Creating Evidence for Practice Using Data-Driven Decision Making

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- decision making
- evidence-based practice
- occupational therapy
- outcome and process assessment (health care)

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To realize the American Occupational Therapy Association's *Centennial Vision,* occupational therapy practitioners must embrace practices that are not only evidence based but also systematic, theoretically grounded, and driven by data related to outcomes. This article presents a framework, the Data-Driven Decision Making (DDDM) process, to guide clinicians' occupational therapy practice using systematic clinical reasoning with a focus on data. Examples are provided of DDDM in pediatrics and adult rehabilitation to guide practitioners in using data-driven practices to create evidence for occupational therapy.

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The Patient Protection and Affordable Care Act of 2010 (Pub. L. 111–148) has created an environment in which health care professionals must redefine their skills and expertise to ensure optimal outcomes using evidence-based practices. Fortunately, the American Occupational Therapy Association (AOTA) promotes these practices in occupational therapy through its *Centennial Vision* (AOTA, 2007) by envisioning the profession as "powerful, widely recognized, science-driven, and evidence-based" (p. 614). To realize this vision, Burke and Gitlin (2012) and Schaaf and Blanche (2012) urged the adoption of evidence-based strategies by the field of occupational therapy to sustain and validate clinical practice. Moreover, Gutman (2009) warned that for occupational therapy to survive in today's health care environment, we must "generate evidence for practice" (p. 670).

Many occupational therapy leaders have supported this vision. For example, Law, Baum, and Dunn (2005) advocated that outcome measurement must be the standard for occupational therapy practice, and Kielhofner (2008) emphasized the use of assessment data to guide intervention and evaluate outcomes. Sudsawad (2006) noted that "creating outcome research that is usable for practice is one of the most important contributions occupational therapy research can make toward evidence-based practice" (p. 700), and Frolek Clark (2010) provided specific strategies for using data to guide practice decisions. However, despite this widespread emphasis on evidence-based practice and the use of outcome measures to document intervention effects, the literature has consistently shown that rehabilitation professionals are not using evidence and data to guide and measure their interventions. Barriers include clinicians' perceived lack of time, knowledge, and skill and the belief that a reliance on evidence may limit their ability to provide client-centered or family-centered care (King, Wright, & Russell, 2011).

To realize the *Centennial Vision,* occupational therapy practitioners must embrace practices that are not only evidence based but also systematic, theoretically grounded, and driven by data (Gutman, 2010). Fleming-Castaldy and Gillen (2013) called for a culture shift whereby practitioners move away from practices based on tradition alone and move to a profession informed by evidence. To accomplish this objective, Jette (2012) suggested that "therapists become interested in data" (p. 1221) and skilled in solving problems based on data. By doing so, occupational therapy practitioners can create evidence through their everyday practice. The purpose of this article is to present the Data-Driven Decision

Making (DDDM) Process (Schaaf, 2011) and its application to occupational therapy practice. This framework is drawn from the extensive literature on evidence-based practices, including the works of Sugari and Hagan-Burke (2001) and McEwen (2009) and personal conversation with T. Benevides, E. I. Blanche, D. Kelly, J. Hunt, E. van Hooydonk, P. Faller, Z. Mailloux, and R. Freeman (January 15, 2010). A unique feature of DDDM is its use of systematic clinical reasoning with a focus on data.

One important aspect of creating a profession that embraces evidence-based practices and utilizes measurement of outcomes as part of everyday practice is to clearly articulate the unique contribution of the profession and set interventions within it. Occupational therapy practitioners have expertise in the facilitation of successful participation in daily life across the lifespan (Law, 2002). We accomplish this facilitation by appreciating the client within his or her life context and creating bridges to health and participation (World Health Organization, 2002). Practitioners also have unique skills for crafting individually tailored interventions based on personal and environmental factors to facilitate health and participation. We must continue to clearly articulate this unique expertise, use it systematically, and evaluate the impact of occupational therapy interventions on participation, health, and quality of life by collecting data on these outcomes. As Law (2002) stated, "Occupational therapy, at its best, measures outcomes of participation" (p. 646). Thus, important components of occupational therapy practice and research include identifying factors that may affect successful participation and health, designing interventions to enhance participation and health, and providing data to evaluate outcomes.

