

Evidence-Based Care Guideline
for

Return to Activity* after Lower Extremity Injury¹

in children and young adults ages 5 through 22 years

Publication Date: 05-24-2010

Target Population

Inclusions: Children and young adults

- with lower extremity injury/surgery requiring progressive re-entry into activity participation**
- ages 5 to 22 yrs, skeletally immature and mature
- cleared for return to desired activities by physician
- who meet the criteria for reintegration into activity participation established in Table 1.

Exclusions: These guidelines are not intended for use with individuals

- returning to high-level activities following upper extremity injury/surgery.

*Including participation in any organized or recreational play or sports activities

**This guideline was developed with a focus on re-entry into activity participation for individuals following knee injury/surgery, but is applicable for individuals following hip or ankle injury/surgery.

Target Users

Physical Therapists

Also included but are not limited to (in alphabetical order):

- Coaches and Athletic Trainers
- Other healthcare providers
- Patients and families
- Physicians

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Introduction

References in parentheses () Evidence Level in [] (See Development Process for definitions)

Successful transition of an individual from rehabilitation to unrestricted activity participation requires a comprehensive, progressive and criterion-based strategy to reduce risk of further injury (*Local Consensus [5]*).

In healthy individuals, studies show that comprehensive training programs utilizing components of strength, balance and core stability training, as well as biomechanical technique and plyometric training, induce changes in movement mechanics that are associated with reducing injury risk (*Hewett 2006 [1a]*, *Myer 2005 [3a]*, *Hewett 1999 [3a]*, *Hewett 2006 [5]*). Similar principles are utilized when establishing a comprehensive rehabilitation program for individuals following injury (*Local Consensus [5]*). Early and intermediate stages of rehabilitation progressively address identified impairments, followed by the advanced stages of rehabilitation focusing on neuromuscular and plyometric training with the advancement of activity-specific drills and activities (*Local Consensus [5]*).

This guideline utilizes a comprehensive and criterion-based approach to successfully transition the individual through the advanced and return to activity phases of rehabilitation into unrestricted activity participation. In this guideline, specific criteria are recommended to determine an individual's readiness for reintegration into activity participation, as well as criteria to determine readiness for unrestricted activity participation.

Expected Outcome

The objective of Return to Activity phase of rehabilitation is successful transition of the patient with knee injury/surgery or other lower extremity injury from the end stage rehabilitation to safe participation in sports with minimal risk of further injury.

Guideline Recommendations

Overall Considerations

1. It is recommended that open communication is utilized among the healthcare team, coaches, and the patient and family to ensure effective collaboration with the plan of care (*Local Consensus [5]*).
2. It is recommended that progression through this care guideline be individualized based on
 - the nature of the injury,

- individual/family goals,
- physical and psychosocial attributes of the individual

(Local Consensus [5]).

3. It is recommended that progression through this guideline be criterion-based, and not time-based. Criterion-based progression depends on achievement of clinical milestones with consideration for the activity demands:
 - The amount of cutting, pivoting and contact occurring during the activity
 - The level of activity (recreational versus elite sport participation)

(Local Consensus [5])

Note: All recommended milestones may not be appropriate for every individual; appropriate rehabilitation progression relies on sound clinical judgment (Local Consensus [5]).

4. It is recommended that the following warning signals prompt communication with the referring physician and medical team:
 - Unexpected or increased irritability
 - Persistent or recurring effusion
 - The occurrence of unexpected symptoms

(Local Consensus [5]).

Assessment

5. It is recommended that a Physical Therapy functional evaluation be completed including the components named in Table 2 to determine an individual’s readiness for entry into the Return to Activity phase (Local Consensus [5]).
6. It is recommended that the individual’s readiness for entry into the Return to Activity phase be based on the criteria in Table 1, and that one of the following management strategies be selected:
 - meets criteria: direct entry into this phase
 - Further evaluation with different assessment tools may be appropriate for some patients based on clinical judgment.
 - does not meet criteria: continue the advanced phases of rehabilitation with focus on identified impairment(s).

