Five Years Later: Achieving Professional Effectiveness to Move Neurorehabilitation Forward

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MeSH TERMS

- central nervous system diseases
- evidence-based practice
- occupational therapy
- rehabilitation

The AOTA *Centennial Vision* outlined in 2007 challenged the occupational therapy profession to become a “powerful, widely recognized, science-driven, and evidence-based” profession that could adapt to changing societal and cultural needs and flourish well into the future. That challenge can be met by simply being *effective* at what we do; this will increase our value and validate our worth. Neurorehabilitation in occupational therapy can also thrive if we verify that the interventions we use and the strategies we implement are grounded in evidence. Professional effectiveness will emerge by (1) increasing the dissemination of research that supports the methods we use and informs others of the successful patient outcomes we achieve and (2) expanding development and validation of instruments that quantitatively and qualitatively measure functional outcomes. Occupational therapists can individually develop professional effectiveness by fostering greater academic–clinical alliances, objectifying evaluation and intervention methods, and preparing future practitioners appropriately for evidence-driven practice.

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Five years ago, when the *American Journal of Occupational Therapy* (AJOT) published the American Occupational Therapy Association’s (AOTA’s) *Centennial Vision* and Executive Summary (AOTA, 2007), the leaders of the profession articulated a strategic plan to move the profession into the future and design a pathway to promote the importance of occupational therapy. Obtaining information from analysts at the Institute for Alternative Futures in Washington, DC, these leaders outlined how the profession would be shaped given future trends in health care, science, and technology. They gathered input from professional partners, special interest groups, practitioners, scientists, educators, and staff to determine what drivers of change would affect occupational therapy practice in the years ahead. Societal issues, such as aging and an increasingly diverse population, health care costs and reimbursement, preventive medicine, and changing lifestyle values, were at the forefront of the factors that could have a significant impact on occupational therapy and how it is defined for, and delivered to, future generations.

Building on current knowledge and assimilating the expert information and ideas put forward in 2007, a vision statement emerged that may hold even greater relevance today: “We envision that occupational therapy is a powerful, widely recognized, science-driven, and evidence-based profession with a globally connected and diverse workforce meeting society’s occupational needs” (AOTA, 2007, p. 613). This vision aligned with the association’s goal

to ensure that individuals, policy-makers, populations, and society value and promote occupational therapy’s practice of enabling people to improve their physical and mental health, secure well-being, and enjoy higher quality of life through preventing and overcoming obstacles to participation in the activities they value. (AOTA, 2007, p. 614)

The predictions of 2007 are proving to be alarmingly accurate: The U.S. population older than age 65 will more than double in the next 45 years, and the Latino population

will triple (Passel & Cohn, 2008). We are beginning to see the effects of the Patient Protection and Affordable Care Act of 2010 (ACA; Pub. L. 111–148), which will potentially provide health care to an estimated additional 32 million people and increase government regulation of health care options and reimbursement (Metzler, Tomlinson, Nanof, & Hitchon, 2012). Preventative medicine is now a major component of the ACA, which has extended coverage to include general physicals and wellness visits (Healthcare.gov, 2011). Finally, generational factions with discrete personal characteristics (e.g., Baby Boomers, Generation X, Millennials) have evolved. These factions are influencing individual lifestyle choices that will affect society as a whole (Pew Research Center, 2011).

The key to occupational therapy's becoming that powerful, widely recognized, science-driven, and evidence-based profession appears to lie in one word: value. Only when other entities, be they payers, scientists, customers, patients, physicians, legislators, or other professionals, value what we do and understand the significant contribution we make to the health and well-being of those we serve can that vision truly be attained. Although many ideas can be generated as to how we can embark on what seems to be the insurmountable task of increasing occupational therapy's value as a profession, the simplistic answer may surprise you. We can increase our value to others simply by being effective at what we do.

Professional effectiveness results when we can see the future and plan our present to meet the needs of patients, consumers, policymakers and, just as important, the students who will become the health care professionals of tomorrow. Effectiveness as a profession can emerge when we verify that the interventions we use, the approaches we take, and the strategies we implement are grounded in evidence and can be successful in improving patient outcomes. In 2000, Margo Holm's Eleanor Clarke Slagle lecture focused on our responsibility to be "competent in, and make a habit of," searching for and assessing the value of the evidence (p. 584). Doing so makes us consumers of research—

one of the first steps needed for our profession to begin to evaluate existing knowledge, interconnect this knowledge with our clinical skills, and expand the base of scientific inquiry within occupational therapy (Abreu, Peloquin, & Ottenbacher, 1998). Indeed, scientific inquiry and the evidence generated will be the driver that will enable the profession to navigate through the inevitable health care challenges that lie ahead (Gutman & Mortera, 1997).

The practice area of neurorehabilitation has certainly felt the effects of the current health care challenges. For example, lengths of stay in inpatient hospitals for stroke have declined from approximately 6.8 days in 1997 to approximately 4.8 days in 2010 (Agency for Healthcare Research and Quality, 2012), leaving less time for intervention. Lengths of stay at inpatient rehabilitation facilities have also shown a reduction from 19.6 days in 2000 to 16.5 days in 2008 (Granger, Markello, Graham, Deutsch, & Ottenbacher, 2009). Payment for outpatient occupational therapy is limited to \$1,880 by Medicare, and extensions are typically given only if cases are medically complex. Valid and copious justification is needed to extend treatment beyond the designated timeline. Home health providers are continually scrutinized for the few therapy visits allowed, and clinicians are inundated with documentation and regulatory requirements. Shorter lengths of stay, fewer visits, and less reimbursement of services are necessitating changes in our practice. We must become more efficient with the time we are given with our patients, and we must expand our knowledge and use those interventions that are grounded in evidence and effective for meeting our goals.

The *American Journal of Occupational Therapy* is committed to publishing articles that focus on the clinical and research-related priorities of the profession, and foremost in this effort are intervention effectiveness studies (Gutman, 2010). Table 1 outlines the number of neurorehabilitation-related publications identified in the previous three *Centennial Vision* reviews (Gillen, 2010; Rao, 2012; Wolf, 2011).

