

FACT SHEET



SECTION ON
PEDIATRICS

AMERICAN PHYSICAL THERAPY ASSOCIATION

Section on Pediatrics, APTA

1111 North Fairfax Street
Alexandria, VA 22314-1488

Phone 800/999-2782, ext 3254
E-mail: peditrics@apta.org

www.pediatricapta.org



Clinical Reasoning in Pediatric Physical Therapist Practice

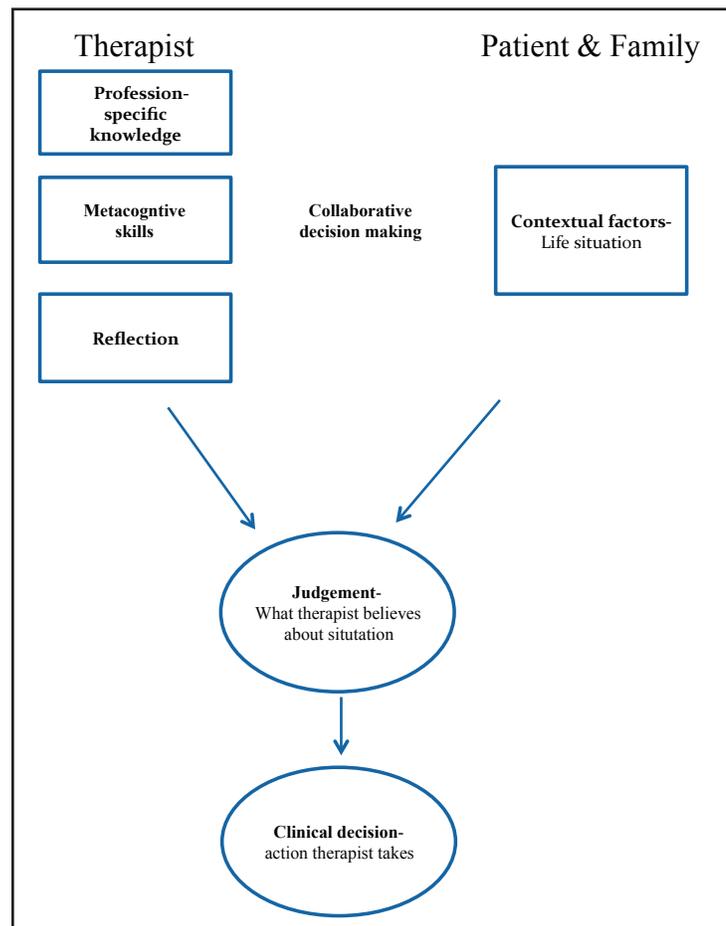
Clinical reasoning is a core tenet of professional autonomy.¹ In pediatric physical therapist (PT) practice, clinical reasoning is both complex and critical. This complexity stems from the numerous patient-specific variables that influence care, such as the setting, family dynamics, the availability of resources and reimbursement, and the innate variability in the growth and development of children. Identifying and considering such contextual variables directs a clinician's actions and decisions and, thus, is vital to achieving patient and family outcomes. While such variables are most evident in the clinical setting, teaching clinical reasoning skills is the responsibility of both the academic faculty and clinical educators. The purpose of this fact sheet is to provide pediatric physical therapists with the basic knowledge, concepts, and terminology encompassing clinical reasoning. Applied examples and tools to facilitate the clinical reasoning process also will be explored.

Definition

In the broadest and most general sense, clinical reasoning can be summarized as the thinking and decision-making of a health care provider in clinical practice.² In the literature, clinical decision-making and clinical reasoning frequently have been used interchangeably. For the purposes of this fact sheet, *clinical reasoning* is operationally defined as the thinking or judgment behind one's action,³ and clinical decision-making is the action on this process.⁴

