather than ignore the results or find fault with the studies, we should be happy to have information both positive and negative regarding our procedures. When it is positive, we have support for our procedures. When it is negative, it offers an opportunity to refine the procedure and test it again or to finally dispose of something not worth the time or money.

Recently, a lot of attention has been focused on measurement procedures, specifically their reliability, validity and diagnostic accuracy. Reliability is often studied first because it is basic to the ability to diagnose accurately and to detect whether the test is measuring the construct that is intended. In other words, if we can't measure something precisely and consistently, how can we possibly expect to know what that something is? Reliability does not assure diagnostic accuracy or the construct validity of any test. It is only one step in the process of test validation. Even if reliability is excellent, evidence is still needed to determine whether any of the tests actually measure their intended constructs.

When it comes to reliability, one rule of thumb is that reliability of measures with continuous data should be >0.80 to be adequate for clinical decision making for an individual patient (based on a potential range of 0.00-1.00 and usually reported as an intraclass correlation coefficient [ICC]). Reliability of categorical measures (usually reported as a kappa coefficient) should exceed 0.70 to have much confidence in the decisions we make using them. More and more reports, some involving members of the North American Orthopedic Rehabilitation Research Network, are showing that the reliability of some of our favorite tests is less than acceptable for clinical decision making that relies on those tests. For example, McClure and colleagues reported that intertester reliability (kappa) for tibio-femoral joint abduction (medial collateral ligament stress test) was very low at 0.06-0.16.[1] Similarly, Cooperman et al. reported intratester reliability (kappa) of the Lachman test to be 0.44.[2] Riddle and Rothstein disappointed many practitioners when they reported the intertester reliability (kappa) of the McKenzie classification system to be 0.26 across 363 subjects and eight clinics and only 0.15 between two McKenzie "specialists".[3] Binkley, Stratford and Gill noted that the interrater reliability (kappa) of identifying specific lumbar segments through palpation was 0.30 and of grading the mobility of lumbar segments marked by the investigators was 0.09.[4] In our work at Programs in Physical Therapy, Northwestern University Medical School (NUPT), we found that intrarater reliability (kappa) of data taken two months apart was 0.17 and 0.48 for knee extension and flexion endfeel and 0.36 and 0.34 for knee extension and flexion pain/resistance sequence.[5] In a follow up study, the interrater reliability (kappa) of the studied components of Cyriax's selective tension tests for the knee ranged from -0.39 to 0.57.[6] For the shoulder, intertester reliability (kappa) averaged 0.45 for endfeel, 0.46 for pain/resistance sequence, 0.32 for resisted testing and 0.50 for palpation.[7] Reliability coefficients like all of these just reported are substantially lower than optimal for decision making using individual tests.

Any of the coefficients in these studies can be affected statistically by poor distributions and by the subjects changing between tests, so the reliability might be better than reported. Nonetheless, the trend of these studies is that many of our measures are not trustworthy. When reliability is low, it means that there is so much error in the measurement that the clinician cannot know whether a test result actually reflects the phenomenon being measured or something else that affected the measurement. When comparing measurements that contain a lot of error, such as we do before and after intervention, any differences between them could reflect error rather than true differences in the phenomenon. Consequently, it is important to minimize error and enhance reliability as much as possible. Ideally, if a test generates data so full of error that any clinical decisions are likely to be erroneous, the test should be corrected, refined or discarded. In the meantime, what are clinicians to do about tests for which there is no substitute or for which the substitute is extremely costly? This article discusses four strategies for clinicians to use to enhance the reliability of test information.

Have the Same Evaluator Take All Measurements on a Patient

Several studies have shown that intrarater reliability may be quite acceptable when interrater reliability is not. For example, Beattie, et al., found that the intrarater reliability (ICC) of measurements of leg length differences was .807 while interrater reliability was .668.[8] Watkins and colleagues found the intratester reliability (ICC) of goniometric measurements of knee extension was 0.98 while intertester reliability was 0.86, lower but still acceptably high.[9] Because intrarater reliability is typically greater than interrater reliability (and higher is always better), one strategy to improve reliability is to use a single evaluator for each patient whenever possible. Measurements taken after treatment may not be meaningful representations of change if different evaluators take them. The practice of sharing patients in the clinic, especially when the patient has few visits, can affect the quality of care rendered in the clinic. Diagnostic accuracy can be threatened if different therapists contribute to the diagnosis; therapists may select different interventions for the patient if they perform different tests and get different results. Most important, evidence for or against the efficacy of intervention will suffer if different therapists take measurements before and after intervention. The superiority of intrarater reliability is a good argument for continuity of care for individual patients rather than sharing patients routinely.

Standardize Clinical Procedures and Train Evaluators to a Criterion Level of Reliability

When patients must be shared among multiple practitioners, be sure to standardize the measurement procedures. Develop lists of steps to be followed and criteria to be used to determine the test result. Then, once established, spend some time in an intraclinic study using the standardized procedures and train together until a criterion level of intertester reliability has been reached.

This suggestion has not been studied much, but studies support the idea. Diamond and colleagues conducted 20 intensive training sessions that included independent measurements of range of motion, sensation and plantar ulcer area and depth, with subsequent discussions and mutual practice to improve interrater reliability in their study of a diabetic foot evaluation. Their interrater and intrarater kappa coefficients for sensation were above 0.70. Of 32 ICCs calculated for range of motion and ulcer size, only six were below 0.80. [10]

Strender and colleagues examined reliability of many lumbar test results gathered by two physical therapists who were specialists in manual therapy, had studied together and worked together for many years. Their results were contrasted with the results from two physicians who used the same tests routinely but had never worked together. The intertester reliability of the two physical therapists was better than that of the physicians, suggesting that learning and working together contributes to improved reliability.[11]

Use Batteries of Tests Rather than One Test to Make Judgments

The decision about the patient's diagnosis ultimately matters more than the results of any individual test that enters into that decision. Several investigators have found that the reliability of a battery of tests is higher than the reliability of the individual tests. For example, where Potter and Rothstein[12] found that intertester percentage of agreement on 11 of 13 individual tests of sacroiliac joint function was 50% or below, Cibulka and colleagues determined the intertester reliability (kappa) of a diagnosis of sacro-iliac dysfunction was 0.88 based on positive results on 3 of 4 tests in a battery.[13] More recently, Fritz and colleagues demonstrated that reliability of classifying a joint as inflamed or not was .76 (kappa), while the reliability of each test that contributed to the classification system was .66 or less.[14] At NUPT, we also found that while the interrater reliability of individual tests in Cyriax's knee evaluation was not generally acceptable, averaging 0.21, the reliability of the final diagnosis using all of those tests in concert was higher at 0.52.[6] The reliability of this outcome is not acceptably high, but it does illustrate that it may be higher than the reliability of the contributing components.

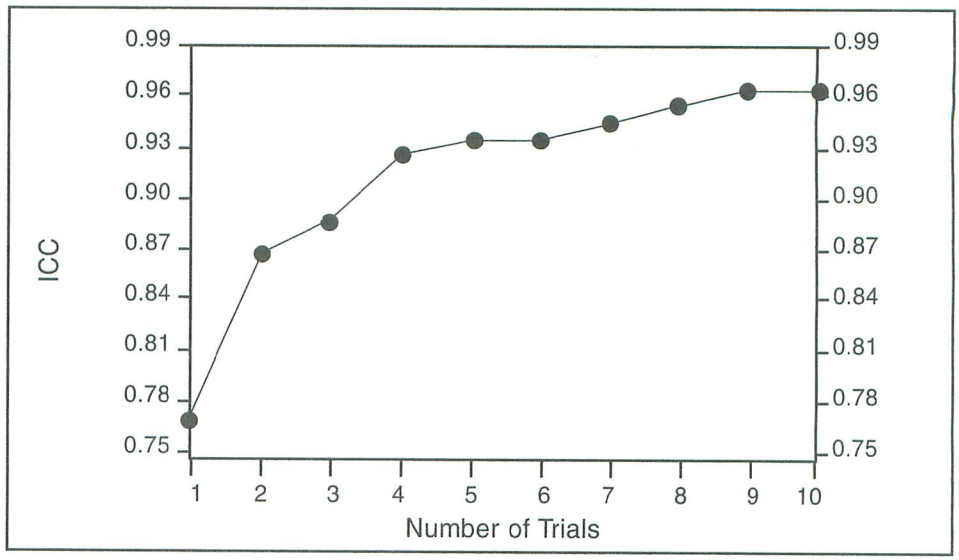

Figure 1. Plot of reliability for a single trial (ICC1,1) and for the mean of two through ten trials (ICC1,k) of a test of knee proprioception

Average Several Measures or Take a Consensus of Opinions

The true value of any phenomenon is unknown. Consequently, the best estimate of the true value is the average of an infinite number of measurements of that phenomenon. In the clinic when several measurements can be made of the phenomenon and averaged, the reliability of the measures will increase. By way of example, investigators at NUPT have been measuring knee position sense with a mechanized device designed to measure the minimal amount of joint excursion patients with knee osteoarthritis can detect.[15] Each patient performs 10 trials. Figure 1 is a graph plotting the reliability for one trial (calculated with an ICC model 1,1 [for a single trial]) and for the mean of trials from 2 trials to 10 trials (calculated with an ICC model 1,k [for the mean of trials]). The reader can see that the reliability was 0.77 for a single trial (good but not good enough), and with each subsequent trial added into the analysis, the reliability increases. By ten trials, the reliability has risen to 0.97 (Hayes, Pai, & Sharma, manuscript in submission).

When the type of information generated by a test does not lend itself to computing an average, such as when the test generates a yes/no type of response, follow the old adage of getting a second opinion and then a third. Assuming the practitioners are of equal skill, taking a consensus of results from several practitioners will lead to more reliable results than a single test.

The purpose of this article was to share some strategies that may help to improve reliability sufficiently to use tests with low reliability. Even though some of the tests mentioned here are flawed, through the use of strategies such as these, you may still be able to use them in the clinic to gather trustworthy information. Try these strategies and confirm for yourselves in your clinics whether they will work for you. Work with someone with knowledge of research design and analysis to perform an intraclinic study and analyze your own reliability. When you have evidence that your reliability on the measures you use in the clinic is adequate, you have a greater chance of diagnosing your patients accurately and of being able to detect real change in your patients following your interventions.

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(Continued on page 35)

Selecting the Best Clinical Diagnostic Test

Paul Stratford, MSc, PT, Gregory Spadoni, BA, BHSc, PT, Andrew Berk, BScPT, PT

Introduction

Clinicians label patients' problems based on the results of clinical tests. For example, a patient with a history of low back pain and episodic posterior thigh pain, and a positive slump or straight leg raise (SLR) test might be labeled as having a disc herniation. In most instances patients are labeled and interventions are implemented without clinicians knowing whether patients truly have the labeled conditions. Given this sequence of events, a clinician's chance of correctly labeling a patient is directly related to the predictive values of the applied tests. Although most clinical textbooks and clinical courses provide details concerning numerous competing tests (i.e., tests intended to identify the same condition), descriptions of the tests' diagnostic accuracies are almost uniformly omitted. This deficiency can lead to uncertainty when competing tests yield conflicting results. The goal of this monograph is to provide an illustration about how to obtain, critique, and apply to clinical practice information about the diagnostic accuracy of clinical tests. Two case scenarios describing patients with low back pain are used to assist in working through these issues.

Patient Scenarios

Both patients are 42-year-old males with no prior history of back pain. Neither patient has a previous history of cancer, corticosteriod use, bowel or bladder dysfunction, saddle paresthesia, intravenous drug use, nor previous infection. The patients share a common history of immediate low back pain that occurred while lifting a heavy bag from the trunk of their cars 2-weeks ago.

Patient 1 experienced central low back pain accompanied by a vague right buttock discomfort. The back pain increases when bending and lifting. Walking does not increase the discomfort.

Patient 2 experienced central low back pain accompanied by frequent radiating discomfort down the right lower limb and into the lateral aspect of the foot. The discomfort is usually associated with bending and lifting. Walking does not increase the discomfort.

A bit of information about your practice: Your practice group has a special interest in spinal conditions; accordingly, it attracts an increased proportion of challenging spinal cases.

A Few Questions to Consider

1. What is the chance that each patient has a serious pathology?
2. What are likely hypotheses for each patient's problem?
3. What is the chance that each patient has a disc herniation?
4. Which clinical diagnostic tests would you apply to test for a disc herniation?
5. What is the consequence of applying clinical diagnostic tests targeted at detecting a disc herniation to both of these patients and labeling the patient's based on the test results?