Data-Driven Decision Making

DDDM provides a framework for reasoning through the occupational therapy process with a focus on utilization of data to guide and measure outcomes. The DDDM process comprises a series of steps designed to organize and guide reasoning (Figure 1):

1. Identify participation challenges and goals.
2. Describe the current level of functioning in each area.
3. Identify factors that may interfere with participation for each identified goal by making observations; taking the client's history; and having discussions with the client, family members, teachers, and others.
4. Conduct standardized and systematic assessments. Use specific assessments to evaluate the potential factors that affect each occupational challenge. The choice of assessment tools is based on information gleaned from Steps 1 and 2 and is guided by the practitioner's clinical reasoning and theoretical perspective. Assessment data are summarized and guide the development of the hypotheses.
5. Identify strengths and barriers to participation. Ascertain the individual and environmental (social, physical, and cultural) strengths that can be used to support participation in meeting goals and the environmental factors that may be barriers to successful participation.
6. Generate specific hypotheses regarding the factors that affect successful participation by using assessment findings.
7. Design the intervention. Develop and explicate specific evidence-based activities and strategies so they can be replicated. Document the frequency, intensity, and time course of these activities and strategies.
8. Identify the proximal and distal outcomes that will be used to monitor progress toward goals. These outcomes are directly related to the hypothesized factors affecting participation and include individual and environmental strengths and barriers. *Proximal outcomes* are the identified factors that affect participation (e.g., poor praxis, decreased cognition or motivation, poverty of movement, spasticity, difficulty processing and integrating sensation; Melnyk & Morrison-Beedy, 2012). *Distal outcomes* are the skills, abilities, and behaviors that are expected to change in response to the intervention (Melnyk & Morrison-Beedy, 2012). These outcomes are directly related to the participation challenges and goals identified in Step 1.
9. Conduct the intervention.
10. Collect, display, and analyze data with a chart, bar graph, line graph, or table for analysis.
11. Monitor progress. Modify hypotheses and intervention as needed on the

Figure 1. Data-Driven Decision Making process.

basis of outcome data. Additional assessments may be performed to further the development of the hypothesis.

Generating hypotheses that are theoretically driven and that use assessment data to identify the factors affecting participation and identifying and measuring outcomes that are both proximal and distal to participation goals are key to this process because they provide a link between function and occupation. Using this process, occupational therapy practitioners can articulate a clear rationale for the intervention and objective outcome markers. Hypotheses can be tested and confirmed or revised on the basis of solid data. The review, display, and analysis of outcome data provide objective evaluation of outcomes that affect function and participation in valued occupations. Clinicians can use the DDDM process to systematically identify and test their reasoning process by acquiring outcome data about the occupational therapy intervention.

Application to Practice: Sensory Integration

We have begun to systematically test DDDM in practice. In a recent randomized trial of occupational therapy using Ayres Sensory Integration® for children with autism (Schaaf et al., 2014), we used DDDM to guide the occupational therapy intervention and to measure outcomes. Assessment data were translated into individually tailored interventions, ensuring that the occupational therapists created interventions that were theory and evidence based and that addressed the sensorimotor factors hypothesized to be affecting each child's participation in identified goals. The independent evaluators in this study used the DDDM table (illustrated in Table 1) to (1) guide the use of standardized assessment data in combination with history taking and observational data to identify participation-focused goals (identified by the parent) for each child; (2) analyze, synthesize, and interpret the data in light of the proposed contribution to the child's participation goals; (3) create hypotheses that clearly articulated the proposed supports and barriers to the identified areas of need; (4) identify outcomes and methods to measure these outcomes; and (5) provide this information to the occupational therapy interventionist in a way that created a seamless link between assessment data and intervention approach.