Neurorehabilitation research publications increased during 2011, yielding the largest number of publications (58);

however, a special issue on head injury that year resulted in an extraordinary number of articles being submitted. Those articles not published in the special issue were distributed across subsequent issues, accounting for the large number of neurorehabilitation articles in 2011. The publication numbers for the past 2 yr have remained fairly consistent, averaging about 20/yr. This article reviews all the neurorehabilitation-related articles published in the 2012 volume of *AJOT*, including effectiveness studies as well as those that highlight other areas such as education, efficiency, basic research, professional issues, occupational engagement and health, and instrument development and testing (Table 2).

Neurorehabilitation Research Published in 2012

Twenty-three publications on the topic of neurorehabilitation were identified. Of those, 10 (43%) were classified as intervention effectiveness studies (Finlayson, Preissner, & Cho, 2012; Glasgow, Fleming, Tooth, & Peters, 2012; Hayner, 2012; Martin, Johnston, & Sadowsky, 2012; Nilsen, Gillen, DiRusso, & Gordon, 2012; Polatajko, McEwen, Ryan, & Baum, 2012; Schepens, Braun, & Murphy, 2012; Skubik-Peplaski, Carrico, Nichols, Chelette, & Sawaki, 2012; Sledziewski, Schaaf, & Mount, 2012; Yang, Lin, Chen, Wu, & Chen, 2012); 6 (26%) discussed instrument development and testing (Engstrand, Krevers, & Kvist, 2012; Flinn, Pease, & Freimer, 2012; Katz, Bar-Haim Erez, Livni, & Averbuch, 2012; Mennem, Warren, & Yuen, 2012; Stefanovich, Williams, McKee, Hagemann & Carnahan, 2012; Tucker, Edwards, Mathews, Baum & Connor, 2012); 2 (8%) were basic research studies (Baker, Aufman, & Poole, 2012; Prager & Lang, 2012), 1 (4%) concerned a specific professional issue (Yuen, Brooks, Azuero, & Burik, 2012); 1 (4%) was centered on education (Frost & Barkley, 2012); and 3 (13%) involved issues of efficiency (Cimarolli, Morse, Horowitz, & Reinhardt, 2012; Craig, 2012; O'Brien, Bynon, Morarty, & Presnell, 2012). One article used qualitative analysis (Craig, 2012)

Table 1. Previous *Centennial Vision* Neurorehabilitation Reviews in the *American Journal of Occupational Therapy*

Review	Type of Study							Total
	Intervention Effectiveness	Instrument Development and Testing	Basic Research	Professional Issue	Efficiency or Efficacy	Education	Occupational Engagement and Health	
Gillen (2010)	9	7	6	0	2	0	0	24
Wolf (2011)	20	15	16	0	5	0	2	58
Rao (2012)	8	4	6	0	2	0	0	20

and 1 used mixed methods (Finlayson et al., 2012); all other studies used quantitative methods. As in previous years, intervention effectiveness studies and instrument development and testing represented the largest percentage of publications in neurorehabilitation research this past year.

Within the effectiveness studies were 5 randomized controlled trials (RCTs; Glasgow et al., 2012; Nilsen et al., 2012; Polatajko et al., 2012; Schepens et al., 2012; Yang et al., 2012), which marks a notable increase in RCTs over previous years (2 in 2010, none in 2009). These effectiveness studies are classified as having Level I status—systematic reviews, meta-analyses, or RCTs (see the classification system outlined in Lieberman and Scheer, 2002). Five effectiveness studies were classified as Level III, one-group, nonrandomized studies (Finlayson et al., 2012; Hayner, 2012; Martin et al., 2012) or Level V, case reports (Skubik-Peplaski et al., 2012; Sledziewski et al., 2012). The diagnoses targeted for the interventions being assessed included stroke ($n = 5$), spinal cord injury ($n = 2$), joint stiffness ($n = 2$), and multiple sclerosis ($n = 1$).

Instrument development and testing was the next most common area of publication, with 6 articles published during 2012. Three studies examined instruments used with the stroke population: Katz et al. (2012) and Mennem et al. (2012) assessed the reliability and validity of the Dynamic Lowenstein Occupational Therapy Cognitive Assessment (DLOTCA) and the Self-Report Assessment of Functional Visual Performance (Gilbert & Baker, 2011), respectively. Tucker et al. (2012) reported the consistency and reliability of methods used to modify the administration and formatting of some commonly used assessments such as the SF-36 (Ware & Sherbourne, 1992),

the Stroke Impact Scale (Duncan et al., 1999), and the Activity Card Sort (Baum & Edwards, 2001) when working with people with aphasia. The other three focused on orthopedic or peripheral hand conditions, with Engstrand et al. (2012) describing standard guidelines for finger goniometry measurement in people with Dupuytren's contracture, Flinn et al. (2012) investigating the reliability of the Flinn Performance Screening Tool for grading the severity of carpal tunnel syndrome, and Stefanovich et al. (2012) assessing the effectiveness of a global rating scale and checklist to grade orthotic fabrication skills of occupational therapy students.

Summary of Research

This review examines 23 articles published in *AJOT* from January 2012 through November 2012 related to neurological rehabilitation. Of the 75 articles published in *AJOT* during this time period, those on this topic represented 30% of the total published studies.

Two intervention effectiveness studies over the past year focused on how specific factors interact with occupational therapy intervention and potentially affect patient outcomes. This theme was apparent in the Finlayson et al. (2012) article, which determined that age, level of impairment, and gender had a significant effect on outcomes of a fatigue management program for people with multiple sclerosis. In contrast, the Glasgow et al. (2012) article determined that the length of time a capener splint was worn (6–12 hr/day vs. 12–16 hr/day) to improve finger extension range of motion (ROM) after hand injury was not a significant factor in patient outcomes.