The difference between clinical reasoning and clinical decision-making may best be illustrated when one considers that a decision can be reached without any reasoning or thought behind that decision. A description by Nikipoulou-Smyrni and Nikopoulos⁵ may shed light on this complicated phenomenon as they describe clinical reasoning as a "process of reflective inquiry, in collaboration with a patient or family, which seeks to promote a deep and contextually relevant understanding of the clinical problem, in order to provide a sound basis for clinical intervention."^{5(p1130)} From this definition, we see that clinical reasoning is a reflective activity wherein the clinician engages the patient and family in a collaborative decision-making process that acknowledges the critical contextual factors that impact clinical intervention. This definition incorporates the critical aspects of reflection, mutual decision-making, patient context, and the thought processes vital in clinical reasoning (Figure 1). Other tenets of clinical reasoning include discipline-specific knowledge, metacognition or reflective self-awareness,¹ patient-centered focus,⁶ and the development of expertise.⁷

Figure 1. Factors in Clinical Reasoning



Adapted from Huhn et al.⁸

Case Vignette:

Jane is a pediatric physical therapist in an outpatient setting. She completes a physical therapy examination with Joey, a 2-year-old boy with delayed gross motor skills. Joey's mother is a single mother with 2 older children, 1 of which has been having behavior problems at school. The family lives in a small apartment, has very limited financial resources, and has no access to medical insurance. Joey's mother reports that she is very concerned about his inability to walk and is worried that Joey might not be able to attend their church preschool next fall if he doesn't start walking soon. The mother is anxious for Joey to start preschool so that she can increase her work hours and qualify for her employer's medical insurance program.

During her 3 years working in pediatrics, Jane has started to notice that children who have a certain diagnosis often present with similar movement patterns and impairments. Jane observes these same movement patterns in Joey. She begins to wonder if there is more to Joey's gross motor deficits than just a delay in his development. Jane also thinks about Joey's family, his home setting, and his mother's goals for him to walk and attend preschool. She begins to ponder the impact of these contextual factors on Joey's physical therapy management as she develops Joey's plan of care.

Types of Reasoning

Although a number of different types of reasoning processes exist, we chose to highlight the following types of clinical reasoning: hypothetico-deductive (deductive reasoning) and pattern recognition (inductive reasoning) (Tables 1 and 2).

Clinical Reasoning as a Developmental Process

A basic understanding of the types of reasoning processes used by physical therapists is essential in learning about our own reasoning process, and in helping students to further develop a strong set of clinical reasoning skills to optimize care for a child and his/her family. Clinical reasoning occurs as a developmental process and, as such, requires students and PTs to engage in critical self-reflection to improve this skill.^{10,11}

As seen in Figure 2, as well as in Tables 1 and 2, novice clinicians are more likely to use a hypothetico-deductive reasoning process, while expert clinicians usually rely on pattern recognition to solve patient problems.^{7,16-18} Typically, novices tend to reflect upon experiences after the encounter occurs using "reflection-on-action,"¹² which allows the clinician to learn and improve following the experience. In contrast, expert clinicians are able to first "stop" the action and then employ metacognitive processes, such as reflection-in-action and reflection-for-action, allowing the expert to respond to clinical situations and problems as they unfold.^{12,13,14,16}

As seen in Figure 1, "reflection" is a key component in the clinical reasoning process. One does not learn from experience alone but from thoughtful reflection on that experience. To underscore the importance of this concept, consider the following example: 10 years of practicing without reflection and without modifying practice based on this reflection is the same as 1 year of practicing in the same manner 10 times. However, 10 years of learning on a continual basis through purposeful reflection and directed education can create a path towards clinical expertise. This learning occurs through a process of reflection and an analytical, progressive method of problem solving. In this situation, the PT is constantly reflecting upon patient experiences, learning from these situations, and transforming his or her thinking structure and processes. Evidence reveals that the ability to demonstrate clinical reasoning skills can determine the clinical expertise of a PT and can be correlated with patient care outcomes.¹³⁻¹⁶

Clinical Reasoning Frameworks

Clinical reasoning models and algorithms may help both clinical and academic educators to guide learners through the process of developing clinical reasoning skills. Clinical algorithms provide a systematic approach to patient care, guiding the novice clinician through decision-making processes. Algorithms such as the Hypothesis Oriented Algorithm for Clinicians (HOAC)¹⁷ and the HOAC II¹⁸ are independent of any specific theoretical approach and were designed to assist clinicians, in any clinical setting, to address the physical therapy needs of their patients/clients. Similarly, pediatric-specific algorithms, such as the Hypothesis Oriented Pediatric Focused Algorithm (HOP-FA),¹⁹ provide a systematic, step-wise guide to the management of pediatric patients/clients that promote a child and family-centered approach to pediatric physical therapist practice.