Our Answers

The literature suggests that an accurate diagnosis cannot be made for 85% of persons with low back pain.[1] One approach advocated for the assessment of persons with low back pain is to start by ruling out serious pathology or those diagnoses that compose the 15% of conditions which can be labeled. These conditions include cancer, ankylosing spondylitis, spinal stenosis, spinal osteomyelitis, compression fracture, cauda equina syndrome, and disc herniation.[1,2] Based on the age of the patients, the rapid onset, and the absence of a previous history of back pain, cancer, corticosteriod use, infection, or bowel or bladder dysfunction, our attention is drawn to disc herniation as the remaining serious pathology to be investigated.[1,2]

One starting point would be to ignore the patients' histories and simply apply the chance that any patient presenting with low back pain has a disc herniation. The literature suggests that the prevalence of back pain with the features of sciatica lasting at least 2-weeks is about 2% and that the prevalence of surgically important disc herniation is also about 2%.[1,2] An improved approach would be to consider our practice prevalence of disc herniation and to use this estimate as each patient's chance of having a disc herniation. The scenario practice is that of a clinic that specializes in low back pain. Presumably, the practice prevalence of disc herniation in a specialty clinic will be higher than that in a clinic that does not specialize in patients with back problems. Let's suppose that for this example the practice prevalence of disc herniation for patients with low back pain in the scenario clinic is 10%. Both of these approaches are limited because they ignore the patients' history findings and they provide the same chance of a disc herniation for both patients.

Most readers will have applied a more sophisticated approach, that of a history specific prevalence, when assigning a chance of a disc herniation to these patients. A history specific prevalence is based on the notion that patients who present with a particular set of findings are more likely to have a given condition than patients who do not present with these findings. Combining evidence from the literature[1,3] with our clinical experience, we assign Patient 1 as having a small chance of having a disc herniation (1%) and Patient 2 a moderate chance of having a disc herniation (50%).

The next question inquires about the clinical tests one would apply to determine the presence of a disc herniation. Tests most frequently identified in textbooks and clinical courses are the SLR, crossed straight leg raise (XSLR), reflex assessments, sensory evaluations, and Slump test. The challenge is to select the best test or combination of tests from these many competing tests.

The last question addresses the consequence of applying and acting on the results of clinical diagnostic tests intended to evaluate the presence of a disc herniation. In order to answer this question it is necessary to know the diagnostic accuracy of these tests. However, as mentioned previously, this information is rarely provided in textbooks or clinical courses. The next section describes an efficient strategy for obtaining information about the diagnostic accuracy of clinical tests.

Searching

The first step is to identify the competing clinical diagnostic tests for the condition or conditions of interest. For the purpose of illustration we will restrict ourselves to the condition of disc herniation. Textbooks are a good place to find a list of the many clinical tests used to assess the presence of a disc herniation; however, most clinicians will be well aware of these tests without having to consult a text. The next step is to locate information concerning the diagnostic

accuracy of these tests. At this point a formal literature search is required. Formal literature searches can be conducted over the Internet free of charge. In this example we used the following Internet address www.ncbi. nlm.nih.gov/PubMed/medline.html.

The next challenge is to perform an efficient search. Review articles provide an excellent starting point because they summarize existing work and provide an efficient reference list of original research papers. This was the starting point for our search conducted on May 25, 1998. Once the web-site was accessed, we reviewed the syntax commands and then choose "Clinical Queries" located in the shared gray area on the left-hand side of the page. The Clinical Queries term implements a search filter. Because we were interested in clinical diagnostic tests, we activated the "diagnosis" category and "specificity" (a search filter term not to be confused with how specificity is used in the rest of the text) emphasis. Our search terms were, "back[word] AND (meta-analysis[ptyp] OR review[ptyp])." This search yielded 37 citations and a quick review of the titles and abstracts revealed two potentially useful articles: one by Deyo et al[1] and the other by by van den Hoogen et al.[3] We obtained copies of these articles from our library; however, article reprints can be ordered directly over the internet.

A quick review of these articles yielded no information about the Slump test. We returned to the web-site and performed a search using the term "slump[word]" and selecting the category diagnosis and the emphasis specificity. No articles were identified. We repeated the search using the emphasis sensitivity (a search filter term not to be confused with how sensitivity is used in the rest of the text) and 11 articles were identified. Of these 11 articles, only one addressed the Slump test used in the context of this article. No information about the diagnostic accuracy was provided. The results of our search suggest that no information concerning the Slump test's diagnostic accuracy (i.e., sensitivity and specificity) exists. Accordingly, subsequent reference will not be made to the Slump test.

Critical Review of Material

Once the relevant citations have been identified, the next step is to review the methodological quality of the citations. Guidelines for reviewing both literature reviews (including meta-analysis) and individual research studies are available.[4-6] Table 1 provides the review article criteria and Table 2 provides the criteria for evaluating a diagnostic study article. Although a detailed review of these criteria is beyond the scope of this monograph we will provide a brief application of the review article criteria.

Table 1. Summary of Guidelines for Assessing a Review Paper*

1. Were the questions and methods clearly stated?
2. Were comprehensive search methods used to locate relevant studies?
3. Were explicit methods used to determine which articles to include in the review?
4. Was the validity of the primary studies assessed?
5. Was the assessment of the primary studies reproducible and free from bias?
6. Was variation in the findings of the relevant studies analyzed?
7. Were the findings of the primary studies combined appropriately?
8. Were the reviewers' conclusions supported by the data cited?

*From Oxman AD, Guyatt GH. Guidelines for reading literature reviews. *Can Med Assoc J.* 1988;138:697-703.

Based on the literature search and a brief review of the articles' titles and abstracts, two articles appeared to have potential.[1,3] However, once the two articles were located it was evident that only the contribution of van den Hoogen et al represented an attempt at a critical review.[3] Oxman and Guyatt's[4] review article criteria are applied to the van den Hoogen paper only.

Were the questions and methods clearly stated? The purpose of the work of van den Hoogen et al was to perform a meta-analysis of the literature regarding signs and symptoms associated with diagnosing radiculopathy, ankylosing spondylitis, and vertebral cancer.

Were comprehensive search methods used to locate relevant studies? The authors state that a MEDLINE search from 1986 to 1992 was performed. Key words were backache or low back and sciatica, cancer, and spondylitis. Titles, subtitles, key words, and abstracts were searched.

Were explicit methods used to determine which articles to include in the review? Only articles that included sensitivity, or sensitivity and specificity were included. Articles that reported fewer than 10 diseased patients were excluded.

Was the validity of the primary studies assessed? Only studies with methodology scores greater than 55/100 were summarized. Two reviewers independently applied nine scoring criteria to the research articles identified by the literature search. Details of the scoring criteria and the actual scores assigned to articles are reported.

Was the assessment of the primary studies reproducible and free from bias? Based on the results of the initial independent reviews, the raters agreed on 279 out of 394 ratings. The 115 disagreements were mostly due to interpretation or reading errors and they were all resolved in a single consensus meeting.

Was variation in the findings of the relevant studies analysed? A brief synthesis is offered concerning conflicting study results.

Were the findings of the primary studies combined appropriately? The authors did not combine the results of the primary studies and no explanation is offered.

Were the reviewers' conclusions supported by the data cited? The authors provided a summary that was consistent with the reported data.

Table 2. Guidelines for Evaluating a Diagnostic Test**

1. Has there been an independent, "blind" comparison with a "gold standard" of diagnosis?
2. Has the diagnostic test been evaluated in a patient sample that included an appropriate spectrum of mild and severe, treated and untreated, disease, plus individuals with different but commonly confused disorders?
3. Was the setting for this evaluation, as well as the filter through which study patients passed, adequately described?
4. Have the reproducibility of the test result (precision) and its interpretation (observer variation) been demonstrated?
5. Has the term normal been defined sensibly as it applies to this test?
6. If the test is advocated as part of a cluster or sequence of tests, has its individual contribution to the overall validity of the cluster or sequence been determined?
7. Have the tactics for carrying out the test been described in sufficient detail to permit their exact replication?
8. Has the utility of the test been determined?

**From Department of Clinical Epidemiology and Biostatistics McMaster University, Hamilton Ontario. How to read clinical journals: II To learn about a diagnostic test. *Can Med Assoc J.* 1981;124:703-710.

Diagnostic Test Methodology

Before we summarize the measurement properties of the diagnostic tests reported by van den Hoogen et al, we will review relevant terminology.[3] The evaluation of a clinical diagnostic test represents a validity study. The diagnostic test under review (eg, SLR) is the predictor variable and the measure of the truth (eg, inspection at surgery) is the criterion standard. In a well designed study, a representative sample of patients is identified and the test under investigation and the criterion standard are applied to all patients.[5] Ideally, the test's result does not influence whether or not the criterion standard will be applied.[5] To avoid bias, a person who is blind to the test's result determines whether a patient truly has the condition.[5] Results of diagnostic studies are often summarized in a table similar to that presented in Table 3.

In Table 3 the terms "condition present" and "condition absent" are used to identify persons who truly have or are free of the condition of interest (in our example disc herniation). The letters "a, b, c, d" are used to reference cells in the 2x2 (read 2 by 2) table, and the sums "a+b, c+d, a+c, b+d, a+b+c+d" denote what are known as marginal values. Two related approaches exist for summarizing the results of a diagnostic test study: one approach uses predictive value terminology and the other cites likelihood ratios.[5,6] In this article we will describe the predictive value terminology only.

Predictive Value Terminology

Prevalence represents the percentage of persons who truly have the condition of interest. As such it represents the pretest chance of having the condition of interest. [100% x (a+c)/(a+b+c+d)].

Sensitivity characterizes those persons correctly identified by the test as having the condition of interest as a percentage of all those who truly have the condition of interest [100% x (a/(a+c))].

Specificity defines those persons correctly identified by the test as not having the condition of interest as a percentage of all those who truly do not have the condition of interest [100% x (d/(b+d))].

Positive predictive value depicts those persons correctly identified by the test as having the condition of interest as a percentage of all those identified by the test as having the condition of interest [100% x (a/(a+b))].This is the chance that a patient who has a positive test findings actually has the condition of interest.

Negative predictive value represents those persons correctly identified by the test as not having the condition of interest as a percentage of all those identified by the test as not having the condition of interest [100% x (d/(c+d))].This is the chance that a patient who has a negative test findings actually does not have the condition of interest.

One important concept when reviewing a clinical diagnostic test is that sensitivity and specificity are not influenced by prevalence; however, predictive values are prevalence dependent. A second point is that researchers know patients' true diagnoses; whereas, clinicians act on test results without knowing the truth. This poses a potential problem in that the predictive values presented for a given study are not likely to be uniformly useful for all patients seen in clinical practice. Fortunately, because sensitivity and specificity are independent of prevalence, they, along with a more clinically meaningful prevalence, one that matches a patient's history specific prevalence, can be used to compute predictive values. The following section illustrates a procedure for altering the prevalence and recalculating the predictive values.

Table 4. 2 x 2 Table Representing a Summary of the Diagnostic Accuracy of the SLR

		Truth: Visualization at Surgery		
		Disc Herniation Present	Disc Herniation Absent	
Test SLR	Positive	96 a	79 b	175 a+b
	Negative	c 4	d 21	c+d 25
		100 a+c	100 b+d	200 a+b+c+d

Predictive Value Example

Table 4 illustrates how the results from an actual diagnostic accuracy might be presented. In this example the prevalence of disc herniation is 50% (similar to that of Patient 2. The sensitivity and specificity of the SLR presented in this table is representative of the values presented in the van den Hoogen review paper. Details concerning how the cell values are calculated are described in the next example for a patient with a 1% prevalence. In the example detailed in Table 5, we compute the predictive values for a history of specific prevalence of 1% (Patient 1's history specific prevalence). If we arbitrarily set the total number of subjects (a+b+c+d) to 100 persons, a prevalence of 1% implies that 1 out of 100 persons have a disc herniation (a+c=1). The number of persons who truly do not have a disc herniation is 99 (b+d is calculated by subtracting "a+c" from "a+b+c+d" (100 in this example i.e., 100-1=99). Thus marginal value "a+c" equals 1 and marginal value "b+d" equals 99. Cell values are determined by using the known sensitivity (96%) and specificity (21%) values from the literature (recall sensitivity and specificity are independent of prevalence). The value for cell "a" is calculated by multiplying the marginal "a+c" by the sensitivity of 96% and "d" is calculated by multiply-

Table 3. Illustration of 2x2 Table Used to Summarize the Results of a Diagnostic Test Study

		Truth		
		Condition Present	Condition Absent	
Test	Positive	True-positives a	False-positives b	a+b
	Negative	c False-negatives	d True-negatives	c+d
		a+c	b+d	a+b+c+d

ing the marginal "b+d" by the specificity of 21%. Cell values "c" and "b" are subsequently determined by subtraction. Once the cell values have been calculated the predictive values are determined as described previously. Thus, in this example the positive predictive value becomes 1.2% and the negative predictive value becomes 99.8%.