Three of the effectiveness studies and 1 efficiency study compared novel, specific

approaches with general approaches or “standard” occupational therapy: Polatajko et al. (2012) found that people with stroke who engaged in a client-centered, cognitive-based goal achievement intervention performed better on functional tasks than those who engaged in traditional therapist-driven occupational therapy; Schepens et al. (2012) described that a “tailored” approach was better than a general occupational therapy approach when instructing people with osteoarthritis in activity pacing; the tailored approach group reported less joint stiffness over time. Likewise, Yang et al. (2012) found that two robot-assisted training regimens (unilateral and bilateral) improved upper-extremity movement in people with stroke differentially and better than standard occupational therapy intervention on selected measures. O'Brien et al. (2012) reported that a targeted occupational therapy intervention combined with a functional conditioning program reduced the length of stay for older people admitted to the hospital as a result of acute trauma when compared with length-of-stay data for people previously admitted receiving only standard occupational therapy treatment.

Another theme present in the effectiveness literature reviewed from the past year was the additive effect of specific interventions when used in conjunction with standard occupational therapy treatment: Using mental practice in addition to occupational therapy appeared to have beneficial effects in reducing impairments and improving perception of occupational performance after stroke when compared with relaxation imagery combined with occupational therapy (Nilsen et al., 2012); intense repetitive task training combined with neuromuscular electrical stimulation assisted in improving motor function of the hand and grip strength in

Table 2. Summary of Rehabilitation-Related Articles Published in the *American Journal of Occupational Therapy* in 2012

Author/Year	Study Objectives	Level (If Applicable), Design, and Participants		Intervention and Outcome Measures		Results	Study Limitations
		Survey	Design	Outcome Measure	Intervention		
Baker, Aufman, & Poole (2012)	To determine the types of equipment problems people with systemic sclerosis experience during computer use and what accommodation strategies they use	<i>N</i> = 27 people with systemic sclerosis who engaged in frequent computer use; 81% female <i>M age</i> = 47.9 yr		The Computer Problems Survey—a self-report survey mailed to participants from a larger parent study who reported frequent computer use		Respondents identified primary problems with chair, keyboard, mouse, and monitor that caused pain, numbness, and fatigue. Accommodation strategies included changing chair, using foot rests and wrist rests, adjusting monitor and keyboard position angles, and taking rest breaks.	Small study sample from parent study; limited generalizability to larger population Incidence of systemic sclerosis is rare.
Gimarolli, Morse, Horowitz, & Reinhardt (2012)	To determine whether vision impairment is a predictor of intensity of OT utilization and outcomes in a sample of older adults receiving subacute rehabilitation in a long-term care setting	Secondary data analysis Interview and review of existing patient chart data; pretest–posttest design <i>N</i> = 100, recruited from new admissions to subacute rehabilitation unit of long-term care facility Age 55 or older		<i>Outcome Measures</i> • Modified Telephone Interview for Cognitive Status • Patient Health Questionnaire–9 for depression • Modified Residents Verbal Brief Pain Inventory • Functional Vision Screening Questionnaire • Various visual impairment tests		After controlling for covariates, poor contrast sensitivity was a significant predictor of decreased time in OT, and poor visual acuity was a significant predictor of higher functional dependency at discharge.	Convenience sample of well-educated, cognitively intact adults admitted to a specific facility
Craig (2012)	To determine knowledge from the existing literature regarding occupational therapy utilization and practice in home health, what gaps in knowledge exist, and what potential research or practice recommendations can be made	Scoping review <i>N</i> = 65 peer-reviewed and non-peer-reviewed articles that mentioned home care or home health services, were applicable to rehabilitation practices under Medicare home health services, or included occupational therapy as a major focus of the article		Not applicable		Review indicated a comprehensive role for OT in home health, with interventions for ADLs and IADLs most frequently mentioned. Major research topics identified include environmental and caregiver interventions, home interventions and environmental modifications, general OT interventions, and OT practice patterns and role. Professional practice topics focused on interventions for specific conditions, practice issues, policy, and case reports.	Included both peer-reviewed and non-peer-reviewed articles; conclusions may be speculative.
Engstrand, Kreviers, & Kvist (2012)	To determine the interrater reliability of ROM measurement in the finger joints in individuals with Dupuytren's disease	Within-subject, repeated-measures design <i>N</i> = 13 with Dupuytren's disease, 11 male; 8 occupational therapists <i>M age</i> = 73 yr		<i>Intervention</i> Goniometers and guidelines for finger joint measurement were provided to occupational therapists; practice sessions held before study day when all occupational therapists measured one digit of each participant.		When standardized guidelines are followed, the interrater reliability of goniometer measurement is high for finger ROM of people with Dupuytren's disease. Highest intraclass correlation (ICC) values were seen in digital PIP extension; lowest ICC values were in MCP flexion.	Small convenience sample Limited generalizability to people with other hand conditions or limitations in finger mobility

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Table 2. Summary of Rehabilitation-Related Articles Published in the *American Journal of Occupational Therapy* in 2012 (cont.)