Models such as the International Classification of Functioning, Disability, and Health (ICF)²⁰ may provide learners with insights into the clinical reasoning process. The ICF is a conceptual framework that underscores the abilities of the individual and examines the interplay of both the internal and external factors that contribute to an individual's health status. Tools such as the Physical Therapy Clinical Reasoning and Reflection Tool (PT-CRT)²¹ incorporate the ICF and may be helpful in moving learners along the developmental path towards clinical expertise.

Other models, such as the biopsychosocial model developed by Edwards and Jones,⁷ depict clinical reasoning as a collaborative process that emphasizes an understanding of the lived experience of the patient and family within the context of the family's values and beliefs. Such models help clinicians to more fully appreciate the impact of a child's condition on daily family life and routines. Considering such contextual factors and not just focusing on the child's gross motor problems may assist the PT to apply clinical reasoning processes within the cultural milieu of the specific child and family.

Table 1. Types of Clinical Reasoning

Type of Reasoning	Definition	Primary Users
Hypothetico-deductive (deductive reasoning)	Generation of a hypothesis based upon results of tests and measures, followed by testing this hypothesis.	Frequently used by novices in all situations and by experts during challenging or unfamiliar cases. Used by experts when pattern recognition isn't working.
Pattern recognition (inductive reasoning)	Quick retrieval of information from well-structured knowledge based upon previous clinical experience. ⁹	Frequently used by experts during familiar situations as they recognize patterns or "scripts" that they have previously heard or experienced.

Table 2. Applied Examples of Reasoning in Pediatrics

Case Example	Hypothetico-Deductive Reasoning	Application to Pediatrics
A 2-year-old child presents with delay of gross motor skills	<p>Deductive reasoning³:</p> <ul style="list-style-type: none"> • Gathers relevant patient history. • Multiple hypotheses are formulated, primarily based upon patient/family interview. • Hypotheses are ruled in or out based upon results of tests and measures and patient interview to determine cause and effect. • Performs additional tests and measures if necessary to substantially determine health condition. 	<p>The novice PT asks the mother various background questions:</p> <ul style="list-style-type: none"> • Birth history (eg, complications during pregnancy or delivery, prematurity, NICU stay) • Onset of motor skills since birth (eg, when did he begin rolling, sitting, crawling?) • Feeding and nutrition, sleeping, communication/cognition • Family and physical environment <p>Hypotheses of developmental delay and cerebral palsy are considered:</p> <ul style="list-style-type: none"> • Performs a checklist of tests and measures (observation of functional movement, range of motion, strength, posture, tone, reflexes, and a standardized pediatric test). <p>The novice PT interprets the results of the above tests and measures and determines that the child demonstrates lower extremity extensor spasticity, weakness, decreased active and passive range of motion, and delayed gross motor skills in the area of mobility. In linking this with the child's history of prematurity and a Grade III IVH, a possible health condition of spastic diplegic cerebral palsy is considered.</p>

Case Example	Pattern Recognition	Application to Pediatrics
A 2-year-old child presents with delay of gross motor skills	<p>Inductive reasoning³:</p> <ul style="list-style-type: none"> • Understanding the patient's story • Through inductive reasoning, the PT identifies the important contextual factors. • Identifies the "pattern" that exists between all patients that have this particular health condition 	<p>The expert PT ascertains from the mother her concern about the child's inability to walk and potential impact on preschool next year:</p> <ul style="list-style-type: none"> • The contextual factors important in this case are the family dynamics (single, working mother with 2 other older children), physical environment (ranch-style apartment with little opportunity to explore environment), and mother's dedication to improving her child's skills. • The PT quickly recognizes the familiar movement patterns of an inability to dissociate LE's for reciprocal creeping and extension during rolling. The PT asks about birth history to determine risk factors for spastic diplegic cerebral palsy as this child has very similar movement patterns and history to other 2-year-old children diagnosed with this health condition.