Clinical Diagnostic Tests Applied to Patients 1 and 2

In this section we will review the diagnostic properties of the SLR, XSLR, achilles reflex, patella reflex, extensor hallucis longus (EHL) weakness, and altered sensation, and apply these properties to Patients 1 and 2. Table 6 summarizes the diagnostic properties of these tests and applies these properties to Patients 1 and 2. Examination of the sensitivity and specificity values for the tests reveals that the SLR has the highest sensitivity; whereas, the XSLR has the highest specificity.The application of sensitivity and specificity can best be revealed by considering a patient who has a history specific disc herniation prevalence of 50%. For this reason we will discuss Patient 2 first.

The clinical usefulness of a test is measured by the extent to which a positive test finding moves the chance of a disc herniation from 50% towards 100%, or by the extent to which a negative test finding moves the chance of a disc herniation from 50% towards 0%. Applying these standards to Patient 2 we find the following.

1) A positive SLR moves his chance of having a disc herniation from 50% to 55%; whereas, a negative SLR moves his chance of not having a disc herniation from 50% to 84%. Thus, a negative SLR provides more information than a positive SLR.
2) A positive XSLR moves his chance of having a disc herniation from 50% to 74%; whereas, a negative XSLR moves his chance of not having a disc herniation from 50% to 56%. Thus, a positive XSLR provides more information than a negative XSLR.
3) A positive achilles reflex moves his chance of having a disc herniation from 50% to 65%; whereas, a negative achilles reflex moves his chance of not having a disc herniation from 50% to 59%. Thus, a positve achilles reflex provides more information than a negative achilles reflex.
4) A positive patella reflex moves his chance of having a disc herniation from 50% to 33%; whereas, a negative patella reflex moves his chance of not having a disc herniation from 50% to 47%. These results indicate that applying this test actually increases the error rate.
5) A positive EHL weakness moves his chance of having a disc herniation from 50% to 72%; whereas, a negative EHL weakness moves his chance of not having a disc herniation from 50% to 63%. Thus, a positve test provides more information than a negative test; however, both findings provide a gain in information in excess of 10%.
6) Either a positive or negative altered sensation finding does not change the chance of a disc herniation appreciably from 50%.

These findings suggest that a negative SLR provides the best single test evidence for increasing one's confidence that a disc herniation does not exist. A positive XSLR provides the best single test evidence—followed closely by a positive EHL weakness—for increasing one's confidence that a disc herniation does exist. Altered sensation does not provide any gain in information and a positive patella reflex increases the uncertainty in the presence or absence of a disc herniation.

Applying the results of the six tests to Patient 1, we find that no appreciable gain in information is achieved by either a positive or negative test finding. However, there is an important lesion to be learned about applying and acting on the result of a test for which a patient has a low prior chance (e.g., history specific prevalence) of having the condition. To illus-

Table 5. Example of Computing Predictive Values Given Known Prevalence, Sensitivity, and Specificity (this example applies a prevalence of 1%)

		Truth: Visualization at Surgery		
		Cases: Disc Herniation Present	Controls: Disc Herniation Absent	
Test SLR	Positive	a = (a+c) x sensitivity a = 1 x 0.96 a = .96	b = (b+d) - d b = 99 – 20.8 b = 78.2	a+b = .96 + 78.2 a+b = 79.16
	Negative	c = (a+c) - a c = 1 - .96 c = .04	d = (b+d) x specificity d = 99 x 0.21 d = 20.8	c+d = .04 + 20.8 c+d = 20.84
		a+c = prevalence x 100 a+c = 0.01 x 100 a+c = 1	b+d =100 - prevalence b+d =100 - (a+c) b+d = 99	Set a+b+c+d = 100

Table 6. Summary of the Test Characteristics Applied to Patients 1 & 2 for Five Clinical Signs Used to Assess the Likelihood of a Disc Herniation

Test Characteristics	SLR/ Lasègue	Crossed SLR	Achilles Reflex	Patella Reflex	EHL Weakness	Altered Sensation
Sensitivity	96%	29%	47%	9%	53%	28%
Specificity	21%	90%	75%	82%	79%	74%
Patient 1 History Specific Prevalence = 1%						
+ predictive value	1.2%	2.9%	1.9%	.5%	2.5%	1.1%
- predictive value	99.8%	99.2%	99.3%	98.9%	99.4%	99.0%
Patient 2 History Specific Prevalence = 50%						
+ predictive value	54.9%	74.4%	65.3%	33.3%	71.6%	51.9%
- predictive value	84.0%	55.9%	58.6%	47.4%	62.7%	50.7%

trate this point, consider that Patient 1 had the isolated finding of a positive XSLR. His chance of having a disc herniation remains extremely low: it has increased from 1% to 3%. More importantly, his chance of not having a disc herniation given a positive XSLR is 97% (100% - 3%). Thus, 97% of patients with a history specific prevalence similar to Patient 1 would be incorrectly labeled as having a disc herniation. Accordingly, the act of applying tests to patients who have a low chance of having the condition for which the test was intended will be to increase the false positive rate. Exhaustive examinations and non-hypotheses driven scans are examples of investigative strategies that serve to lower the prevalence and increase the false positive rate.

Combined Testing

Clinical diagnostic tests are usually not applied in isolation, but rather are used in combination to increase one's certainty concerning a finding. This section provides an example of how tests can be combined to improve the overall predictive values and ultimately, the confidence one has about a finding. This process will be illustrated on Patient 2 who has about a 50% chance of having a disc herniation prior to conducting the physical examination. Two conditions will be illustrated: the first where the SLR is negative and the second where the SLR is positive. Test results will be considered in series.

Condition 1. The first clinical diagnostic test to be applied is the SLR and the test result was negative. Patient 1 has now moved from a 50% chance of having a disc herniation to an 84% chance of not having a disc herniation. Because of the negative SLR test finding the pre EHL test chance of having a disc herniation is 16% (100%-84%). A negative EHL test finding moves the patient's chance of not having a disc herniation from 84% to 90% and a disc herniation can be virtually ruled-out.

Condition 2. Once again the SLR was applied first to the patient, but in this case the test result was positive. This moves the patient's chance of having a disc herniation from 50% to 55%. The XSLR was applied next. Because of the positive SLR finding, the pre XSLR chance of having a disc herniation is 55%. A positive XSLR moves the patient's chance of having a disc herniation to 78%. A third test, EHL weakness, is now applied to the patient. A positive EHL test moves the patient's chance of having a disc herniation from 78% to 90% and a disc herniation can be virtually ruled-in.

In the previous examples the tests were applied in series and the relevant predictive value was used to determine the subsequent test's pre-application chance of having a disc herniation. Test results can also be considered in parallel and decision rules can be developed for the interpretation of parallel test findings. For example, consider that the consequence of not detecting a condition that is life threatening (e.g., cancer). One could apply several tests and consider a positive finding to be a positive test result on any one of the applied tests. The action would be to proceed—as least from an investigative point of view—as if the patient had the condition until more definitive tests prove otherwise.

Clinical Synthesis

In clinical practice, physical therapists use diagnostic tests on a daily basis to assist decision making concerning their patients. When faced with a particular patient presentation, the clinician must use the best available information to make a prediction about the truth. The closer one's diagnosis is to the truth, the more appropriate the resulting treatment strategy and the greater the likelihood of success. The information available for consideration comes from a variety of sources: patient history, history specific prevalence, clinical tests and their predictive values, and the clinician's own experience. The synthesis of this information will yield the best diagnosis when considered in a hypothesis driven paradigm.

The SLR, XSLR, key muscle, and deep tendon reflex tests are taught and routinely carried out as part of the scanning examination of patients with low back pain. Traditionally, the scan is undertaken to rule out serious pathology and clear the way for a more detailed clinical evaluation. Given the increase in direct access to physical therapy services, adequate screening of patients by frontline practitioners is imperative. However, while gathering information in the scanning exam the findings must be considered in the context of a hypothesis driven evaluation. Considering the SLR as an example, clinicians are reminded that the SLR may have merits in conditions other than disc herniation. However, its diagnostic value for other pathology has yet to be determined. Therefore, the SLR test may have specific merits for different patient presentations and its importance to the clinician lies in recognizing the differences when interpreting results.

A natural question is "Should the SLR continue to be routinely undertaken during the scanning examination of patients with lower quadrant dysfunction?" Whenever one applies a clinical test it should be in the context of a purposeful investigation. In the case of the SLR one could envision three bona fide reasons for its application: 1) as a known predictor of the absence of disc herniation, 2) as an unknown predictor of either the presence or absence of other pathology, and 3) as a way of maintaining one's skill in applying and interpreting the test. Recognizing the reason for the test in a particular patient will allow the clinician to correctly consider the result and apply the finding to the diagnostic equation.

Much of what we have presented involves numbers and calculations. We have put the formula into a spreadsheet program and have found this to be a practical way of handling repetitive calculations. However, in day to day practice it is not expected that these numbers will be remembered. We have found the following approach to be useful.

1. Rather than assigning an exact percentage to a history specific prevalence, it is reduced to one of five categories: extremely unlikely, unlikely, possible, likely, and extremely likely.
2. Patients rated as extremely unlikely or unlikely will have a greater false positive rate.
3. Patients rated as likely or extremely likely will have a higher false negative rate.
4. Tests are selected based on their measurement properties.
5. It is not expected that clinicians will remember the actual numbers for sensitivity and specificity, but rather will recall whether a test or series of tests is better at "ruling in" or "ruling out" a condition.
6. The likelihood of serious pathology existing and the consequence of missing serious pathology are established and a decision rule on what will constitute either a positive or negative finding is defined (ie, the issue of series or parallel test interpretation).

Sharing the Work and Disseminating the Knowledge

Information concerning the diagnostic accuracy of many clinical tests is available. Unfortunately, it is not presented in textbooks. How can we as a profession rapidly increase our knowledge concerning this information? One approach is to organize small working groups with common clinical interests. Each group could take on the task of doing a literature search and presenting a critical summary of the diagnostic properties of tests for a given condition. The information could be shared in a two or three page synthesis in this newsletter or *Physical Therapy.* Moreover, the information could be presented as part of continuing education

courses. Finally, the information could be reinforced by contributing to specialization certification examinations.

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Making Tests with Low Reliability Work for You

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Lumbar Magnetic Resonance Imaging and its Role in the Physical Therapy Evaluation of People with Low Back Pain

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Low back pain syndrome (LBP) remains an extremely common, yet poorly defined clinical condition for which many people seek physical therapy. With the exception of those patients with acute fractures, severe nerve compression or certain lytic lesions, the anatomic source of symptoms of LBP is usually speculative. The advent of magnetic resonance imaging (MRI) has provided clinicians with the opportunity to view in vivo lumbar morphology in extraordinary detail, allowing the opportunity to detect abnormalities which may be the cause of symptoms. In many parts of North America, lumbar MRI has become an integral part of the diagnostic work-up for patients with LBP and/or lower extremity radiculopathy. As such, physical therapists are increasingly utilizing MRI findings within the process of patient evaluation and treatment planning. In this communication, I will briefly describe the application and interpretation of lumbar MRI and discuss recent findings regarding the relationship of MRI findings to LBP. This is intended to be a brief overview to assist in clinical decision making. For more detail, interested readers are referred to several recent publications.[1-5]

What information does lumbar MRI provide?

The MRI signal is generated by measuring energy given off from hydrogen nuclei that have been displaced within a magnetic field. Through a complex process of signal transformation, a high resolution image is created which represents human tissue as a function of shape and biochemical composition. The detection sensitivity of lumbar MRI is enhanced by its ability to image thin (3-5mm) tissue "slices" at various angles, giving examiners the opportunity to study small regions of tissue. Magnetic resonance imaging is non-invasive and does not use ionizing radiation, therefore posing less risk to the patient than plain film radiographs, computerized tomography or myelography.