Table 1: Criteria for entry into Return to Activity phase of rehabilitation (see Appendices for further description of testing/scoring)

A. Successful completion of comprehensive rehabilitation program based on clinical judgment or companion evidence-based care guidelines ♦	
B. Results of functional evaluation (see Table 2)	
Pain	• Resolved during all activities
Effusion	• Resolved during all activities
ROM	• Full AROM compared to uninvolved lower extremity
Strength	• QF and HS ≥ 85% of the uninvolved (measured with dynamometer)
	• For hip/ankle injuries, relevant musculature ≥ 85% of the uninvolved (measured with dynamometer)
	• MMT: 5/5 for relevant musculature
Report-based Functional tests	• For knee involvement, IKDC score ≥ 85
	• For hip involvement, HOS score ≥ 85
	• For ankle involvement, FAAM score ≥ 85
Performance-based Functional tests	• Demonstrate LSI ≥ 85 on all SL hop tests
	• Demonstrate appropriate mechanics during additional screens per clinical judgment

♦ Based on evaluation findings and clinical judgment, some patients may directly enter this phase without prior participation in rehabilitation.

AROM = active range of motion; FAAM = Foot and Ankle Ability Measure; HOS = Hip Outcome Score; HS = hamstring muscles; IKDC = International Knee Documentation Committee subjective knee function instrument; LSI = limb symmetry index; MMT = manual muscle test; ROM = range of motion; QF = quadriceps femoris muscles; SL = single limb

Table 2: Components of evaluation for entry into Return to Activity phase

Physical Therapy functional evaluation components	
Pain	<ul style="list-style-type: none"> • VAS
Effusion	<ul style="list-style-type: none"> • Girth measures
ROM	<ul style="list-style-type: none"> • Goniometry
Strength	<ul style="list-style-type: none"> • Dynamometer assessment • Manual muscle test or functional endurance tests
Report-based Functional tests	<ul style="list-style-type: none"> • General health instrument • Region-specific instrument
Performance-based Functional tests	<ul style="list-style-type: none"> • SL hop tests • Additional screens, including but not limited to: <ul style="list-style-type: none"> -DL/SL squat (repeat) -DL/SL jump (repeat)

ADL = activities of daily living; AROM = active range of motion; DL = double limb; ROM = range of motion; SL = single limb; VAS = visual analog scale

Table 3: Principles to guide neuromuscular re-education component of rehabilitation (Local Consensus [5])

Neuromuscular Control	
During rehabilitation, neuromuscular re-education is progressed by manipulating motor learning principles to facilitate retention and transfer of training from controlled clinical environments to activity-specific environments (Local Consensus [5]).	
NM control:	<ul style="list-style-type: none"> • The interaction of sensory and motor systems to anticipate or respond to proprioceptive and kinesthetic information to produce coordinated movements (Kisner 2007 [5])
Factors contributing to optimal NM control (Local Consensus [5]):	<ul style="list-style-type: none"> • Proprioception • Balance • Coordination • Postural stability • Core stabilization • Dynamic stabilization • Power generation • Power absorption
Factors contributing to skill acquisition and/or reacquisition (Fredricks 1996 [5]):	<ul style="list-style-type: none"> • Amount of practice • Feedback (amount and type) • Guidance versus discovery learning • Part-task versus whole-task practice • Accuracy versus speed • Environment

NM = neuromuscular control

Intervention

- It is recommended that the patient participate in therapeutic activities that functionally progress and optimize strength and muscle performance (Local Consensus [5]):
 - Focus activities to challenge muscle demand: progress intensity, frequency and duration of activity
 - Focus activities to challenge muscle power generation
 - Focus on activity-, sport-, position-specific activities
 - Activity progressions:
 - Single leg to double leg transitions, and vice versa
 - Alter planes of movement to focus on lateral and rotational activities, and transition activities
 - Add unanticipated perturbations and changes in support surface
 - Add sequential and simultaneous activities
 - Challenge multiple trunk (core) and lower extremity muscle groups simultaneously
- It is recommended that the patient participate in therapeutic activities that functionally progress neuromuscular control (Table 3) (Local Consensus [5]):
 - Focus on activity-, sport-, position-specific activities and drills
 - Promote transfer of skills from clinic to field/court
 - Focus on high-level plyometric activities
 - Power generation during take-off
 - Force attenuating strategies during landing
 - Activity progressions:
 - Progress impact loading
 - Progress intensity, frequency, and duration of therapeutic activities
 - Single leg to double leg transitions, and vice versa
 - Alter planes of movement to focus on cutting/pivoting and transition activities
 - Add activity- or sport-specific perturbations
 - Alter support surface
 - Add sequential and simultaneous activities