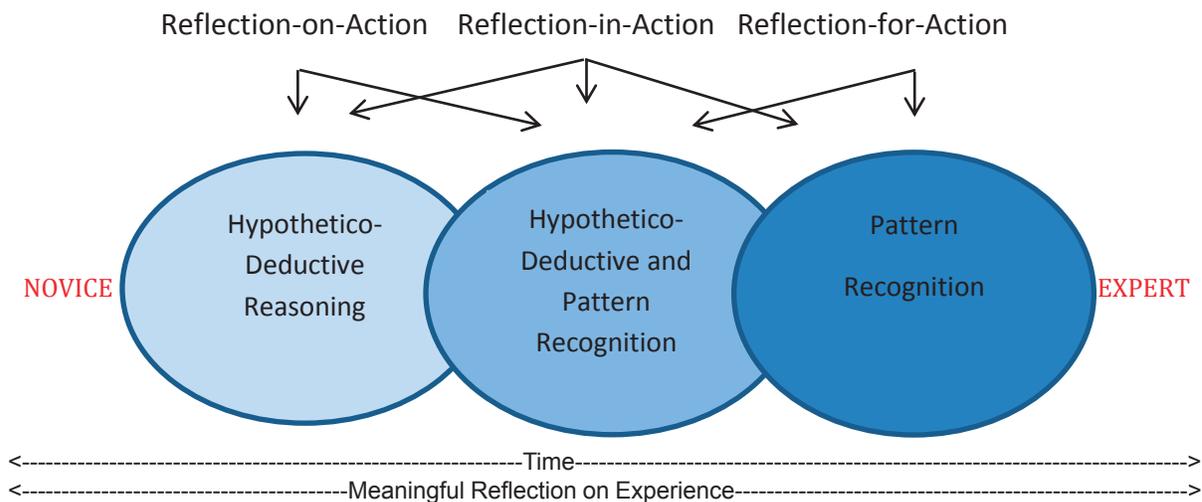
Teaching Clinical Reasoning Skills in the Clinic and the Classroom

Whether in the clinic or in the classroom, clinical reasoning is often best taught in the context of patient care and clinical cases.²² Long after students have forgotten mundane facts and figures, they often will recall a specific patient's "story." Within a specific patient scenario or case, clinical instructors (CIs) and academic faculty can assist learners to identify additional information that must be gathered to fully understand the patient's story and to generate hypotheses related to the case. Creating a concise problem representation that captures the child's primary issues and concerns in 1 or 2 sentences can help learners to grasp salient patient-specific details that are often abstract.²² Learners can then transform patient stories into specific case descriptions that allow the learner to mentally visualize the patient within the context of a specific case. Forming mental images from a variety of context-specific cases will help learners to build a repertoire of case examples from which to further develop reasoning skills.²³ Encouraging learners to compare and contrast cases that are apparently similar may assist learners to sharpen their awareness of patient differences and contribute to accurate problem representation.²²

Use of Purposeful Questioning

The purposeful use of questioning techniques also may help learners to rethink and reframe a seemingly routine patient case. "What if" questions can be particularly useful in this regard: "What if this family were homeless? What additional concerns and considerations would this bring to the case?" "What if the child had a progressive condition?" "How would that potentially impact the selection of a seating and mobility device?" "What if we were seeing this child in a school setting instead of in an outpatient clinic?" "What additional factors would need to be considered in the examination process?" Questions that ask learners to think towards the future also can be helpful: "What do you expect this child's function abilities to be in 1 year?" "In 5 years?" "What needs to be done now to maximize this child's future independence?" Questions that force learners to prioritize patient problem areas also can help learners to consider and justify specific aspects of a patient case: "What single impairment is most limiting to this patient's gait function?" "Why?" "What single factor is most limiting this patient's desired participation in a community-based sports program?" "What can you as a physical therapist do to address this issue?"