Because of the differences in fluid content between various tissues, the highly sensitive MRI can provide excellent contrast between different soft tissue such as muscle, nerve and fat. By "weighing" an image, an examiner can highlight the presence of local concentrations of fluids such as blood, pus, or various types of edema. Thus, lumbar MRI is extremely useful to detect tissue responses to trauma, infection and inflammation and is generally considered as the imaging modality of choice for individuals with suspected serious disease (Table 1).

Relative to those patients with LBP and/or radiculopathy, the indications for MRI are more controversial. Two primary issues arise: (1) lumbar MRI is a costly procedure (usually $800.00 to $1,000.00 in the United States), and (2) the diagnostic yield (i.e. what useful information is obtained) is uncertain. Because an image can be weighted to highlight the contrast between fluid nucleus pulposus and less aqueous annulus fibrosis, lumbar MRI provides an excellent opportunity to study the intervertebral disc. Such anatomic impairments as disc degeneration, displacement (bulge, herniation) and impingement of the disc on the cauda equina or nerve roots can therefore be readily appreciated. Ostensibly, this would appear to provide answers to many questions about the anatomic etiology of LBP by confirming clinical hypotheses relating to the role of intervertebral disc and LBP. For example, the presence of disc bulging or herniation in patients with LBP would be a logical explanation of symptoms. Recent literature has however shown this to be an oversimplification.

Table 1. Common disease processes visible on lumbar MRI (from Beattie P, Meyers SP. Magnetic resonance imaging in low back pain: General principles and clinical issues. *Physical Therapy*. 1998;78:738-753. Reprinted with permission)

Spinal Cord
Tumors: primary and secondary
Syringohydromyelia
Spinal cord trauma
Ischemia and infarction
Vascular malformations
Inflammatory and degenerative disease of the spinal cord
Infections
Intradural, extramedullary
Tumor, nerve sheath tumors
Infection and inflammation
Arachnoiditis
Guillain-Barre syndrome

The relationship of common lumbar MRI findings to symptoms

In 1986 Powell, et al[6] reported a study which used lumbar MRI to determine the relationship of pregnancy to disc displacement in pregnant and non-pregnant women. Interestingly, these researchers detected a high prevalence of disc degeneration and displacement in this population of healthy, asymptomatic young people. Several subsequent studies reported similar findings (ie, disc degeneration, bulging and herniation) which are quite prevalent in adults irrespective of the presence or absence of LBP.[7-9] This gives rise to an obvious question that when a patient with LBP is found to have disc abnormality on MRI, is this the cause of the symptoms or simply an incidental finding? This creates much confusion clinically. For example, should treatment and further work-up be based upon the assumption that the patient has "disc problems"? In the extreme, this could lead the patient to believe that he or she has a more severe condition that is actually the case and in some instances, lead to inappropriate surgical intervention. On the other hand, inappropriately ignoring the disc impairment could lead to an underestimation of the patient's condition and deprive the individual of the appropriate intervention.

Considering the above, it is clear that not all disc abnormalities visible on MRI are "symptom-generators."[10,11] Several studies have attempted to identify the disc abnormalities which are likely to be associated with symptoms. Jensen and colleagues[9] classified disc abnormalities according to magnitude and reported that only disc "extrusions" (severe herniations which extend beyond the disc interspace) were uncommon in asymptomatic individuals but noticeably more prevalent in patients with LBP. Investigating the role of nerve encroachment by disc material, Boos, et al[5] re-

ported that while minor nerve compression from disc displacement was common in asymptomatic people, severe nerve compression was seen only in symptomatic individuals.

A study in which I am currently involved is attempting to determine the relationship between lumbar anatomic impairment visible on MRI and the spatial distribution of pain. Thus far, we have assessed 350 subjects and have found no association between the type of pathology and symptom distribution and only a weak association between the level of nerve root compression and the distribution of symptoms.

Thus, in the absence of serious disease, there remains uncertainty between the relationship of many lumbar MRI findings and symptoms. How then should you utilize the MRI report that a patient may bring to the physical therapy evaluation?

How do MRI findings influence clinical judgments?

The lumbar MRI report will provide an enormous amount of useful information regarding the morphology of the lumbar spine, however over-interpretation, while tempting, can lead to problems. Correlation with physical examinations is absolutely essential. Some general guidelines include:

Normal MRI in a patient with LBP

If the MRI is "normal," it is highly unlikely the patient has serious pathology, such as tumor or inflammatory disease, unless the symptoms are referred from a location distant to the site being imaged. The reassurance gained from this can have extraordinary positive benefits to the patient by decreasing disease conviction (the erroneous belief that one has a serious disease).[12] The presence of a normal MRI in a patient with LBP may lend support to the existence of such conditions as facet syndrome, or sacroiliac joint dysfunction, however because of the lack of valid diagnostic tests, clinicians must use caution when classifying patients with these diagnoses.

An important medical-legal concern relates to the use of a normal MRI to conclude the patient does not have a back problem and is, therefore, "malingering". Given the limitations in the research, it is obviously inappropriate to do this, since a normal MRI does not rule out the presence of symptom-generating impairments.

Abnormal MRI from a patient with LBP

Given abnormal or "positive" findings on lumbar MRI, the fundamental concern is to differentiate the findings into symptom-generators, risk factors for future problems, and benign variations. The following findings are common in people with or without LBP: disc degeneration, disc bulging, protrusion or small-medium herniation and mild or moderate nerve compression (ie, encroachment of the spinal nerve by disc material).[1,10] These findings have the potential to be symptom-generators or they may be benign variations, and are thus, inconclusive without concomitant findings from physical examination.

Following lumbar MRI, many patients are alarmed to learn that they have "abnormal discs". This may lead them to overestimate the magnitude of their problems leading to reduced expectations from therapy and fear avoidance behaviors. It is, therefore, important to inform patients that these findings are also common in people who do not have symptoms and while it is unclear whether these findings are the source of their current problem, they do not necessarily imply a severe condition.

The following findings are rare in people without LBP: disc extrusion,[9] free fragments of disc,[13] and severe nerve compressions.[5] When individuals present with these findings, a strong argument may be made regarding their relationship to symptoms. Once again, however, strong correlation with clinical findings is necessary.

Discussion

The uncertainty of the meaningfulness of many MRI findings does not mean that lumbar MRI is useless in the evaluation of people with LBP, but rather, as with all evolving technologies, it requires further refinement. Magnetic resonance imaging remains the optimal imaging modality to rule out serious pathology in the small sub-set for whom this is a concern. For the large group of people with activity-limiting LBP, the meaningfulness of most MRI findings remain unclear. There are several reasons for this. Lumbar MRI is obtained from a recumbent subject and fails to account for forces which occur during upright postures. For example, it may be the instability of a disc displacement which is the critical favor. This may explain why disc bulges and herniations appear similar between people with or without symptoms when imaged supine. Morphologically, the neural foramina in the lumbar spine are quite large relative to the size of the cauda equina and nerve roots. Therefore, large disc displacements which appear very dramatic on MRI may still leave room for the nerve to have unencumbered displacement during lumbar motion. This is supported by the notion that the nature of an inflammatory interface between the disc and spinal nerve is the key to triggering pain rather than the degree of compression,[14,15] thus two herniations may be identical in size but one causes an inflammatory reaction with adjacent tissues (perhaps due to leakage of nuclear material in the symptomatic person) whereas the other does not (in the asymptomatic person).

Human anatomy is characterized by variations in structure between people. When an anatomic variation is observed, it is uncertain whether it should be classified as a benign variation, a symptom-generator, or as a risk factor for future problems. This is true not just of intervertebral joint disorders, but of such findings as scoliosis, limb length differences and other types of lower extremity malalignment. As advances in biometrics continue, we will have much more precise descriptions of human anatomy. These representations, when combined with valid test findings from physical examination, will allow us to develop classifications that will drive more effective treatments.

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(Continued on page 45)

MARKETING THE EVIDENCE

Gregory Spadoni, BA, BHSc, PT

We can all use help when it comes to marketing the profession of physical therapy. The potential markets are varied and therefore the strategy must be tailored to the specific target. The purpose of this report is to outline one strategy that has been developed to market the profession of physical therapy to physicians. All too often physicians may not be aware of the merits of our art to their patients.

The evolution of health care in the last decade has introduced many new challenges to the profession of physical therapy. Specifically two important challenges are justifying what we do and marketing our profession as we compete for the ever-shrinking health care pie. Allied professions and payers alike are all too often seeking evidence for the effectiveness of a given intervention. '*Evidence-based practice*' has become the buzz-word in health care. Unfortunately the level of evidence varies greatly for the efficacy of many physical therapy interventions that have witnessed 'clinical success' for years. With the evolution of research in the field of physical therapy it becomes imperative that we '*spread the good news*' when evidence of the effectiveness of an intervention becomes available.

Traditionally physical therapists have not had the need to market the profession. However in today's climate marketing is essential to prevent encroachment on our unique body of knowledge and to maintain our patient base, as we now find ourselves competing with allied health professionals. Pharmaceutical companies have been using research evidence to market their products to physicians for years. Therefore, in the same framework as the pharmaceutical monograph, a concept for marketing physical therapy was conceived. The concept developed was to provide a concise summary of the efficacy of a physical therapy intervention to physicians.

The rationale acknowledges that it is often a challenge for health care professionals to keep abreast of current literature in their discipline while maintaining a clinical practice. The concept arose to aid the physician in making decisions about the care of specific patients based on the best available evidence. The information is intended to be kept as a quick reference for the family physician who may otherwise be unable to keep abreast of the latest developments in orthopaedics. It is hoped that a management protocol will assist in directing referral to physical therapy, and possibly avoid the unnecessary referral of such patients directly to specialists for consultation.

Therefore, educational monographs would be created relating to selected orthopaedic conditions for which there is evidence supporting a given assessment technique, intervention strategy, or outcome measure. To be *user-friendly* it would be necessary to succinctly present the evidence and a summary of the "bottom line." An example of such a monograph is displayed in Appendix 1. It summarises the evidence for the management of chronic low back pain with radiological diagnosis of spondylolysis or spondylolithesis.

The format of the monograph begins with the presentation of a "clinical scenario," which outlines the inclusion criteria for the evidence under consideration. Secondly a "management question" is posed that outlines possible options for patient care. The "clinical bottom line" presents the scientific evidence that supports the efficacy of the intervention and finally, an outline of the specific physical therapy intervention is presented.

In considering the work of O'Sullivan et al[1] (Appendix 1) it was imperative that the study employed adequate scientific rigour. Evaluation of this study revealed that it reported level one evidence[2] (high quality randomized control trial) and statistically significant findings in favor of the intervention in question. Evidence of a lower level would have undoubtedly cast doubt on any reported findings, and would therefore be weaker evidence. In drafting a monograph, it is recommended that inclusion of evidence be reserved for the best evidence.

This marketing concept also serves as a means of continuing education for physical therapists. Its development requires a commitment to the review of current literature relative to the practice of physical therapy; and the ability to effectively scan and evaluate the literature for appropriate information. Once created, the monographs also serve as a source of continuing education for other physical therapists in orthopaedics and reinforce evidenced based practice.

I encourage clinicians to support the marketing of physical therapy, and to devote some time to continuing education pursuits. In the hopes of fostering these sentiments I invite the copying of the enclosed monograph (Appendix 1), for distribution and enlightenment in your medical neighborhood.

Appendix 1

Putting Evidence First:

Management of Chronic Low Back Pain with Radiological Diagnosis of Spondylolysis or Spondylolisthesis

Prepared by: Greg Spadoni BA, BHSc, PT, ProActive Physiotherapy, Hamilton, On

Clinical Scenario

A patient between 16-50 years presents with chronic low back pain (>3 months with no sign of abating) and a radiological diagnosis of spondylolysis or spondylolisthesis.

Management Question: Should treatment consist of traditional interventions or a specific exercise program?

Clinical Bottom Line: A RCT in *Spine* has reported that a *specific exercise program* appears to be more effective than commonly prescribed *traditional interventions.*

The Evidence

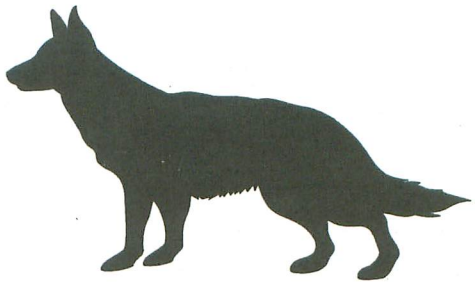
44 patients (16-49 yrs; 27 males, 17 females) participated in a Randomized Control Trial (RCT) and were assigned to two treatment groups. The first group underwent a 10-week program of specific lumbar stabilization exercises directed by a physical therapist. The second group underwent a 10-week treatment program as directed by their medical practitioner. After the initial 10-weeks and at a 30-month follow-up, the specific exercise group demonstrated a statistically significant reduction in pain status and functional disability. The control group displayed no significant change in these parameters, after intervention, or at follow-up.