Author/Year	Study Objectives	Level (If Applicable), Design, and Participants	Intervention and Outcome Measures	Results	Study Limitations
Finlayson, Preissner, & Cho (2012)	To determine whether age, gender, work status, or impairment level affect fatigue management program outcomes for people with multiple sclerosis (MS)	Level III Secondary data analysis using mixed-effects model <i>N</i> = 181 people with MS; 79% female <i>M</i> age = 55 yr	<i>Intervention</i> Small group-based teleconference treatment focusing on fatigue in MS and use of rest, body mechanics, environmental modification, and prioritizing energy expenditure <i>Outcome Measures</i> • Fatigue Impact Scale • SF-36 • Self-Efficacy for Energy Conservation Questionnaire	Younger participants experienced greater reductions in fatigue impact and greater improvements in self-efficacy; no age differences were found in physical or mental health. Participants with less impairment experienced greater mental health gains and were more likely to retain the gains. Women experienced greater fatigue effect benefits than men, but men experienced greater mental health benefits. No work status effects were found.	Cognitive issues of people with MS not considered Work status not specifically defined
Flinn, Pease, & Freimer (2012)	To determine the internal consistency, intratester reliability, and convergent validity of the Flinn Performance Screening Tool (FPST) for people with carpal tunnel syndrome (CTS)	Reliability and construct validity Assessment <i>N</i> = 46 participants classified as having CTS at an extreme, severe, moderate, mild, minimal, or negative level; 73% female <i>M</i> age = 47 yr	<i>Outcome Measures</i> • Functional Status Scale (FSS) of the Boston Carpal Tunnel Questionnaire • FPST • Waterloo Handedness Questionnaire	Adequate score reliability and moderate convergent validity found for FSS and FPST; overall findings support the reliability and construct validity of the FPST.	Majority of participants classified as having mild CTS; no participants in the extreme, moderate, or minimal CTS categories
Frost & Barkley (2012)	To determine whether more occupational therapy educators teach traditional manual patient handling (TMPH) or safe patient handling (SPH) techniques as the standard of practice and whether attitudes and beliefs related to these techniques predict OT educators' intention to continue to teach TMPH or SPH	Nonexperimental correlational design <i>N</i> = 138 educators: 77% from an entry-level master's program, 23% from an associate's degree program, and 5.8% from an entry-level doctoral program	<i>Outcome Measure</i> Patient Transfer Curriculum Survey	TMPH was the most frequent method taught as the standard of practice (78%), whereas 22% taught SPH. Educators' traditional attitude and perceived behavioral control were essential factors in continued teaching of TMPH techniques. Those educators who taught SPH techniques were influenced by factors such as safe normative belief and safe intention.	Educators were biased about the subject matter. Survey was long, and some educators may not have responded because of lack of sufficient time to answer all questions. Open-ended questions should have been included to gather more subjective data.
Glasgow, Fleming, Tooth, & Peters (2012)	To determine whether participants using dynamic capener splints 12–16 hr/day make greater progress in contracture resolution than those who use splints 6–12 hr/day over 8 wk of treatment	Level I RCT <i>N</i> = 18 participants with extensor deficits of the PIP joint due to hand injury <i>M</i> age for 6- to 12-hr group = 41.0 yr; mean age for 12- to 16-hr group = 35.3 yr	<i>Outcome Measures</i> • Finger goniometer to measure ROM • Tension gauge to measure torque • Dynamic capener splint	No significant differences in extension ROM were noted between the two groups. 78% of participants from the 12- to 16-hr group used their splints <12 hr/day. Static extension splints were used in addition to capener splint for participants with flexion and extension deficits.	Small sample size 78% of participants from the 12- to 16-hr group used their splints <12 hr/day. Static extension splints were used in addition to capener splint for participants with flexion and extension deficits.

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Table 2. Summary of Rehabilitation-Related Articles Published in the *American Journal of Occupational Therapy* in 2012 (cont.)

Author/Year	Study Objectives	Level (If Applicable), Design, and Participants		Intervention and Outcome Measures		Results	Study Limitations
		Level III	Time series quasi-experimental single-subject ABA design	Intervention	Outcome Measures		
Hayner (2012)	To determine whether the California Tri-Pull Taping (CTPT) method reduces shoulder pain and inferior glenohumeral subluxation, improves ADL function, and increases AROM	$N = 10$ participants from 1 mo to 5 yr after stroke		CTPT	Pain, subluxation, shoulder AROM, ADL ability	People who received the CTPT showed significant decreases in inferior subluxation from baseline through intervention phase, but not through the postintervention phase. Significant increases in shoulder flexion, abduction AROM, and improved ADLs were evident through both phases.	Small sample size does not allow for generalizability. Clinicians providing the intervention were not blinded. The primary researcher who created the method collected the data. Varied levels of stroke onset existed in the study.
Katz, Bar-Haim Erez, Livni, & Averbuch (2012)	To determine the psychometric properties of the new Dynamic Lowenstein Occupational Therapy Cognitive Assessment (DLOTCA) and the most frequent level of mediation used in people with stroke for further planning of intervention	Comparative study $N = 83$: 38 hospitalized clients who sustained first stroke (mean age = 57.7 yr) and 45 healthy control participants (mean age = 62.67 yr)		DLOTCA		The DLOTCA shows high correlations between raters. Moderate to high internal consistency was seen in most test domains except for visual perception. Both groups benefited from mediation with a moderate to high effect size. The instrument was shown to be effective in providing information regarding needs for mediation.	Interrater reliability was only assessed for 10 study participants. Small sample size and specific population do not allow for generalizability. The healthy control participants had lower average years of education, which was a significant variable across the test domains.
Martin, Johnston, & Sadowsky (2012)	To determine whether intense training using repetitive task practice and neuromuscular electrical stimulation (NMES) results in an increase in strength and efficiency of hand function in people with tetraplegia when performing a functional task	Level III Prospective case series $N = 3$ patients currently receiving therapy M age = 18.7 yr		Intervention Task training and NMES were provided in addition to physical therapy and OT for eight 30-min sessions over 14 days Outcome Measures • Jebsen-Taylor Test of Hand Function • Box and Block Test • Semistructured interview for patient thoughts regarding training • Repetitive task performance • NMES		Improvements in hand motor function and speed were observed following intervention. A reduction of spasticity and the emergence of a more effective grasp also were noted.	Small sample size limits generalizability. A longer intervention cycle could possibly yield more robust results. Individual intervention effect of NMES and repetitive task practice were not assessed separately.
Mennem, Warren, & Yuen (2012)	To determine whether the Self-Report Assessment of Functional Visual Performance (SRAVP) is a valid instrument to measure the severity of ADL limitations in people with homonymous hemianopia (HH) after stroke	Reliability and construct validity assessment $N = 30$ people with stroke and HH in outpatient or low vision rehabilitation program in Department of Veterans Affairs system; 29 men M age = 63.9 yr		Outcome Measure SRAVP		The SRAVP shows adequate reliability and validity in evaluation of the severity of ADL impairment in people with HH after a stroke. Cronbach's $\alpha = .99$ and Pearson's correlation coefficients ranged from .37 to .99 for the three subscales of the test and the SRAVP overall score.	Small sample size Predominance of men in the sample Possible recall bias

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Table 2. Summary of Rehabilitation-Related Articles Published in the *American Journal of Occupational Therapy* in 2012 (cont.)