Figure 2. Clinical Reasoning: A Developmental Process



Reflection

As previously mentioned, reflection, whether written or verbal, is a necessary and powerful tool in the development of clinical reasoning skills. By promoting effective, meaningful reflection, clinical instructors and academic faculty can capture their students' thought processes and gain a better understanding of their students' decisions. Encouraging learners to recognize and analyze relevant events and situations can promote development of the self-awareness skills necessary to synthesize the knowledge gained from a specific event and to apply this knowledge to future patient care situations.²⁴ In addition to traditional reflection methods, peer coaching, where students meet and discuss clinical situations in pairs or small groups, has been suggested as way to encourage reflection in a supportive environment.²⁵

The "One Minute CI"

Another tool that may be helpful in the clinical setting is the "One Minute Manager" technique or the "One Minute Clinical Instructor (CI)."²⁶ Concepts from the "One Minute Manager" have been adapted for the CI and help to provide learners with clinically pertinent information and feedback in a timely, concise manner. Within the "One Minute CI," the CI capitalizes on teaching moments and requires the learner to form opinions regarding a specific clinical problem. In this way, the CI is able to address issues in the context of patient care in an effective and efficient manner that recognizes the limitations of time in the clinical setting. The "One Minute CI"²⁶ technique includes the following steps:

- Step 1: Ask the learner to state an opinion about the issues presented in the clinical case.
- Step 2: Ask the learner for evidence to support this opinion.
- Step 3: The CI then provides the learner with specific information that can be directly applied to the clinical problem at hand.
- Step 4: The CI reinforces the learner's correct assumptions and actions and addresses any mistakes or misconceptions.

Other Tools

Although tools such as progressive case disclosure may be more readily applied in academic settings, they also could be adapted for use by CIs. In progressive case disclosures, the instructor gradually unfolds key aspects of the case while learners attempt to consider key components in examination and intervention. For example, a progressive case might start by providing very limited information about a child: "A 5-year-old boy presents for a physical therapist examination related to concerns of persistent bilateral toe-walking." Learners would then identify specific aspects of the patient's history and current status that the instructor would reveal only if directly asked. From the information disclosed, the learners would identify specific tests and measures to be performed, and the instructor would again reveal these findings only if directly asked. In this manner, the learner would be directed to consider various aspects of the case, determine if referrals to other practitioners are needed, and identify the various intervention options available within the context of the specific case.

Conclusion

Clinical reasoning is an integral and critical aspect of effective pediatric physical therapist practice. By intentionally directing and guiding learning experiences in ways that promote the development of clinical reasoning skills, physical therapists can facilitate the application of clinical reasoning strategies in both the clinic and the classroom.