Specific Exercise Program

(directed by a physical therapist; monitored with pressure biofeedback)

1. Train contraction of deep abdominal muscles (transverse abdominis, internal obliques)
2. Train specific contraction of deep abdominal muscles and co-contraction of segmental lumbar muscles

(Continued on page 45)



(www.orthopt.org)

The Orthopaedic Section

In cooperation with the University of Tennessee College of Veterinary Medicine

and the

Orthopaedic Section Veterinary Physical Therapy SIG

present:

"Canine Physical Therapy I"

June 18 - 20, 1999 * University of Tennessee, Knoxville

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Bone Changes in Older Persons
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APTA
American Physical Therapy Association

Letter to the Editor

Defend Skilled PT Practice Scope or Perish: A Need To Take A Stand

Dear Editor,

It is time we take a stand on teaching manipulation and manual therapy procedures to support personnel including physical therapist assistants and ATCs.

The American Academy of Orthopaedic Manual Physical Therapists (AAOMPT) in response to the issues related to inappropriate clinical mentoring and utilization of support personnel including ATCs and physical therapist assistants practicing manual therapy techniques has taken a stand with a position statement addressing the scope of practice of manual and manipulative therapy.

The following recent response from AAOMPT was edited to provide a discussion of the issues, a description of the AAOMPT position statement, and an opinion from the AAOMPT Practice Affairs Committee responding to a recently promoted cervical spine course for ATCs and PTAs.

Let's let this position facilitate further open dialogue and a movement to a consensus on this issue. It is time to defend and enforce skilled physical therapist practice scope or perish.

Sincerely,
Stephen McDavitt, PT, MS, MTC

To Whom This May Concern:

As physical therapists practicing OMPT and representing AAOMPT we are extremely concerned and totally disagree with teaching joint manipulation and mobilization techniques to physical therapist assistants and athletic trainers. Certainly we believe that any manipulation or mobilization procedure can be taught at the psychomotor level to almost anyone. The issue, however, is that in applying those techniques a thorough skilled examination before, during, and after such treatment is imperative to not only assess the results, but provide safety for the patient.

There is nothing within a physical therapist assistant curriculum or that of an athletic trainer which would provide them with the necessary skills and abilities to assess and treat that which you have described in your brochure including the atlanto-occipital joint, atlanto-axial joints, and lower cervical joints. Further, the capability for acting on determining pathomechanics and diagnostic approaches especially of the spine are beyond the competency training of supportive personnel including the physical therapist assistants and/or athletic trainers.

Speaking as chair of the Practice Affairs Committee of AAOMPT I would also like to inform you that the American Academy of Orthopaedic Manual Physical Therapists has adopted the following position statements:

1. Any joint manipulation/mobilization techniques into a restricted or painful range should be performed by the physical therapist and not delegated to supportive personnel including physical therapist assistants.

The AAOMPT recognizes that there are other manipulation/mobilization techniques that at times requires on-going critical decision making while at other times are relatively routine. In the routine circumstances those techniques may be delegated. When the higher level of critical decision making is necessary, those techniques should be performed by the physical therapist and not delegated to support personnel including the physical therapist assistant.

2. The AAOMPT is opposed to the teaching of joint manipulation/mobilization to all supportive personnel including physical therapist assistants.

The AAOMPT feels continuing education faculty need to be accountable for and cease from teaching certain skills and abilities to those that do not have the cognitive or affective skills and training to clinically apply the psychomotor components of such skilled techniques as joint manipulation/mobilization. Consider also that manual therapy defined in the "*GUIDE TO PHYSICAL THERAPIST PRACTICE*" page 162 states manual therapy "is a broad group of skilled hand movements used by the PHYSICAL THERAPIST (emphasis added) to mobilize soft tissues and joints for the purposes of modulating pain, increasing ROM, reducing or eliminating soft tissue inflammation, inducing relaxation, and improving contractile and non-contractile tissue extensibility and improving pulmonary function." Joint manipulation and mobilization fall within the categories of manual therapy. Therefore in our opinion, that expressed by AAOMPT, and as described in the *Guide to Physical Therapist Practice*, manipulation/mobilization should not be instructed to physical therapist assistants and athletic trainers.

We hope you will consider these opinions and look beyond the issue of filling classrooms at the expense of diluting a high level therapeutic skill amongst those incapable of all the dimensions required to be effective and safe to the public. The impact and risk of further blemishing the eyes of an already contentious legislative climate is also a necessary consideration.

The AAOMPT looks forward to your reply at your convenience.

Sincerely,
Stephen McDavitt, PT, MS, MTC
AAOMPT Practice Affairs Chair

Abstracts and Book Reviews

Coordinated by Michael J. Wooden, MS, PT, OCS

Siegel IM. *All About BONE: An Owner's Manual.* Demos Medical Publishing, Inc., 1998, paperback; 206 pp., illus.

The purpose of this book is to provide the reader with information regarding the function of bone, both in health and in disease. Written by an orthopaedic physician in response to the many questions he received over the years from patients inquiring about the structure, nature, injury, and disease of bone, the author ventures to teach the reader how to keep the bones and joints healthy and functioning optimally.

There is an introduction followed by 15 chapters, an epilogue, glossary, and index. The introduction provides a brief description of the origin of bone in biblical terms, archeological evidence of bone disease, historical treatment of bone injury, and advancement to more modern means of investigating the status of bone. The first chapter provides a sound overview of the structure, function, and maintenance of bone. Chapters 2 through 5 present general information on injury to bone and soft tissue. Chapter 6 instructs the reader on prevention of injury, offers examples of simple stretching exercises, and provides a catalog of sport injuries specific to the shoulder, elbow, hand, and running injuries affecting the knee, lower leg, foot, back, and hip, along with tips on basic rehabilitation. Chapter 7 focuses on normal posture, and Chapter 8 provides information on scoliosis. Chapters 10-13 are dedicated to the structure and injury of bone, and provide hints on treating regional problem areas (low back, neck, knee, hand). Chapter 14 considers congenital diseases of the bone, and Chapter 15 highlights examples of information learned about bone from archeological findings. Chapters 1-13 conclude with a series of questions and answers.

Overall, this book is a good source of lay information about the structure and function of bone, as well as common injuries to bone. The author liberally introduces medical terms and is consistent in providing the reader with the origin of each term and an explanation of its meaning. In general, a good overview of the anatomy, pathology, diagnosis, and treatment for injury is provided. Tables provide information on risk factors for weak bone (osteoporosis) and sources of calcium to promote strong, healthy bone.

Notably, the book lacks an adequate description of physical therapy intervention for bone and soft tissue injuries. Especially noted is the absence of physical therapy examination, evaluation, and education. The author's reference to physical therapy is generally limited to the application of moist hot packs, deep electrical diathermy, intermittent traction, massage, ultrasound, and TENS.

Several discrepancies and a few pieces of inaccurate information are found in the book. For example, a series of illustrated stretching exercises are provided in the fitness and bone chapter, which include two exercises involving full forward flexion from the waist while standing. Later, in the chapter on low back pain, the author states at least three times that bending should *never* occur from the waist, but always from the knees and hips. In the knee chapter, the author suggests that a strong quadriceps is used to compensate for a torn anterior cruciate ligament, and the medial meniscus is larger and more mobile, making it more vulnerable to injury. Overall, the inconsistent information is minimal and should not dilute the otherwise solid overview of healthy and diseased bone states.

This book provides a good introductory foundation for understanding the structure and function of bone, with basic information on common problems associated bone injury and dysfunction. I would not recommend it as a text for physical therapy students, however, it would be appropriate for lay individuals seeking an initial source of basic information about bone.

Brenda Boucher, PhD, PT, CHT

Harriet W, Michel TH. *Chronic Pain Management for Physical Therapists.* Butterworth-Heinmann, 1997m, 282 pp, softcover, illus.

The authors and contributors composed of PTs, PhDs and EdDs, reflected the team needed to successfully write a book on this specialty. Chronic pain management for physical therapists provides information about a specialty that few clinicians have had formal training. With the exception of chapters on physiology of pain and chronic pain concepts, this book was very clinical.

The chapter on medication management was very insightful on non-opioid and opioid analgesics, muscle relaxants, and medical management of neuropathic pain and psychological factors affecting response to medications. The chapter on evaluation of the patient with chronic pain was excellent. The evaluation used definitions based on the ICIDH model assessing the disorder, impairments, and disability. The assessment of disability was very good as the authors discussed testing impairments and function using valid and reliable tools. Functional restoration treatment approach had good levels of success with the primary goals of returning the patient to high levels of function. Case examples illustrated treatment protocols of various patients. The program discussed exercise, education, self-management techniques, functional goal setting, behavior modification techniques, and modalities.

The book also included chapters on documentation, behavior medicine assessment, neuroblockade procedures, prevention, and assessment of disability and a guide to pain treatment facilities. The authors also included an appendix featuring a pain curriculum for students in occupational and physical therapy schools.

Chronic pain in the field of physical therapy has lacked acknowledgment in both board certification and the *Guide to Physical Therapist Practice.* The authors bring some valuable information to clinicians to assist in assessment and treatment of patients with chronic pain. I would highly recommend Chronic Pain Management for Physical Therapists as a reference tool for students, clinicians, and clinical faculty.

Daryl Lawson, MPT, PT

Byrd JW. *Operative Hip Arthroscopy.* New York, NY: Thieme Medical Publishers Inc.,1998, 220 pp, hardcover, illus.

The purpose of this book was to cover all facets of hip arthroscopy. There are fifteen chapters that discuss this topic comprehensively. They include the history of hip arthroscopy, indications and contraindications of hip arthroscopy, physical exam of the hip, imaging tech-

niques of the hip, gross, portal, and arthroscopic anatomy of the hip, complications associated with hip arthroscopy, rehabilitation, clinical nursing care in hip arthroscopy, and the future of hip arthroscopy.

Hip arthroscopy by the lateral approach, the supine position, and without traction are covered in great detail from setting up the operating room, the surgical technique, case reports, and postoperative care.

Arthroscopy of select hip lesions included eight cases that included: removal of loose bodies, excision of a labral tear, debridement/abrasion of an inverted labrum with grade IV chondral defect, synovectomy, excision of an impinging osteophyte, assessment of avascular necrosis, debridement of a ruptured ligamentum teres, and assessment of a painful total hip arthroplasty.

One of the strengths of this book was the arthroscopic views that are found throughout the book. The views are very clear and well described so that the reader can quickly orientate themselves to the anatomy as well as the pathology, when present. The imaging pictures from x-ray, CT scan, and the MRI were also very distinct. There are 192 color illustrations in this book all of which are of the highest quality.

The rehabilitation chapter was systematic in presentation and clearly illustrated. At the end of the chapter there are four appendices that include postoperative rehabilitation for hip arthroscopy and arthroscopic hip debridement, hip exercises, and water exercises.

I would recommend this book for any physical therapist involved with patients where this surgical technique is being utilized.

Jeff Yaver, PT

Canavan PK. *Rehabilitation in Sports Medicine a Comprehensive Guide.* Stamford, CT: Appleton and Lange; 1998, 399 pages.

Paul Canavan enlisted the assistance of 36 physicians, physical therapists, nutritionists, and psychologists in developing this text. He designed this book to be "a comprehensive reference guide for medical professionals. . . in the treatment of common athletic injuries." In addition, he wanted to create a text that "would answer the most often asked questions" about nutrition, strength training, and psychology, as well as rehabilitation and the athlete. In reviewing this text, I have concluded that he has generally succeeded.

The first five chapters cover the subjects of strength and conditioning, nutrition, the roles of health care professionals in rehabilitation, the physiologic rationale strength training in rehabilitation, and the psychology of working with an injured athlete. I found the nutrition and psychology chapters to be the most informative. Both were easy to understand without oversimplifying the information, while at the same time being very practical and comprehensive. The weakest chapter, in my opinion, was entitled "Strength and Conditioning: Developing a Plan." Although it touched on all of the variables that need to be addressed in a strength program, there were few recommendations that were clear enough to be readily applied to a rehabilitation program. This may be reflective, however, of contradictions in the literature regarding the resistance, sets, and repetitions that are most effective in developing strength.