Author/Year	Study Objectives	Level (If Applicable), Design, and Participants	Intervention and Outcome Measures	Results	Study Limitations
Nisen, Gillen, DiRusso, & Gordon (2012)	To determine whether OT paired with mental practice (MP) reduces impairments and improves function and whether using MP as an internal view or external view would be more effective at reducing impairment and increasing self-perception of occupational performance	Level I Single-blind RCT <i>N</i> = 19 with a unilateral subacute stroke, 9 men. Control group mean age = 66.2 yr; internal MP group mean age = 46.6 yr; external MP group mean age = 62.0 yr	<i>Intervention</i> Skilled OT, 30 min 2x/wk for 6 wk, and mental imagery <i>Outcome Measures</i> • Vividness of Movement Imagery • Questionnaire-2 • UE section of FMA • Jebsen-Taylor Test of Hand Function • COPM	Internal and external groups at posttest showed statistically similar improvements on the JTHF and FMA. All three groups demonstrated improvements on the COPM. OT and MP combined may prove beneficial for UE recovery after a stroke; self-perception does not appear to be enhanced by MP.	Randomization was not stratified by side of stroke or for other potential confounding variables. Small sample size and specific population do not allow for generalizability.
O'Brien, Bynon, Morarty, & Presnell (2012)	To determine whether a targeted OT intervention and functional conditioning program (FCP) affect a patient's length of stay (LOS) and discharge destination	Cohort study with historical controls <i>n</i> = 50 older adults admitted with acute trauma to regional hospital; <i>n</i> = 105 historical controls <i>M</i> age = 75.52 yr for intervention group, 77.42 yr for control group	<i>Intervention</i> FCP and skilled OT intervention provided. <i>Outcome Measures</i> • Neurobehavioural Cognitive Status Examination • Westmead Post Traumatic Amnesia Scale • Nonstandardized OT assessments • Hospital database used to obtain LOS and discharge destination of historical controls	Targeted OT and FCP for older adults may have been associated with a reduced hospital LOS compared with that of the control group. Referral rates to OT significantly increased in the intervention group.	Lack of randomization Inability to properly match intervention and control groups across all variables
Polatajko, McEwen, Ryan, & Baum (2012)	To determine whether there is a difference in performance on three self-selected goals after Cognitive Orientation to Daily Occupational Performance (CO-OP) intervention compared with standard occupational therapy (SOT) in adults with stroke	Level I RCT (pilot study) <i>N</i> = 8 community-dwelling people with stroke ≥ 6 months afterward, with a NIHSS score of < 13, IQ = ≥80, minimal aphasia; 57.9% women <i>M</i> age = 60.4 yr	<i>Intervention</i> CO-OP and SOT <i>Outcome Measures</i> • Performance Quality Rating Scale • COPM	Participants in the CO-OP group showed greater improvements in performance than participants receiving SOT.	Small sample size Nonblinding of assessment administration Significant withdrawal rates High recruitment-to-enrollment ratio
Prager & Lang (2012)	To determine whether initial AROM measurements of shoulder flexion and wrist extension predict UE motor function 3 mo after stroke and whether nonmotor impairments are a factor	Prospective cohort study <i>N</i> = 50 people with acute stroke <i>M</i> age = 59 yr	<i>Outcome Measures</i> • AROM of shoulder flexion and wrist extension • UE Motricity Index Score • Short Blessed Memory Test • NIHSS collected at initial OT assessment and 3 mo after	AROM measurements at the shoulder and wrist joints are weak predictors of UE motor function 3 mo after initial evaluation. Nonmotor deficits did not influence outcome of motor function of the affected UE 3 months later.	Participants with more severe stroke outcomes were not represented in the sample. More sensitive instruments to quantify nonmotor deficits could

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Table 2. Summary of Rehabilitation-Related Articles Published in the *American Journal of Occupational Therapy* in 2012 (cont.)