The occupational therapy interventionists then used an evidence-based, manualized intervention based on sensory integration theory to craft sensorimotor activities and environmental adaptations to facilitate participation and goal attainment. The intervention was systematically described and replicable and individually tailored to each child's needs. Importantly, outcomes were identified and measured, and findings were organized graphically for analysis and used to tailor, adjust, or refocus the intervention plan. (Table 1 details an example of this process for one child in the study.) Thus, the intervention was rigorously tested, providing data on outcomes. Participants who received the intervention ($n = 17$) scored significantly higher on goal attainment scaling ($p = .003$, $d = 1.2$) and significantly decreased their need for caregiver assistance for self-care ($p = .008$, $d = 0.9$) and socialization ($p = .04$, $d = 0.7$) as measured by the Pediatric Evaluation of Disability Inventory (Haley, Coster, Ludlow, Haltiwanger, & Andrellos, 1992) compared with the control group ($n = 15$). Qualitative data obtained from parent and teacher interviews supported these quantitative findings.

Table 1. Data-Driven Decision Making: Example of Steps 1–9 Using Ayres Sensory Integration® Theory

Identify Participation Challenge and Goal	Describe Current Level and Factors Affecting Participation	Conduct Assessment	Identify Strengths and Barriers	Hypothesis Generation	Design and Conduct Intervention	Proximal and Distal Outcome Measures
To play with others during preschool	Child prefers to play alone, and when others approach, he moves away; he may become physically aggressive. He is overly focused on objects. He tends to play roughly, including pushing or shoving.	Sensory Processing Measure (SPM; Parham, Ecker, Kuhaneck, Henry, & Glennon, 2007) shows overreactivity to tactile and auditory sensations, decreased body awareness, and underreactivity to proprioceptive and vestibular sensations with active seeking of these sensations. Delayed play skills based on Revised Knox Preschool Play Scale (Knox, 2008)	*Strength* Child enjoys playing with trucks. *Challenge* Environment is noisy and cluttered, which affects play.	Overresponsivity to tactile and auditory sensations makes it difficult for the child to tolerate others in the environment. Decreased body awareness related to underresponsivity and seeking of proprioceptive and vestibular sensations result in overly rough play with others.	Discuss the impact of the environment on sensory processing and behavior with classroom staff, and identify strategies for reducing noise and clutter in the play environment. Implement supervised, active sensory–motor activities using sensory integration theory to decrease sensory seeking, underresponsivity of vestibular and proprioceptive sensations, and overresponsivity to tactile and auditory stimuli (e.g., climbing up slide on playground, riding toys with peers, rolling down grassy hill, playing on climbing structures).	*Proximal* Child's tactile and auditory reactivity as measured by SPM and charting of behaviors (improvement in body awareness as measured by SPM). *Distal* Number of minutes spent in parallel play during free play time, as measured by daily charting.

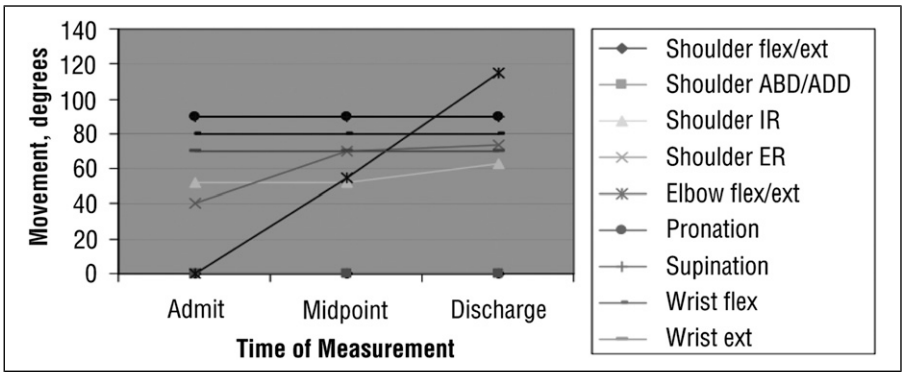

Figure 2. Proximal outcomes: Change in active range of motion of right upper extremity.
Note. ABD/ADD = abduction/adduction; Admit = at admission; ER = external rotation; ext = extension; flex = flexion; IR = internal rotation.