9. It is recommended that the Physical Therapist guide the patient through a progressive re-integration into desired activity (*Local Consensus [5]*):
- Progressive reintegration that coincides with activities and training in the clinic:
 - Improve cardiovascular/activity endurance
 - Maintain appropriate performance technique
 - Initial return to play: non-contact drills, conditioning activities
 - Modify time of participation
 - Modify speed/demand of participation (50% effort or speed progressing to full effort and full speed)
 - Progress return to play: contact drills, full practice:
 - Modify time of participation
 - Modify speed and demand of participation
 - Progress return to play: scrimmage and game time:
 - Modify time of participation
10. It is recommended that when the goals in Table 4 are achieved, the patient
- be cleared for unrestricted activity participation, and
 - follow up with the physical therapist to ensure successful reintegration and participation in unrestricted activity participation
- (*Local Consensus [5]*).

Discharge from Therapy

11. It is recommended that discharge from therapy be based on clinical judgment, attainment of goals in Table 4 and successful participation in desired activity (*Local Consensus [5]*).

Future Research Agenda

Determining appropriate objective criteria for safe rehabilitation progression and readiness for unrestricted activity participation following lower extremity injury/surgery.

Table 4: Criteria for unrestricted activity participation (see Appendices I, II and III for further description of testing/scoring)

A. Successful reintegration into desired activity	
B. Results of functional evaluation	
Pain	• Resolved during all activities
Effusion	• Resolved during all activities
Strength	• QF and HS ≥ 90% of the uninvolved (measured with dynamometer) • For hip/ankle injuries, relevant musculature ≥ 90% of the uninvolved (measured with dynamometer)
Report-based Functional tests	• For knee involvement, IKDC score ≥ 85 • For hip involvement, HOS score ≥ 85 • For ankle involvement, FAAM score ≥ 85
Performance-based Functional tests	• SL hop tests, LSI ≥ 90 • One or more of the following criteria ♦ ♦ <ol style="list-style-type: none"> 1. Drop vertical jump, demonstrate appropriate mechanics 2. Tuck Jump Assessment, less than 6 flaws 3. Star Excursion Balance Test, composite reach distance ≥ 94
	• Demonstrate appropriate mechanics during activity-specific maneuvers and drills -limb symmetry -symmetrical and adequate power generation to meet task demands -symmetrical and adequate power absorption to meet task demands -integration of multiple and unanticipated movement patterns

♦ ♦ Assessment tool chosen depends on clinical judgment with consideration for type of injury and demands of desired activity.

FAAM = Foot and Ankle Ability Measure; HOS = Hip Outcome Score; HS = hamstring muscles; IKDC = International Knee Documentation Committee subjective knee function instrument; LSI = limb symmetry index; QF = quadriceps femoris muscles; SL = single limb

Appendix I – Assessment of Strength

An isokinetic or isometric evaluation via an isokinetic dynamometer is the gold standard for evaluation of muscle force production. If an isokinetic dynamometer is not available, hand-held dynamometry may provide a reliable secondary method (*Local Consensus [5]*).

Quadriceps Strength Assessment: Muscles about the knee function to protect joint structures by controlling joint motion and absorbing shock. When muscle strength is compromised, movement patterns are likely altered and excessive forces may be transferred directly to the joint surfaces. Quadriceps femoris strength deficits have been associated with altered knee mechanics (*Bush-Joseph 2001 [3a], Lewek 2002 [4a], Mikesky 2000 [4a]*), such as reduced knee flexion angles during loading (*Lewek 2002 [4a]*) and higher loading rates (*Mikesky 2000 [4a]*) that may contribute to joint damage over time. The level of muscle force production that is necessary to ensure appropriate mechanics and protect joint structures is not known.

Quadriceps strength deficits are typically quantified as a Quadriceps Index (involved force production/uninvolved force production*100%) and reported criteria for return to high-level activities widely varies (Quadriceps Index = 65 to 90%) (*Moller 2001 [2a], Webster 2001 [2a], Keays 2003 [4a], Gobbi 2002 [4a], Noyes 2000 [4a], Shelbourne 1995 [4a], Roi 2005 [5], Kvist 2004 [5]*). See Tables 1 and 4.