Author/Year	Study Objectives	Level (If Applicable), Design, and Participants	Intervention and Outcome Measures	Results	Study Limitations
Schepens, Braun, & Murphy (2012)	To determine whether a tailored approach to activity pacing improves self-perceived osteoarthritis joint stiffness to a greater degree than a general approach	Level I Secondary analysis of an RCT <i>N</i> = 32 people with symptomatic knee or hip osteoarthritis <i>M</i> age = 59.5 yr for general activity pacing group; 63.9 yr for tailored activity pacing group	<i>Outcome Measures</i> • Baseline data measures • Western Ontario and McMaster Universities Osteoarthritis Index • Wrist accelerometer	Participants in the tailored activity pacing group significantly improved self-perception of joint stiffness compared with participants in the general activity pacing group. The tailored activity group also demonstrated decreasing self-perceived joint stiffness over time.	have been used for more predictability of UE motor function at 3 mo. Small sample size limits generalizability. Only a limited number of occupational therapists were trained in the interventions, which could have resulted in bias.
Skubik-Peplaski, Carrico, Nichols, Chetette, & Sawaki (2012)	To determine whether UE motor recovery, neuroplasticity, and occupational performance change with the use of occupation-based interventions provided to a patient with chronic stroke	Level V Single-subject case report <i>N</i> = a 55-yr-old man with chronic stroke (15 mo postinfarct)	<i>Outcome Measures</i> • COPM • FMA • SIS • transcranial magnetic stimulation (TMS)	Contralateral and ipsilesional cortical reorganization and expansion of motor maps were seen through TMS. Improved occupational performance and functional use of UE were present, as supported by changes on COPM.	Small sample size limits generalizability. Ancillary techniques such as purposeful activities and preparatory methods may have confounded the results.
Siedziewski, Schaaf, & Mount (2012)	To determine whether traditional occupational therapy combined with use of the Reo Go [®] UE robotic trainer increases UE function after incomplete spinal cord injury	Level V Single-subject case report <i>N</i> = a 51-yr-old man with incomplete spinal cord injury	<i>Outcome Measures</i> • Basic measures of manual muscle testing • AROM and sensory testing • Functional testing, including FIM and Capabilities of Upper Extremity Instrument (CUE)	Participant demonstrated increases in AROM, independence during self-care tasks, strength, and perceived CUE function.	Findings are not generalizable to spinal cord injury population. CUE was completed retrospectively. Established exercise protocols for the Reo Go are lacking. Goniometer measurements are highly variable.
Stefanovich, Williams, McKee, Hagemann, & Carnahan, (2012)	To determine whether a Global Rating Scale (GRS) and checklist accurately evaluate the technical skills in OT students in creating a finger MCP stabilizing orthosis	Survey; Delphi method used to develop instrument <i>N</i> = 15	<i>Intervention</i> Six experienced occupational therapists and nine novices performed orthotic fabrication. Three evaluators used GRS and checklist to score fabrication skills. <i>Outcome Measures</i> • Videotape • GRS and checklist	The GRS and checklist appear to be reliable and valid indicators of technical skills in OT students when creating finger MCP stabilizing orthosis.	Test-retest reliability, intrarater reliability, and responsiveness need to be further evaluated.
Tucker, Edwards, Mathews, Baum, & Connor (2012)	To determine methods to modify outcome measures for people with aphasia	Prospective cross-sectional study	<i>Outcome Measures</i> • Boston Diagnostic Aphasia Examination • SF-36	Providing individuals with aphasia external supports such as modifying administration format and providing systematic examiner support led to	Data were not collected from participants without the use of the modifications.

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Table 2. Summary of Rehabilitation-Related Articles Published in the *American Journal of Occupational Therapy* in 2012 (cont.)

Author/Year	Study Objectives	Level (If Applicable), Design, and Participants	Intervention and Outcome Measures	Results	Study Limitations
Yang, Lin, Chen, Wu, & Chen (2012)	To determine whether unilateral robot-assisted training protocol (URTP) and bilateral robot-assisted training protocol (BRTP) for recovery of UE movement after stroke elicits better performance than standard OT treatment and whether the two training methods have differential effects in outcome measures	<i>N</i> = 29 community-dwelling people with aphasia secondary to stroke ≥ 3 mo duration <i>M</i> age = 60.8 yr	<ul style="list-style-type: none"> • SIS • Reintegration to Normal Living Index • Activity Card Sort 	the collection of more reliable information on surveys.	Limited diversity and convenience sample lead to decreased generalizability.
		Level I RCT <i>N</i> = 21 people with stroke between 6 mo and 5 yr postonset; 14 men <i>M</i> age = 51.29 yr	<i>Outcome Measures</i> <ul style="list-style-type: none"> • FMA • Medical Research Council • Grip strength • Modified Ashworth Scale • Bi-Manu Track robotic device 	URTP and BRTP showed different types of benefits for improvement in movement. URTP may be most beneficial for those needing to improve muscle power, strength at distal joints, and upper-limb motor impairment, whereas BRTP might be more beneficial for those needing to improve proximal muscle power.	Small sample size decreases the study's generalizability and power. Motor control strategy used after intervention was not assessed, and there was no follow-up time point. Occupation-based outcome measures were not included.
Yuen, Brooks, Azuero, & Burik (2012)	To determine the driving simulator scenarios considered most dangerous or problematic by certified driver rehabilitation specialists	Survey <i>N</i> = 164 U.S. and Canadian members of the Association for Driver Rehabilitation Specialists. Mean experience = 10.1 yr	<i>Outcome Measure</i> 22 items on a Likert scale describing various driving scenarios with several open-ended questions for which respondents could provide other driving scenarios that should be included	More than 70% of respondents reported four critically important driving scenarios: turning left in oncoming traffic (86%), navigating four-way intersections with traffic lights or signs (77.4%), driving in multiple lanes with traffic on both sides (73.2%), and reacting to unexpected events that required emergency braking or aggressive maneuvers to prevent an accident (71.3%).	Study did not apply the aforementioned driving scenarios in real time by means of a driving simulator.

Note. Effectiveness studies are classified using the system described in Lieberman and Scheer (2002): *Level I* = systematic reviews, meta-analyses, randomized controlled trials; *Level II* = two-group, nonrandomized studies; *Level III* = one-group, nonrandomized studies; *Level IV* = descriptive studies; *Level V* = case reports and expert opinion. ADL = activity of daily living; AROM = active range of motion; COPM = Canadian Occupational Performance Measure; FMA = Fugl-Meyer Assessment; IADL = instrumental activity of daily living; *M* = mean; MCP = metacarpophalangeal; NIHSS = National Institutes of Health Stroke Scale; OT = occupational therapy; PIP = proximal interphalangeal; RCT = randomized controlled trial; ROM = range of motion; SIS = Stroke Impact Scale; UE = upper extremity.

people with tetraplegia (Martin et al., 2012). Last, occupational therapy combined with the use of the REO-Go™ (Motorika, Trussville, AL) upper-extremity robotic trainer increased active range of motion (AROM), strength, and independence during self-care tasks for people with incomplete spinal cord injury (Sledziwski et al., 2012).

The final 2 effectiveness studies examined the effect of a novel or specific intervention that could be considered a subset of occupational therapy practice. Hayner (2012) assessed the use of a tri-pull method of taping for improving glenohumeral subluxation, ROM, and function in the upper extremities of people with chronic stroke. Skubik-Peplaski et al. (2012) examined how true occupation-based practice affected neuroplasticity and upper-extremity motor recovery after stroke.