Application to Practice: Rehabilitation

DDDM was used in rehabilitation practice for a client with an incomplete C5–C6 spinal cord injury whose goal was to become independent in drinking from a cup and self-feeding so that he could resume the occupations of dining with his significant other and hanging out with his friends while watching sporting events (Sledziewski, Schaaf, & Mount, 2012). Using assessment data, the occupational therapist (first author) determined that decreased strength and range of motion were the primary factors limiting the client's ability to bring a cup and fork to his mouth, and they then developed an evidence-based intervention.

Data on strength and range of motion (proximal outcomes) and self-feeding and drinking (distal outcomes) were collected. After 4 wk of intervention, data analysis showed that strength and range of motion in elbow flexion improved (Figure 2), as did self-care skills, including the ability of the client to feed himself and drink independently as measured by the FIM™ (Deutsch, Braun, & Granger, 1997; Kidd et al., 1995; Figure 3). Further, perceived use of the upper extremity improved as measured by increase in scores on the Capabilities of Upper Extremity instrument (Marino, Shea, & Stineman, 1998), and the client's perceived quality of life improved as he was better able to participate in desired occupations.

The efficacy of the intervention for this client was demonstrated by systematically implementing an occupational therapy intervention based on solid assessment data and measuring, documenting, and charting outcomes. Publication of this case report in the *American Journal of Occupational Therapy* (*AJOT;* Sledziewski et al., 2012) provided evidence-based data for occupational therapy and an example for occupational therapy practitioners interested in implementing similar strategies.

Strategies for Action

To remain a leader in health care, the occupational therapy profession must generate practice-based evidence. Several strategies are recommended to realize this goal. First, practitioners can use DDDM as part of their routine practice. This framework provides a strategy for clearly articulating the occupational therapy reasoning process. By following the steps outlined in DDDM, the practitioner systematically tests occupational therapy intervention and provides evidence for practice. As Forsyth, Summerfield Mann, and Kielhofner (2005) and Ohtake, Strasser, and Needham (2013) suggested, knowledge for practice is generated when clinicians link theory to practice, thereby engaging in *practice scholarship.* DDDM adds to this concept, providing a strategy to identify, collect, display, and analyze outcome data.

Second, publication of these data informs practice, allowing the profession to build its repertoire of evidence. *AJOT* supports this effort by providing an outlet to disseminate practice-based research, adding to the profession's knowledge base (Gutman, 2008). Third, on a professional association level, AOTA and the American Occupational Therapy Foundation can further support these efforts by providing training opportunities in outcome-driven approaches and continuing to support the