Chapters 6 through 13 proceed to detail common injuries and the treatment of those injuries. The chapters are divided into body regions beginning with the cervical spine, continuing down the spine, and following with the upper and lower extremities. Hand and wrist injuries are not included in this book. While all of the chapters are unique because different contributors wrote them, in general, they provided a thorough background of anatomy, and supplemented the text with photographs of treatment techniques, exercises, and radiographic diagnostic tests. I found the photographs a very helpful adjunct, especially for visualizing treatment techniques and exercises. There was a discrepancy in the radiographic photographs with some containing an arrow or circle pointing out the pathology, and others did not. At times it was difficult to determine what the picture was showing.

In my opinion, the chapters discussing the extremities contained the best reference materials. Moreover, they truly reflected the rehabilitation of the athlete by including a review of the biomechanics of running and programs for interval throwing and running when an athlete in

(Continued on page 45)

Public Relations Committee

Media SpokesPerson Network

The PR committee has been working on updating the Media Spokesperson network. A strategic plan and a policy & procedure guideline is in the final stages. The three primary goals for the MSN are:

1. Provide a mechanism to afford a quick, organized public relations response to issues that impact on the profession of Physical Therapy and/or the Orthopaedic Section.

This goal provides a means for the Orthopaedic Section to inform members in all geographic areas about potential media events. The members can then distribute press releases, be available for interviews etc,. The MSN was initially conceived as a media strike force. This function will be maintained as one of the primary objectives. Action maybe coordinated with the APTA's Dept of Public Relations.

2. Enhance Physical Therapist's perception of the importance of a public relations/marketing program and provide information on implementation.

This goal will provide information to the MSN members about the importance of how public relations/marketing plans influence consumer demand for Physical Therapy services. Since the number of physical therapists whose practice depends on marketing skills is decreasing, there is a need for us to inform all our members that only through their efforts on a local level will we obtain the exposure we desperately need. Information on effective marketing skills to increase local media exposure will be provided, as well as, continuing education opportunities available to enhance our public relations skills.

3. Enhance the public awareness of Orthopaedic Physical Therapy as the specialty of choice for prevention, evaluation, treatment and rehabilitation of musculoskeletal injuries.

To accomplish this additional information may be distributed. General public relations material, hints on media management, research results, etc, may be used. Rick Watson has been named the director of the MSN. He has great deal of experience with obtaining media exposure and is very enthusiastic about helping to spread the word about the benefits of Physical Therapy. If you have any thoughts on these goals, or other ways which the MSN can be utilized to help serve the membership or public, please contact Rick or me.

National Student Conclave

The Orthopaedic Section was again a sponsor of the National Student Conclave in Cincinnati on October 30th. This meeting was attended by more than 1200 physical therapy and physical therapist assistant students. Its purpose is to provide practical information relating to clinical practice, leadership, and professional development. At this meeting, we had the opportunity to influence the future leaders of our profession. From our exhibit booth, Tara and I were able to speak with most of the attendees and encourage their participation in our section. Our presence was very well received and I am confident we will gain many student memberships. In addition, there were many Orthopaedic Section members speaking to the students. Their efforts are also greatly appreciated.

Terry Randall, PT
Chair

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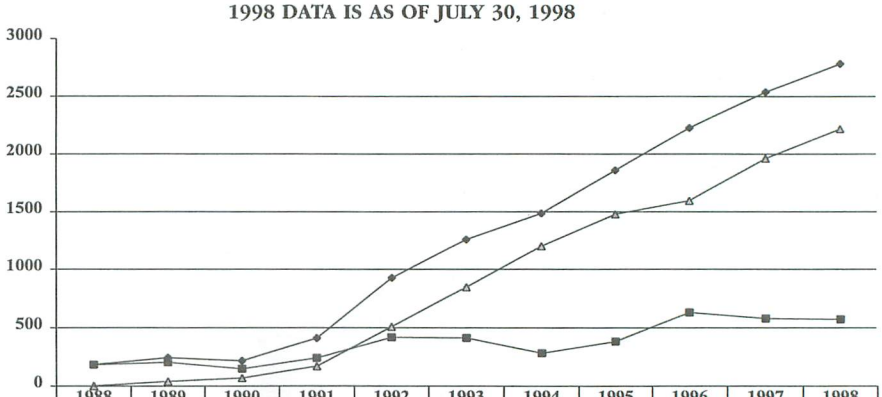

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Liablilities	183	203	148	240	417	413	283	382	629	577	570
Equity	2	40	69	170	508	844	1,201	1,477	1,595	1,961	2216

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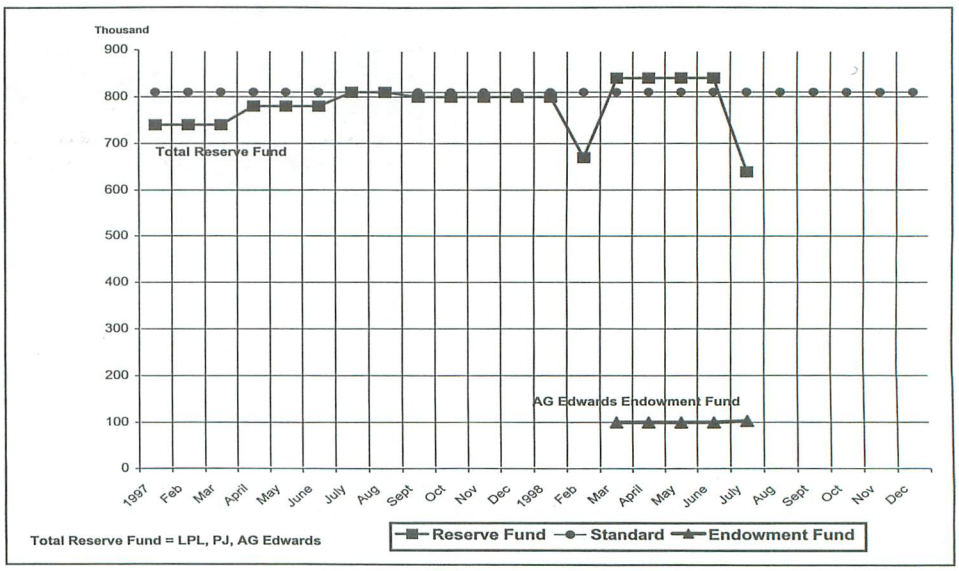

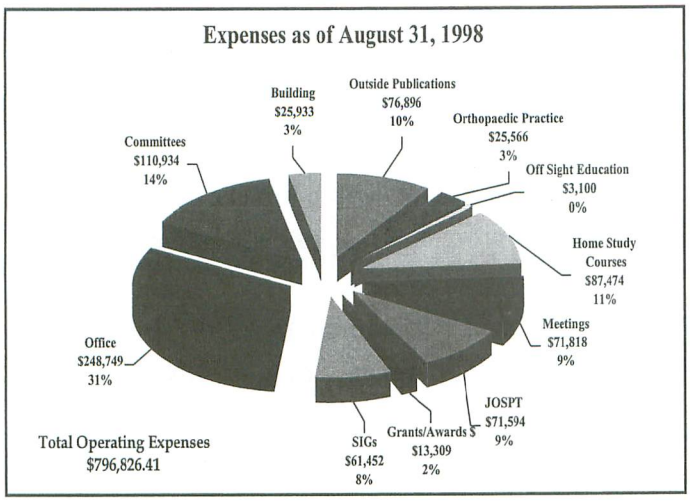

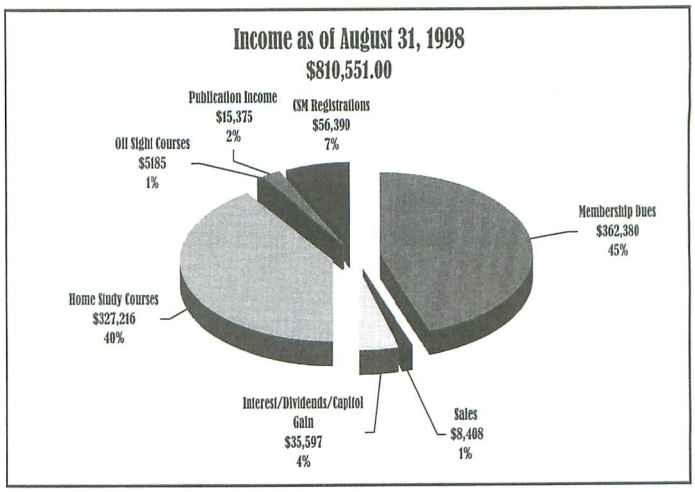

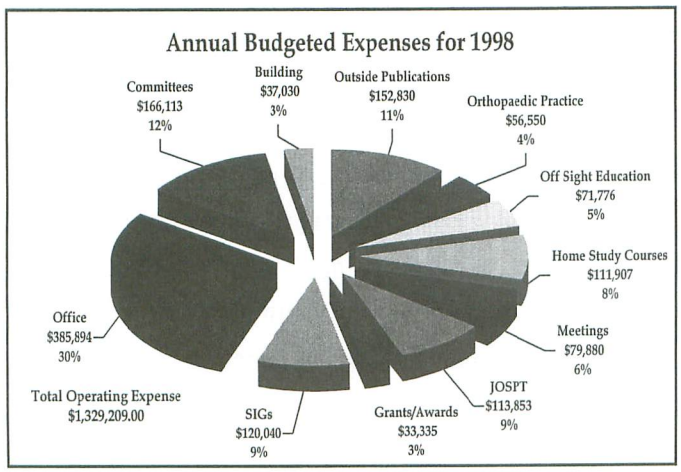

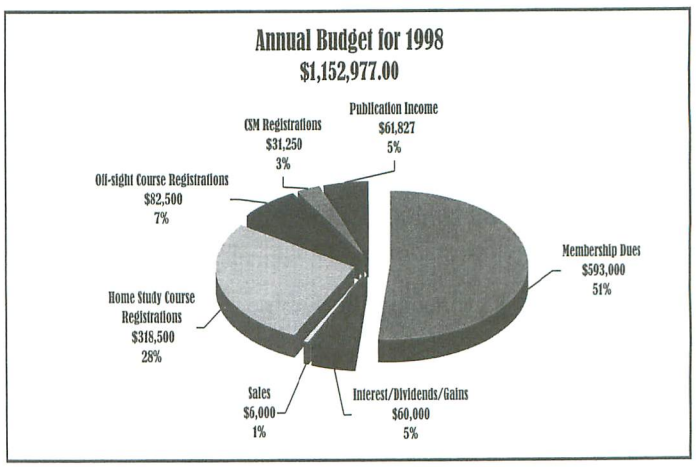

Lumbar Magnetic Resonance Imaging

(Continued from page 37)

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Paul Beattie is a physical therapist at University Sports Medicine at the University of Rochester. He is also an adjunct professor at Ithaca College, Department of Physical Therapy at the University of Rochester.

Marketing the Evidence

(Continued from page 38)

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Gregory Spandoni, BA, BHSc, PT is currently employed at ProActive Physiothrapy, Hamilton, ON.

Abstracts and Book Reviews

(Continued from page 43)

returning from an injury. These would be very helpful and useful to the clinician that does not work exclusively with athletes but is counseling one about return to activity. Several rehabilitation programs or protocols for diagnoses ranging from rotator cuff impingement to Achilles' tendonitis are also included.

Rehabilitation in Sports Medicine A Comprehensive Guide is a good foundation or basic reference book to begin your collection, and I recommend it to athletic trainers, physical therapists who are starting to work with athletes, and physical therapy and athletic training students alike.

Allyson L. Baughman, MPT

Answers

(From page 8)

Top Picture: Florene Johns, Dorothy Santi.
Bottom Picture: Sandy Burkart, Stanley Paris.

PROPOSED PRIMARY CLINICAL CARE PRACTITIONER SPECIAL INTEREST GROUP, ORTHOPAEDIC SECTION, APTA

Are you interested in Primary Care Physical Therapy? Do you provide primary care physical therapy or direct assess physical therapy to your patients? Are you interested in wellness and prevention? If you are, we need your participation.

Given the fact that health care delivery systems in this country are moving toward primary care based systems that improve patient access, physical therapists must be prepared to perform primary care physical therapy. The *Guide to Physical Therapist Practice* (November, 1997) outlines the physical therapist's role in primary care. The future and possible survival of our profession lies in the new paradigm shift towards primary care based delivery systems which include our traditional roles in management of movement dysfunctions, but also promotes the physical therapist's role in prevention and wellness.