The articles focusing on instrument development and testing were diverse, examining reliability and validity measures for new instruments such as the Flinn Performance Screening Tool for people with carpal tunnel syndrome (Flinn et al., 2012) and the Self-Report Assessment of Functional Visual Performance for people with homonymous hemianopia (Mennem et al., 2012), both of which revealed adequate score reliability. A novel global rating of change test and checklist was developed with input from several experienced occupational therapists and hand therapists to assess occupational therapy students' skills in orthotic fabrication (Stefanovich et al., 2012). Tests more commonly seen in occupational therapy practice were also validated: The reliability of goniometry was measured in a population with Dupuytren's disease; interrater reliability was high when standardized guidelines were followed (Engstrand et al., 2012). The Lowenstein Occupational Therapy Cognitive Assessment (LOTCA) was also found to have high correlations between raters when used with people with stroke (Katz et al., 2012).

Two studies examined the predictive value of initial occupational therapy measures of impairment: Vision impairment was found to be a strong predictor of decreased time spent in occupational

therapy subacute rehabilitation sessions and a higher functional dependency level at discharge (Cimarolli et al., 2012). In contrast, Prager and Lang (2012) found that initial AROM measures at the wrist for people with acute stroke are weak predictors of upper-extremity function at 3 mo.

Two articles addressed specific occupational performance issues: Baker et al. (2012) identified computer equipment problems experienced by people with systemic sclerosis. This study determined that changing the seating, using foot and wrist rests, and adjusting computer components were the most frequent accommodation strategies used. Some of the most problematic driving scenarios were identified by certified driver rehabilitation specialists in the Yuen et al. (2012) study. Turning left into oncoming traffic, navigating four-way intersections, and reacting to unexpected events were acknowledged to be the most difficult when retraining people to drive after injury or illness.

Finally, 2 articles discussed occupational therapy practice, with the Craig (2012) review indicating that occupational therapy has a comprehensive role in home health services and that activities of daily living (ADLs), environmental modification, and caregiver training are foremost in typical home health occupational therapy interventions. Additionally, modification of standardized assessment protocols to accommodate people with aphasia was found to be effective; Tucker et al. (2012) described how these tools can be adapted to meet the needs of the patient and implemented in occupational therapy practice while still maintaining reliability.

A variety of instruments were used across the studies conducted. Common standardized assessments often seen in occupational therapy practice such as the SF-36, LOTCA, Jebsen-Taylor Test of Hand Function, Canadian Occupational Performance Measure, Box and Block Test, Fugl-Meyer Assessment, and upper-extremity motricity index were used in a majority of the articles reviewed ($n = 14$). Other, less commonly used instruments or tools developed for the specific research question

posed were also present: the Computer Problems Survey, the Patient Transfer Curriculum Survey, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), the Self-Efficacy for Energy Conservation Questionnaire, and the Modified Telephone Interview for Cognitive Status. Impairment-level measures frequently used in occupational therapy practice, such as the Modified Ashworth Scale, manual muscle testing, goniometry, and ROM, were also present in the studies reviewed.

All 10 intervention effectiveness studies included impairment-level outcomes. Cimarolli et al. (2012) addressed vision impairment reduction in their efficiency study. The Prager and Lang (2012) basic research study likewise addressed whether initial upper-extremity AROM measurements would predict upper-extremity function 3 mo after stroke. As is evident in the reviewed articles, impairment-level measures that yield specific, objective data enable quantitative analysis and can be a starting point for scientific inquiry. Along with these measures, some of the studies also used instruments that yielded qualitative information such as the Self-Efficacy for Energy Conservation Questionnaire, the Self-Report Assessment of Functional Visual Performance, and a semistructured interview.

Five Years Later and Halfway to Our *Centennial Vision*: Are Neurorehabilitation Practice and Research Moving Forward?

As can be seen in the previous *AJOT* reviews, neurorehabilitation research articles continue to be generated at a rate of approximately 20 per year, which is relatively low. On a positive note, the quality of the studies appear to be improving: Five intervention studies from the past year are ranked as Level I (systematic reviews, meta-analyses, or randomized controlled trials). A PubMed search for research articles using the keywords *occupational therapy* and *effectiveness* yielded approximately 130 articles. However, when diagnosis-specific keywords such as *stroke* and *spinal injury* were added, the numbers were still surprisingly low ($ns = 11$ and 4). Although occupational therapy researchers may be publishing outside of

AJOT, there remains a paucity of occupational therapy intervention effectiveness research in general.

Barriers outlined in the *Centennial Vision* (AOTA, 2007), such as “rigid adherence to the status quo” (p. 614) and “misalignment between the current occupational therapy priorities and the external environment” (p. 614), could certainly have an impact on the amount of research being published. The number of occupational therapy clinician–researchers is few despite initiatives by the association, educational programs, and professional leaders; clinicians are required to focus on service delivery, and many do not see research as clinically relevant (Cusick, 2001). A large disconnect still appears to exist between the academic and clinical environments in philosophy and priorities (Peloquin & Abreu, 1996), and even with the strong move toward evidence-based practice, use of research evidence by clinicians is suggested to be modest at best (Dysart & Tomlin, 2002). Effectiveness studies are the means by which we increase our value as a profession and impart to others the importance of our services. As we move forward, we will need to find the means to enable clinicians and researchers to engage in this type of inquiry and provide support for publication and dissemination of findings.

Instrument development continues and will be a critical element in occupational therapy’s achieving effectiveness as a profession. The use of standardized instruments that provide objective, measurable data can increase the value of a profession by validating the need for service provision, determining the appropriate health care services needed, addressing public policy issues, and assisting in the assessment of workforce requirements (Moore & Jull, 2009). At a minimum, it informs others of our ability to meet patient outcomes and determine the benefit of our interventions. The research reviewed in the past year is a movement in that direction; we can begin by measuring impairment-level outcomes, which lend themselves to easy, efficient measurement, to provide the data and pair these with activity or participation

measures that will provide information, producing comprehensive assessments of patient function.

Our Next Steps: Moving Forward Toward Effectiveness as a Profession

As part of the *Centennial Vision* summary, eight elements were identified as being highly relevant to the vision both members and nonmembers wanted to emerge over the next 10 yr. In examining a few of these elements, we can see some of the challenges that lie ahead and the steps we will need to take to move closer toward our *Centennial Vision*.