References

1. Higgs J, Jones M, Loftus S, Christensen N. *Clinical Reasoning in the Health Professions*. 3rd ed. Boston, MA: Butterworth-Heinemann/Elsevier; 2008.
2. Christenson N, Nordstrom T. Facilitating the teaching and learning of clinical reasoning. In: Jensen GM, Mostrom E, eds. *Handbook of Teaching and Learning for Physical Therapists*. 3rd ed. Boston, MA: Butterworth Heinemann; 2013:183-199.
3. Benner P, Hooper-Kyriakidis P, Stannard D, eds. Thinking-in-action and reasoning-in-transition: an overview. In: *Clinical Wisdom and Interventions in Critical Care: A Thinking-in-Action Approach*. Philadelphia, PA: WB Saunders; 1999:4-13.
4. Magistro CM. Clinical decision making in physical therapy. *Phys Ther*. 1989;69(7):525-534.
5. Nikipoulou-Smyrni P, Nikopoulos C. A new integrated model of clinical reasoning: development, description, and preliminary assessment in patients with stroke. *Disabil Rehabil*. 2007;29(14):1129-1138.
6. Edwards I, Jones M, Carr J, Braunack-Mayer A, Jensen G. Clinical reasoning strategies in physical therapy. *Phys Ther*. 2004;84(4):312-335.
7. Edwards I, Jones M. Clinical reasoning and expertise. In: Jensen GM, Gwyer J, Hack LM, Shepard, KF, eds. *Expertise in Physical Therapy Practice*. 2nd ed. Boston, MA: Elsevier; 2007:192-213.
8. Huhn K, Black L, Jensen G, Deutsch J. Construct validity of the health science reasoning test. *J Allied Health*. 2011;40(4):181-186.
9. Groen GJ, Patel VL. Medical problem solving: some questionable assumptions. *Med Educ*. 1985;19(2):95-100.
10. Furze J, Black L, Jensen G, et al. Beyond our box: clinical reasoning progression: tools for entry-level, clinical and residency education. Session presentation at: The American Physical Therapy Association's Combined Sections Meeting; February 18, 2010; San Diego, CA.
11. Furze J, Nelson K, Jensen G, Gagnon K. Pediatric clinical reasoning: tools for entry-level and residency education. Session presentation at: The American Physical Therapy Association's Combined Sections Meeting; February 9, 2012; Chicago, IL.
12. Schon DA. *The Reflective Practitioner: How Professionals Think in Action*. New York, NY: Basic Books; 1983.
13. Jensen GM, Resnik L. Using clinical outcomes to explore the theory of expert practice in physical therapy. *Phys Ther*. 2003;83(12):1090-1106.
14. Embrey DG, Yates Y. Clinical applications of self-monitoring by experienced and novice pediatric physical therapists. *Pediatr Phys Ther*. 1996;8(4):156-164.
15. Embrey D, Adams L. Clinical applications of procedural changes by experienced and novice pediatric physical therapists. *Pediatr Phys Ther*. 1996;8(3):122-132.
16. Embrey DG, Nirider B. Clinical applications of psychosocial sensitivity by experienced and novice pediatric physical therapists. *Pediatr Phys Ther*. 1996;8(2):70-79.
17. Echternach JL, Rothstein JM. Hypothesis-oriented algorithms. *Phys Ther*. 1989;69(7):559-564.
18. Rothstein JM, Echternach JL, Riddle DL. The hypothesis-oriented algorithm for clinicians II (HOAC II): a guide for patient management. *Phys Ther*. 2003;83(5):455-470.
19. Kenyon LK. The Hypothesis-Oriented Pediatric-Focused Algorithm: a framework for clinical reasoning in pediatric physical therapist practice [published ahead of print October 19, 2012]. *Phys Ther*. doi:10.2522/ptj.20120080.
20. International Classification of Functioning, Disability and Health: ICF. Geneva, Switzerland: World Health Organization; 2001.
21. Atkinson HL, Nixon-Cave K. A tool for clinical reasoning and reflection using the International Classification of Functioning, Disability and Health (ICF) framework and patient management model. *Phys Ther*. 2011;91(3):416-430.
22. Bowen JL. Educational strategies to promote clinical diagnostic reasoning. *N Engl J Med*. 2006;355(21):2217-2225.
23. Eva KW. What every teacher needs to know about clinical reasoning. *Med Educ*. 2004;39(1):98-106.
24. Wainwright SF, Shepard KF, Harman LB, Stephens J. Novice and experienced physical therapist clinicians: a comparison of how reflection is used to inform the clinical decision-making process. *Phys Ther*. 2010;90(1):75-88.
25. Ladys Fiewsky RK. Impact of peer-coaching on the clinical reasoning of the novice practitioner. *Physiother Can*. 2004;56(1):15-25.
26. Neher JO, Gordon KC, Meyer B, Stevens N. A five-step "microskills" model of clinical teaching. *J Am Board Fam Pract*. 1992;5(5):419-424.

FOR MORE INFORMATION:

If you have additional questions, would like to order additional copies of this fact sheet, or would like to join the Section on Pediatrics, please contact the Executive Office of the Section on Pediatrics of the American Physical Therapy Association at: APTA Section on Pediatrics, 1111 North Fairfax Street, Alexandria, VA 22314, 800/999-2782, ext 3254, Fax: 703/706-8575. Or visit the Section's Web site at www.pediatricapta.org.

©Copyright 2013 by the participants of the July 2012 Pediatric Education Summit, with special thanks to expert contributors Jennifer Furze, PT, DPT, PCS, Lisa K. Kenyon, PT, PhD, PCS, and Gail Jensen, PT, PhD, FAPTA.