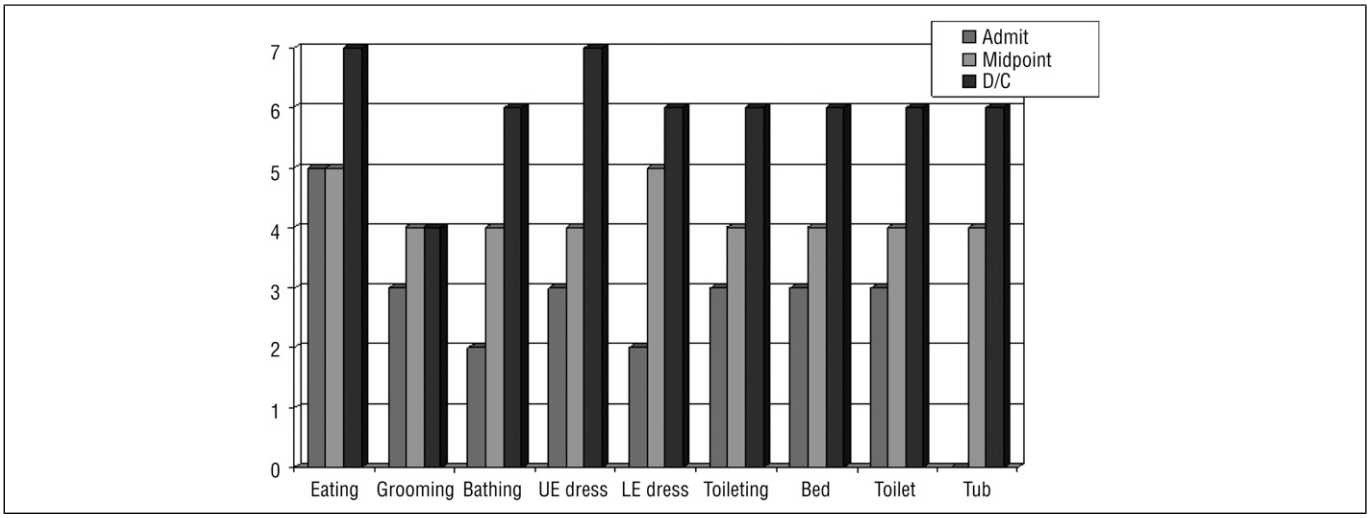

Figure 3. Distal outcomes: Change in FIM scores.
Note. Admit = at admission; D/C = at discharge; LE = lower extremity; UE = upper extremity.

development of research capacity in the field. Finally, education programs must train students with the skills and knowledge to participate in practice-based research, ensuring that their occupational therapy skills not only are theory and evidence based but also designed to produce evidence through measurement and analysis of outcomes.

To address this need, our team designed and implemented a series of advanced-practice certificates with the goal of enhancing content expertise through evidence-based, data-driven methods (see http://www.jefferson.edu/health_professions/occupational_therapy/programs/certificates.cfm). Participants reported that these advanced-practice certificates helped guide their clinical reasoning and assisted them in being more systematic and critical of the assessments and interventions used in daily practice.

Three student case reports have provided evidence for occupational therapy practice (Bellefeuille, Schaaf, & Polo, 2013; Schaaf, Hunt, & Benevides, 2012; Sledziewski et al., 2012), emphasizing that evidence-based methods must also become part of fieldwork education so that students can experience best practices that use evidence and data to test interventions. Our team integrated DDDM strategies into a Level 2 fieldwork training site, guiding students and fieldwork supervisors to organize their reasoning by tying occupation-based interventions with specific measurement strategies. Fieldwork supervisors and students reported that these practices helped with utilization and understanding of evidence-based practices, including outcome measurement. Students reported that DDDM helped them organize their reasoning, contextualize intervention within occupation, use assessment data more thoroughly, and focus on outcome identification and measurement (Schaaf, Santalucia, & Johnson, 2013).

Implications for Occupational Therapy Practice

DDDM has the following implications for occupational therapy practice:

- A systematic reasoning process that includes collection, display, and analysis of outcome data can scientifically validate occupational therapy practice.
- DDDM provides a mechanism to create evidence through practice by utilizing data to guide and measure practice.
- Occupational therapy practitioners' expertise in facilitating participation and measurement of participation-based outcomes is essential to validate practice.

Conclusion

DDDM can be a useful strategy to help realize the *Centennial Vision* by providing practitioners with a systematic process for explicating reasoning, using assessment data to develop and tailor client-centered intervention, and measuring and reporting on outcomes. By providing a clear link from impairment to function to participation, DDDM affords occupational therapy practitioners a vehicle for creating evidence and demonstrating their unique skills and knowledge to enable participation and health. Moreover, DDDM provides a mechanism to use best practices; outlines a systematic, data-driven approach; and allows practitioners to document evidence in their daily practice on a case-by-case basis. In this way, evidence is created through practice. Such methods are imperative to support the *Centennial Vision* and to uphold our position as leaders in health care. ▲

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