Hamstring Strength Assessment: There are no published studies regarding criteria for hamstring muscle performance. See Tables 1 and 4.

Hip and Ankle Strength Assessment: There are no published studies regarding criteria for hip or ankle muscle performance. See Tables 1 and 4.

Appendix II – Assessment of Function

Patient-reported Assessment: There are many patient-reported measures that assess function during activities of daily living (ADL), recreational activities, and sports activities. For individuals with knee conditions, the International Knee Documentation Committee subjective knee function instrument (IKDC) is widely used and detects improvement or deterioration in symptoms, function, and sports activity experienced by patients with a variety of knee conditions (*Irrgang 2001 [3a]*). The IKDC is a reliable and valid measure of knee-related function in adults and young adults (*Irrgang 2006 [3a]*, *Irrgang 2001 [3a]*, *Anderson 2006 [4a]*), and in children as young as 6 years (*Schmitt 2010 In Press [4a]*). See Tables 1 and 4.

For individuals with hip or ankle pathology, region-specific instruments are available. The Hip Outcome Score (HOS) assesses function during activities of daily living and sports and the validity, reliability and responsiveness of the measure have been shown in adult patient populations (*Martin 2008 [4a]*, *Martin 2007 [4a]*, *Martin 2006 [4a]*). The Foot and Ankle Ability Measure (FAAM) is a reliable and valid measure of function during ADL and sports for adult individuals with leg, ankle or foot musculoskeletal disorders (*Martin 2005 [4a]*). See Tables 1 and 4.

Performance-based Assessment, Single limb Hop Tests: Physical performance of function is often evaluated with single-limb hop tests (*Noyes 1991 [4a]*) due to their convenience and reliability (*Reid 2007 [4a]*, *Brosky 1999 [4a]*, *Bolgia 1997 [4a]*). Hop tests are applicable for a wide variety of patients with knee or other lower extremity joint involvement (*Local Consensus [5]*). Performance deficits are typically quantified as a Limb Symmetry Index (see below) and reported criteria for return to high-level activities varies, but is within the range of 85 to 90% of the uninvolved limb (*Noyes 2000 [4a]*, *Roi 2005 [5]*, *Kvist 2004 [5]*).

Each hop test is performed on a single limb and includes (1) a single leg hop for distance, (2) a triple cross-over hop for distance, (3) a straight triple hop for distance, and (4) a 6 meter timed hop (Figure 1). Individuals perform 1 practice trial, followed by 2 measured trials on each leg (*Local Consensus [5]*). The average of each trial type is used to calculate a limb symmetry index ($LSI = \text{involved/uninvolved} \times 100\%$ for the distance measures and $LSI = \text{uninvolved/involved} \times 100\%$ for the timed hop). See Tables 1 and 4.

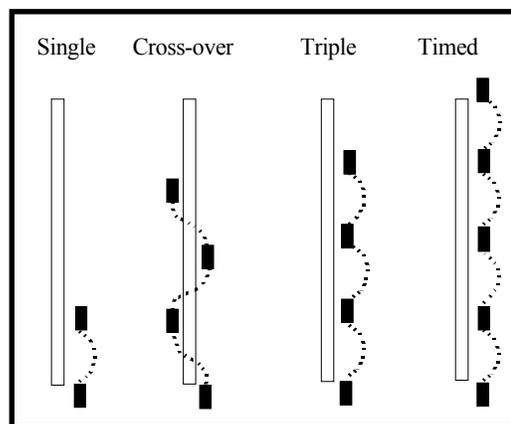


Figure 1. Graphic representation of single leg hop tests (*Noyes 1991 [4a]*).

Appendix III – Assessment of Technique

The gold standard to evaluate movement patterns and joint mechanics is with three-dimensional motion analysis. The availability and expense of these tools limit their clinical utility for the majority. Although not comparable to three-dimensional analysis, video analysis and associated video analysis software packages are feasible in most clinics and offer a more sensitive means to analyze movement patterns (*Local Consensus [5]*).