As Orthopaedic Section members, were are interested in starting a primary care physical therapy SIG. We envision the mission of the SIG to: Provide communication among physical therapists interested in primary care; provide continuing education related to primary care physical therapy; foster problem solving in primary care physical therapy; analyze and define primary care physical therapy practice; foster development of post-professional APTA credentialed primary care physical therapy residencies; serve as a resource to APTA and academia; and influence political action and policy making processes regarding the practice of primary care physical therapy.

We have asked the Orthopaedic Section for meeting space at the 1999 Combined Sections Meeting. Information and directions will be made available at the Orthopaedic Section Booth during the Combined Sections Meeting in Seattle. To become a Level I SIG we need to secure 200 signatures from Orthopaedic Section members. In addition, we need to identify physical therapists who are or have been performing primary care/direct access physical therapy.

For questions or comments, please contact:

Robert DuVall, MMSc, PT, OCS, MTC
2645 Wilshire Terrace
Lawrenceville, GA 30044
Phone: 770-979-1400
Fax: 770-978-3360
Email: robertduvall@sprintmail.com

Edsen Donato, MPT, OCS
850 East Washington
Colten, CA 92324
Phone: 909-370-0572
Fax: 909-370-4389
Email: ezd001@aol.com

Name _____

*For clarity enclose a business card

Address _____

City _____ State _____ Zip _____

Phone _____ Fax _____ Email _____

Signature _____

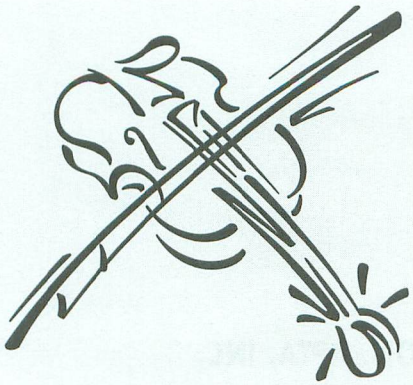
Please check:

_____ I am an Orthopaedic Section Member.

_____ Yes, I am in favor of this group forming.

_____ I am a Primary Clinical Care Practitioner.

Please Fax to 770-978-3360



Performing Arts

SPECIAL INTEREST GROUP **ORTHOPAEDIC SECTION, APTA, INC.**

IADMS

Brent Anderson, Shaw Bronner, Marshall Hagins, and Jennifer Gamboa attended the Eighth Annual Meeting of the International Association for Dance Medicine and Science in Hartford, Connecticut from October 30 to November 1, 1998. This umbrella organization provides a wonderful opportunity to network and collaborate with physicians, therapists, dancers, dance instructors, certified movement analysts, and instructors in Pilates-based conditioning. The programming this year was quite varied. The board range of topics included discussions of how to implement fitness training for professional dance students, alternative approaches to treating anterior hip tendinitis, increasing movement potential for dancers with functional scoliosis, and much more. Shaw Bronner presented her research on the "Kinematic Analysis of Pass in Dancers" and also sat on a panel discussing some of the important issues related to dance medicine and science research. Brent and Jennifer also attend a meeting of the IADMS Research Committee, which is another body dedicated to stimulating research in the field of dance medicine. IADMS is a great organization for therapists to join and provides a wonderful forum for beginning researchers to present their material. The 1999 meeting will be held in Tring, England. Watch this column for more information.

Dance Wellness Program

Long Island University's Division of Physical Therapy and Dance Department have established a collaborative Dance Wellness Program to increase the health awareness of dance students in relationship to the specific demands of their art form. The program includes individual dance screenings, specific conditioning recommendations, and lectures on common dance injuries, basic first aid, and healthy lifestyle choices.

Research

Congratulations to Shaw Bonner and Bruce Brownstein, founders of SOAR Research. The SOAR facility has officially moved into its new home at Long Island University, and Shaw and Bruce are actively pursuing grants.

Congratulations to Marshall Hagins for the publication of an article he authored entitled "Intratester and Intertester Reliability of the Palpation Meter (PALM) in Measuring Pelvic Position," *Journal of Manual and Manipulative Therapy*, 1998;6(3):130-136. This study was a preliminary step in the research Marshall is now pursuing to look at the relationship between hip strength and static postural positions.

Several PASIG members will be presenting platform presentations at CSM '99, including Shaw Bronner and Marshall Hagins. Stop by Orthopaedic Section Booth in Seattle to get your schedule of PASIG events.

Upcoming Meetings of Interest

Performing Arts Medicine Association (PAMA), Medical Problems of Musicians and Dancers. Aspen, Colorado, June 24 to June 27, 1999. Performing Arts Medicine Association has just issued a call for abstracts for both music and dance medicine research (Deadline is January 15, 1999). This is another great opportunity for PTs to network and present original research. Please contact Jennifer M. Gamboa at 703-527-9557 for more information.

PASIG Executive Board

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Secretary: Shaw Bronner, PT, MHS, OCS phone: (202) 752-4021 fax: (212) 752-4029 e-mail: sbronner@liu.edu

Pain MANAGEMENT

SPECIAL INTEREST GROUP • ORTHOPAEDIC SECTION, APTA, INC.

From the Editor

In my last newsletter, I had the privilege of presenting a case study given to me by Gerry Scotese on manual therapy s/p hip fracture. It is with sadness that I now present his obituary. Gerry died this fall while attending a pain conference. Although I only knew Gerry via telephone and email, I quickly came to feel his passion for pain management, his devotion to his patients and to his family. We commiserated in both being married to radiologists and suffering through their board exams.

The community of physical therapists has lost a colleague and an advocate: a passionate voice for the compassionate management of pain. Please join me in extending condolences to Gerry's family and friends.

Lisa Janice Cohen, MS, PT, OCS
cohen.lisa@mgh.harvard.edu
fax: 617-726-8022

Gaetano Scotese

It is with great sorrow and regret that we have lost another colleague and friend. On Saturday, September 12, 1998, Gaetano "Gerry" Scotese suddenly passed away from a massive heart attack. He is survived by his four children and his wife. Prior to becoming a physical therapist, Gerry spent enlisted time during the Vietnam War as a Navy Seal. He went back to school and, in 1977, was accepted to the U.S. Army Baylor PT Program. After retiring from the military he worked in a variety of clinical environments to include both hospital and outpatient physical therapy clinics. However, he loved and excelled in the field of pain management. He was the founding member of the Pain Management Special Interest Group of the Orthopedic Section. He had written several excellent articles on pain management, lectured widely at conferences on the subject, and was a Fellow of the American Academy of Pain Management.

Gerry will be remembered, most of all, as being a devoted husband and father. Personally, he was warm, gregarious, and generous. He was always ready to volunteer his services whether it was for his children's school functions, to teach, or to further the APTA agenda. He was a tireless and sometimes outspoken proponent of pain management issues. Juggling his time between being a dad and a busy clinician, he always seemed to have another project brewing. Gerry was loyal to his friends. He always had a way of making you feel good about yourself. A real kidder, Gerry could take as well as give it out. However, he always had a kind and encouraging manner about him. His sudden departure has left us all with a large void. We will deeply miss you, Gerry.

William H. O'Grady, MA, PT, OCS, COMT

In Remembrance

Gaetano Scotese was a friend and a colleague. He treated people in pain, cared about people in pain, shared his knowledge about treating pain and was the driving force behind the creation of the Pain SIG. Thank you Gaetano you've gone away to a better place where there is no pain, we'll miss you but we'll see you soon.

Tom Watson, PT

Call for Nominations

The terms of office for all the PMSIG positions are 2 years. Elections are staggered with the President and Secretary alternating with the Vice President. *The Nominating Committee is seeking names of individuals willing to be nominated for the offices of President and Secretary.* Elections will be held

CONTENTS:

Current Officers: PMSIG

Tom Watson, MEd, PT, FAAPM	President
Joe Kleinkort, MA, PhD, PT	Vice President
John E. Garzione, PT, AAPM	Secretary

at the PMSIG business meeting at CSM '99 in Seattle, WA. All SIG members who are Orthopaedic Section members are eligible to vote. ***Nominees must be members of the Orthopaedic Section.***

Please contact either Lisa Cohen (617-724-6306) or Joe Kleinkort (indusrehab@aol.com).

Call For Submissions

The Pain Management Special Interest Group Newsletter is published 4 times a year in *Orthopedic Physical Therapy Practice*. This newsletter can only be possible with the interest and assistance of our members. I am currently accepting materials for inclusion, including but not limited to: case studies, abstracts, clinical position papers, upcoming pain related conferences, for example. Please submit your materials to me via email, fax, or "snail" mail. I have included the deadlines for future issues for your planning. Thank you.

April issue: Feb 19th
August issue: June 18th
December issue: Oct 8th

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Veterinary

SPECIAL INTEREST GROUP

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Email: tfred@centuryinter.net

Upcoming Courses
Plan Ahead for CSM!
Veterinary Physical Therapy
February 6, 1999 Seattle, WA
Speakers: Lesley Kerfoot, PT, CHAP
"Equine Physiotherapist."
Wesley Rau, PT
"Canine Manual Therapy."

Canine Physical Therapy I
June 1999 Knoxville, TN
Speakers: David Levine, PT, PhD
Darryl Millis, DVM
Contact Tara Fredrickson, Orthopaedic Section, APTA 800/444-3982
For: Physical Therapists, Physical Therapist Assistants, Veterinarians, Veterinary Technicians, and Students of those professions

First International Symposium on Rehabilitation and Physical Therapy in Veterinary Medicine
August 7-11, 1999 Oregon State University
Speakers: 60 International Contributors
Contact: Linda Blythe, DVM, Dean, Veterinary College
541/737-2098 $300 range
Call for more information and conference brochure.

Course offered in Wisconsin
Reprinted from NAVTA News June 1998 Volume 12, No. 2
Published by the North American Veterinary Technician Assn, Inc.

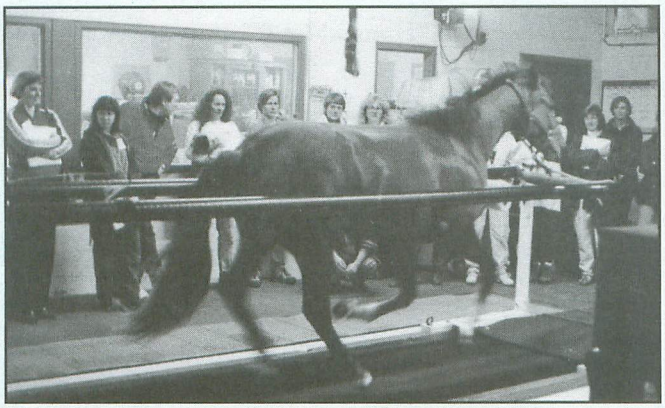
The Healing Oasis Veterinary Hospital is starting a veterinary technician postgraduate training course in veterinary massage and physical therapy. This program will consist of three modules (three days each) and will include topics such as anatomy and neuro-anatomy (including dissection), introduction to massage therapy, introduction to physical therapy, massage techniques, accupressure, and shiat-su.

The curriculum of this unique program has been sent to the Wisconsin Educational Approval Board for their approval. This program will emphasize the bylaws and regulations that apply to the Alternative/Complementary Therapy Modalities, in accordance with the American Veterinary Medical Association. For more information call (414) 886-1100 or email: helingo@internetmci.com

Equine Physical Therapy I
A review by Gwynne Oakes

The Orthopaedic Section presented its first Veterinary PT SIG class. A 2 1/2-day seminar, Equine Physical Therapy I was offered 10/09-10/11/98 at Cornell University, Ithaca NY to an audience of 87 people. Speaker Lin McGonagle, MSPT, BSc Animal Science, and President of the Veterinary PT SIG began the seminar with an overview of the history of PT for animals in the US; an outline of countries with Vet PT organizations; application, benefits, and PT intervention available for treating animals. The AVMA guidelines, APTA position statement and review of various state veterinary practice acts regarding PT for animals was also discussed with an outline of practice opportunities, risks, and risk management associated with veterinary PT.

The balance of the course was taught by Amanda Sutton MCSP, SRP, Grad. Dip. Phys. Ms. Sutton is a chartered



physiotherapist from Great Britain where she has practiced for 12 years in clinical physiotherapy. Ms. Sutton's credentials include 1995 British Three Day Event Team Physiotherapist and 1996 British Olympic Equestrian Team Physiotherapist.