Vision: Expanded Collaboration for Success; Challenge: Academic–Clinical Alliances

Academic–clinical alliances are needed to expand our ability to perform effectiveness studies and embark on scientific inquiry that will assist in broadening the evidence base of occupational therapy. Academics skilled in research may often not have direct access to patient populations they wish to study; similarly, clinicians who would like to experiment with research activities may not have access to the academicians who could feasibly assist them in the process. These types of collaborations can potentially generate larger numbers of research participants to conduct viable effectiveness trials and yield more robust and powerful results.

In the articles reviewed, 9 of the studies with the largest participant numbers (mean $N = 85.77$, standard deviation = 62.43) used surveys (Baker et al., 2012; Frost & Barkley, 2012; Stefanovich et al., 2012; Yuen et al., 2012). Additionally, secondary analysis of existing data for the entire sample (Cimarolli et al., 2012; Finlayson et al., 2012; Schepens et al., 2012) or part of the sample (O’Brien et al., 2012) was used in 4 of the articles, and the final large subject study was a scoping review using current topic-specific literature (Craig, 2012). The direct patient intervention studies (Engstrand et al., 2012; Flinn et al., 2012; Glasgow et al., 2012; Hayner, 2012; Katz et al., 2012; Martin et al., 2012; Mennem et al., 2012; Nilsen et al., 2012; Polatajko et al.,

2012; Prager & Lang, 2012; Sledziewski et al., 2012; Tucker et al., 2012; Yang et al., 2012) all had fewer participants than the survey studies (mean $N = 23.71$, standard deviation = 22.94).

Survey and secondary analysis designs can be efficient and less time consuming than investigations involving assessment of direct interventions with patient populations. However, some researchers have suggested that direct human subject investigation is a natural model for occupational therapy (Schwartzberg, 1980), and perhaps this should be our gold standard for research. Clinicians in practice can easily develop single-subject and case-series designs; some of these methods can be quite robust and implemented by clinician–researchers with little statistical expertise (Nourbakhsh & Ottenbacher, 1994). Clearly, rigorous investigations that can use any thoughtful design to examine the effectiveness of the interventions we provide to typical patient populations and do so within the clinical environment will always be prove to be informative and useful.

Academic faculty can bridge the academic–clinical gap through specific activities such as engagement in faculty clinical practice, clinical consultation, educational consultation, collaborative grant writing, and mentoring (Peloquin & Abreu, 1996). Clinical faculty can accept fieldwork students, volunteer to instruct patient-centered courses at academic institutions, and enlist the assistance of researchers to begin scholarly activities such as developing creative clinic-based case studies or case designs. Beginning that arduous step to participate in collaborative grant writing with academics will also improve occupational therapy’s effectiveness as a profession. Research that begins with questions posed by clinicians is that which will eventually be most easily translated to clinical practice (Strzelecki, 2008).

Vision: Evidence-Based Decision Making; Challenge: Use the Evidence and Objectify Occupational Therapy Practice

Using evidence databases and drawing on other effectiveness studies will continue

to be critical in advancing the profession. These efforts should begin early with students in allied health curricula and focus on answering clinically relevant questions (Boruff & Thomas, 2011). In a recent study of occupational therapy students, knowledge of evidence-based concepts was determined to be directly related to the formal instruction received on the topic (Thomas, Saroyan, & Snider, 2012).

As mentioned previously, standardized and normed instruments can assist in documenting change in status more accurately, which can in turn improve occupational therapy's effectiveness (Watts, Broiler, & Schmidt, 1989). In addition, the development of new, valid, and reliable tools that are efficient and have ease of administration are those that the profession will need and will adopt as we strive for professional excellence and effectiveness. The past year's publications indicate a commitment to this initiative. Using impairment-, activity-, and participation-level assessments in combination with understanding the important person-specific factors will be most informative (Coster, 2008). When occupational therapists can provide this rich quantitative and qualitative information to families, payers, and providers, we will become more effective at what we do.

Vision: Well-Prepared, Diverse Workforce; Challenge: Focus on the Areas in Which Occupational Therapists Practice

According to the *2010 AOTA Compensation and Workforce Study* (AOTA, 2010), more than two-thirds of all occupational therapists surveyed (67.7%) currently practice in hospital-based settings (non-mental health), skilled nursing settings, and schools. Our effectiveness studies and research efforts should be focused toward the patient populations served and the challenges faced in these settings. In recent years, the profession has embraced community-based practice settings and nontraditional roles and worksites for occupational therapists; however, the data have indicated that occupational therapists are primarily engaged in traditional medical model and educational model practices.

Most important, occupational therapy educational programs must recognize that the majority of students they graduate will be employed in traditional hospital settings and school systems. Curricula should reflect this priority with an emphasis in these areas and appropriate time spent on the courses that prepare students not only to succeed but also to thrive in the environments in which they will build their careers. Students should have continual and ample opportunities to work with actual patient populations and experience hands-on learning that will promote exceptional practice. Educators must instill in these leaders of the future a desire for lifelong learning and continual questioning of the status quo. Model educational programs will be those that are able to modify curricular elements to reflect both the current and the future health care needs of society and give to the occupational therapy workforce skilled, competent professionals informed and prepared to meet those needs.

Summary

As occupational therapists, we can increase our value to consumers, insurers, policy-makers, and society simply by being more effective at what we do: Neurorehabilitation practice will be more effective if we step outside our comfort zone and are proactive in developing the clinical-academic alliances needed to improve patient care through rigorous scientific inquiry. We will be more effective if clinicians begin to engage in simple research designs that can answer the most basic clinical questions. We are effective if practicing therapists recognize the importance of standardized instruments and implement measures and interventions grounded in evidence. And we will become extremely effective if educators prepare future occupational therapy professionals for the realistic needs of the current and future health care systems in which they will be employed. Herein lies our value, our growth, and our future. ▲

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