According to Ms. Sutton, "Physiotherapists have an important place alongside the veterinary surgeon in the treatment of acute and chronic injuries. With the use of manual techniques and electrotherapy we can stimulate healing, minimize secondary problems associated with the injury and improve flexibility and performance. As a profession we aim to increase owners awareness and teach techniques to maintain quality of life. We also aim to improve veterinary surgeons understanding of our role in animal rehabilitation."

She further explained that , "Horses are susceptible to athletic injury as a result of their lifestyle and the demands of their particular equestrian discipline. These injuries vary from very minor to major incapacitating trauma. More often than not we are aware of a problem because the horse will be resting the affected area or will have signs of direct trauma or he may be lame. However, it is up to us to identify the risk factors, eliminate them and treat or manage these problems in order to minimize the effect on the horse."

Highlights of Day I

Equine skeletal and muscular anatomy was reviewed. Detailed handouts were provided for each attendee to study.

Ms. Sutton explained initial examination of any animal begins from a distance. This view takes in the whole animal giving an impression of how all the parts fit together and compliment each other. You must look at where the horse lives and trains; look at the rider and the riders difficulties.

The equine hip, stifle, hock, and hoof were examined segmentally appreciating the articulations, and specific functions individually. Vertebral kinematics show us that the equine vertebral column, vertebral positioning, and spinous processes play an important role in understanding functional anatomy. For example, there is little movement at the horse's neck except at the top of the neck. Most of the spinal movement is at the L-S joint, the thoracic sling (under saddle area), and the top of the neck. The back muscles primarily originate on the forelimb so again you need to look at the whole animal.

We completed the day with a visit to the Equine Performance Lab at the Veterinary school. Lisa Mitchell, LVT discussed current research projects at Cornell using the treadmill and provided a demonstrated how this equipment is used. Karen Gellman, DVM shared her experiences with the gait analysis system and discussed methods of collecting data using the treadmill.

Day II Etiology of Injuries and Treatment was the Topic of the Day

For example, pelvic lameness accounts for 37% of the lameness diagnoses with 41% due to chronic SI problems and 15.5% musculoligamentuous injury. An initial assessment of the lame horse begins with observing the horse at rest. We must look at its stance, bedding, and muscular development. When observing movement compare posture and gait at a walk and trot in straight lines on a firm surface. Observations may also be made on a lunge line (circling both directions), cantering, moving backwards, and with a rider.

Treatment approach may vary depending on whether its forelimb or hindlimb lameness. A compilation of treatment modalities was discussed including trophic electrical stimulation (TES) which is applied to muscle with specific physiological influence of its metabolic pathway, and helps with nutritional development, and growth of muscle. TES aids its ability to repair itself providing or reversing changes in atrophy. Ultrasound, interferential, laser, TENS, H-wave, and magnetic field therapy were also discussed with outlines of benefits and appropriate applications. A discussion of conformation abnormalities of the horse was presented, inherent abnormalities of posture are a common finding, and the predisposition that they place to certain clinical problems in the horse is well documented. According to Amanda, desirable features in the normal horse include:

"A straight line drawn down from the tuber spinae of the scapula bisects the limb to fetlock and drops to heel.

A straight line drawn through the shoulder and knee to mid hoof.

A straight line drawn from behind goes from hips through hocks to mid hoof.

A straight line drawn laterally from the tuber ischii follows the metatarsus to the fetlock."

How can PT be implemented to a horse? Pre-op: monitoring muscle nutrition and prevent secondary problems associated with compensations. Post-op: for muscular nutrition and prevent secondary problems associated with compensations. Post-op: for muscular re-education, contracture prevention, to name a few. Neurologically: for nerve palsy, to re-educate balance and movement, address spasms. Orthopedically: to monitor joint movement, prevent atrophy, treat discomfort associated with inflammation, and to prevent compensations (trick movements). For trauma: to reduce edema, prevent scar tissue, for aging to maintain full active ROM, and maintain healthy muscular nutrition.

Case studies were presented with video tapes of patients and the interventions Amanda used. All were followed by discussion of the various modalities, exercise, and training needed to restore function.

Highlights Day 3

Commonly seen injuries were discussed with various protocols offered. For example, TEAM approach was suggested for movement re-education. This is the Tellington Equine Awareness Method based on Feldenkrais techniques used in humans. This technique uses nonhabitual movement patterns to increase the horses awareness. The treatment results in increased ease of movement, a decrease in pain and stress, and improved general well-being. Finally, saddle fitting and its importance to equine function, comfort, and performance was discussed.

In summary, the Equine Physical Therapy I course was an overwhelming success. Amanda is a very dynamic and animated speaker. Her willingness to share her experiences is greatly appreciated.

THE PRACTICE OF VETERINARY PHYSICAL THERAPY

In the last issue we provided copies of the APTA position statement and the AVMA Guidelines for "Alternative and Complementary Veterinary Medicine." These documents were voted on and passed by their respective associations which indicates a common interest in the field of veterinary physical therapy.

Even though there is national support for the practice of veterinary physical therapy, each state regulates its own laws specific to this emerging field. In the Idaho Veterinary Practice Act there is a clause that lists physical therapy under "therapeutic options or alternative therapies." It further indicates that "Before any therapeutic option or alternative therapy is performed on an animal by a veterinary technician or an allied health professional, a veterinarian must first perform a diagnostic evaluation of the patient to rule out the use of conventional forms of veterinary medicine." In the New Mexico PT Practice Act, veterinarians are included on the list of primary health providers which are identified as their legal referral sources."

In the Massachusetts Veterinary Practice Act, a clause is included that states "Any specialist in the health care or zoological field may be called in for consultation in these special fields by a veterinarian licensed in the commonwealth and may collect a reasonable fee for such consultation."

The Pennsylvania Veterinary Code allows for consultation services and specifically defines consultation as "a deliberation between two or more licensed veterinarians or a licensed veterinarian and other licensed professionals concerning the diagnosis of an animal's condition, the care to be provided, and the proper management of the case."

It is my understanding that in other than these four states New Mexico, Idaho, Massachusetts, and Pennsylvania it is illegal for physical therapists to treat animals. One of the reasons that this practice is restrictive for physical therapists is that many laws include the word "human" in the definition of "physical therapy."

States with "Human" in PT Practice Act

Alaska	Montana
Alabama	New York
Arkansas	Oregon
Colorado	Rhode Island
Florida	Utah
Georgia	Washington
Hawaii	Wyoming
Idaho	
Iowa	District of Columbia
Kansas	Virgin Islands
Maine	Puerto Rico
Missouri	

If you live in one of the states listed, it will be less likely that practice on animals will be supported by your PT Board. A suggestion is that you obtain copies of your state's PT and Veterinary Practice Act. Read them and discuss them with both Boards to see how they interpret their respective practice acts. There may be some role in consultation that will be allowed.

An article recently published in *The Horse* (October 1998, p. 54) indicates that Illinois, Louisiana, Maine, Florida, Oregon, Texas, and Vermont are all states where physical therapy may be applied to animals. This information has not yet been verified. As we receive more details about practice acts, we will publish them in the newsletter.

Some readers have shared their concerns that veterinarians and veterinary technicians can provide therapy services without extensive training. In most states, veterinarians and veterinary technicians are licensed to provide ANY beneficial treatment to animals which includes physical therapy. The treatment of animals is the domain of the veterinary team, even if they are not educated in the science of rehabilitation medicine. This is one of those issues that we have to accept. Our energy might be better spent trying to change things that we do have influence over, such as our own state practice acts. As we move forward to explore modifications to our physical therapy laws, rules, and/or regulations, it is critical to have the support of veterinarians and veterinary technicians. We must cooperate if we expect to succeed in the political and legal arenas.

There are some therapists who advocate discontinuing the SIG educational programs until the practice of treating animals is legal. As with many situations in life, there are several ways to approach a problem. The SIG has chosen to be proactive. The practice acts are not going to change by themselves. The education programs serve many purposes that all relate to promoting the needed changes in legislation. It is a matter of perspective. Educated physical therapists are more capable of generating interest among veterinary staff at hospitals, clinics, and private practices as well as within veterinary organizations and colleges. Educational programs help to prepare physical therapists to be knowledgeable and respected team members within veterinary medicine. Educational programs will prepare veterinarians so that they understand the role of rehabilitation and can make informed

referrals to physical therapists or veterinary technicians. Educated veterinarians are more likely to work together with PTs to change the practice acts. If we can establish a grass roots effort via a national network of educated professionals, then we can make a difference one state at a time. I believe that EDUCATION IS THE KEY TO AFFECTING CHANGE IN THE STATE PRACTICE ACTS.

Liability is another complication. Kirk Van Orsdale and McGinnis will provide coverage to PTs who live in states where this practice is addressed in the PT Practice Act-only New Mexico. Limited access is a challenge. Some physical therapists are choosing to become veterinary technicians or veterinarians so that they do not have to deal with politics or wait years for their state practice acts to change.

For a current list of veterinary colleges and programs in veterinary technology contact:

American Veterinary Medical Association
1931 N. Meacham Rd, Suite 100
Schaumburg, IL 60173
(847) 925-8070

North American Veterinary Technician Association
PO Box 224
Battle Ground, IN 47920
(765) 742-2216

EDUCATION PLAN UPDATE

Since publishing our "Education Plan" in the last two newsletters, we have received valuable feedback. It is clear that having three different specialty tracts creates an overwhelming task in providing three sets of instructors, a variety of appropriate facilities across the country as well as developing three separate curricula. We also have had to rethink the idea of providing a specialist versus a generalist entry-level education program. After careful consideration, it seems most practical to consolidate our efforts and focus on providing a well rounded approach to our education plan. When our series of courses are completed, each individual should have the skill they need to approach any animal in collaboration with a veterinarian with a basic degree of competence. This series would enable physical therapists to apply for certification. Speciality courses could still be developed as interest is generated.

The education committee is "back to the drawing board"! We will have our Revised Education Plan ready to present to the Orthopaedic Section Board at CSM in February. The new plan will be published in the spring newsletter. Thank you for your patience as the SIG is learning and growing. Please contact Lin McGonagle if you have any ideas or input you would like to contribute.

NEW RECRUITS

You may have noticed that there are a few new names under the officers in this newsletter. Brief introductions are in order.

Rita Brereton has agreed to be the coordinator for all the State Vet PT SIG Liaisons. She has already sent out advertisements to each state PT chapter to publish in their respective newsletters. The ads explain the role of the SIG Liaison and are requesting interested individuals to contact Rita. She has also developed a manual to help each liaison to get started on their new adventure.

Nancy Murphy is our Public Relations Coordinator. She will be taking over the newsletter in January 1999 and is involved in creating a brochure and logo for the SIG. Nancy is currently working on a letter of introduction about the Vet PT SIG to send out to veterinary organizations ie, the AVMA, AHVMA, AAEP, NAVTA.

If you talk to these women or meet them at CSM, please let them know how much you appreciate their dedication and enthusiasm!

NAME THAT SIG!

Several readers have wondered why the SIG is named "Veterinary PT" instead of "PT for Animals" or "Animal Rehabilitation." Finding a name for the SIG was not as easy as it might seem. Many unique names were considered. The wording we decided on was actually taken directly from the Guidelines for Alternative and Complementary Veterinary Medicine. This document was developed by veterinarians and approved by their House of Delegates in 1996. Our choice of names was carefully considered over a period of a year through discussions with Jan Richardson, PT, PhD, OCS (APTA President and National Liaison between the APTA and the AVMA), Bill Boissonnault, PT (President of the Orthopaedic Section), the Orthopaedic Section Board, an open business meeting of the Orthopaedic Section in San Diego, and at our first informational meeting at CSM in Boston. We also obtained input from one of the original writers of the veterinary guidelines. The consensus was to use "Veterinary Physical Therapy" because it was supported by both the AVMA and APTA on a national level.

AMERICAN HIPPOTHERAPY ASSOCIATION

For those of you with interests in Therapeutic Horseback Riding or "Hippotherapy," there is an active national association made up of dedicated occupational, physical, and speech therapists. The AHA is a subgroup of NAHRA (North American Handicapped Riders Association). The Veterinary PT SIG does not plan to encompass hippotherapy as a part of our agenda. Our focus is in the assessment and treatment of animals using physical therapy techniques. The officers of AHA and the SIG have agreed to support each other and share information.

If you would like to receive their newsletter or get more information about the American Hippotherapy Association contact:

NAHRA
PO Box 33150
Denver, CO 80233
1-800-369-RIDE

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