Performance-based Assessment, Drop Vertical Jump: The drop vertical jump task has been used repeatedly in the literature as an assessment tool of lower extremity biomechanics during a plyometric task (*Hewett 2005 [3a]*, *Ford 2003 [3a]*, *Myer 2007 [4a]*). Specifically, the identification of deviant mechanics during this task, such as landing asymmetry and dynamic knee valgus, have been identified as injury risk patterns (*Hewett 2005 [3a]*, *Paterno 2007 [4a]*). Mechanical faults or neuromuscular control deficits potentially identified by this test may have important consequences for the patient with a knee or other lower extremity joint injury. Limb asymmetry and decreased ability to attenuate loads during the landing phase of the drop vertical jump increases the potential for loads to be directly transferred to the joint surfaces. For example, altered frontal plane landing mechanics, such as dynamic knee valgus, may be a method of increasing knee motion excursion to attenuate shock; however, this pattern reduces joint contact area and may increase the stress born on a focal portion of the knee. This type of landing pattern may be particularly detrimental for a patient with knee pathology involving the subchondral bone or articular cartilage. In addition, this landing pattern is associated with increased risk for anterior cruciate ligament injury (*Hewett 2005 [3a]*).

For the drop vertical jump, the individual performs a double-leg landing from a standard height (31 cm) (*Ford 2003 [3a]*) and then immediately performs a maximum effort double-leg jump (*Ford 2003 [3a]*). Performance is visually evaluated using the following criteria – both feet leave the box simultaneously, both feet land simultaneously, weight bearing is symmetrical, and landing force is adequately and symmetrically absorbed by both lower extremities (*Local Consensus [5]*). Video analysis may be helpful in identifying alterations in mechanics (*Local Consensus [5]*).

Performance-based Assessment, Tuck Jump: The Tuck Jump exercise (Figure 2) has been advocated as a reliable tool to identify lower extremity landing technique faults during a plyometric activity (*Myer 2008 [5]*). The mechanical faults identified by this task may relate to risk of further or future injury in patients with lower extremity injury. Specifically, performance of the tuck jump is assessed for limb symmetry as well as appropriate lower extremity mechanics and shock absorbing strategies in an effort to mitigate further injury risk.

For the test, the individual performs repeated tuck jumps for 10 seconds while the clinician visually grades the outlined criteria (Figure 3). Standard video analysis may be used to assist with assessment accuracy and for visual feedback for the patient. The patient's techniques are subjectively rated as either having an apparent deficit or not. The deficits are tallied for the assessment score. It has been suggested that patients who demonstrate 6 or more flawed techniques would benefit from further training (*Myer 2008 [5]*). See Table 4.



Figure 2. Demonstration of tuck jump exercise. Reprinted, with permission, from G.D. Myer, K.R. Ford, and T.E. Hewett, 2008, “Tuck jump assessment for reducing anterior cruciate ligament injury risk,” *Athletic Therapy Today* 13(5): 39-44.

Tuck Jump Assessment	Pre	Mid	Post	Comments
<u>Knee and Thigh Motion</u>				
① Lower extremity valgus at landing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
② Thighs do not reach parallel (peak of jump)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
③ Thighs not equal side-to-side (during flight)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>Foot Position During Landing</u>				
④ Foot placement not shoulder width apart	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
⑤ Foot placement not parallel (front to back)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
⑥ Foot contact timing not equal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Excessive landing contact noise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>Plyometric Technique</u>				
8. Pause between jumps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Technique declines prior to 10 seconds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Does not land in same footprint (excessive in-flight motion)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Total _____	Total _____	Total _____	



①



②



③



④



⑤



⑥

Figure 3. Assessment form for Tuck Jump. Reprinted, with permission, from G.D. Myer, K.R. Ford, and T.E. Hewett, 2008, "Tuck jump assessment for reducing anterior cruciate ligament injury risk," *Athletic Therapy Today* 13(5): 39-44.

Performance-based Assessment, Star Excursion Balance Test: Performance on the Star Excursion Balance Test (SEBT) (Plisky 2006 [2a], Kinzey 1998 [3a]) is indicative of the likelihood of lower extremity injury (Plisky 2006 [2a]). A study in high-school basketball players found that female athletes with a composite reach distance of less than 94% of their limb length were 6.5 times more likely to sustain a lower extremity injury during the season (Plisky 2006 [2a]).

For the test (Plisky 2006 [2a]), individuals are instructed to stand on one leg and reach with the contralateral limb in an anterior, posteromedial and posterolateral direction (see Figure 4). A composite score is calculated by summing the reach distance in all three directions, then dividing the sum by the patient's leg length. See Tables 1 and 4.

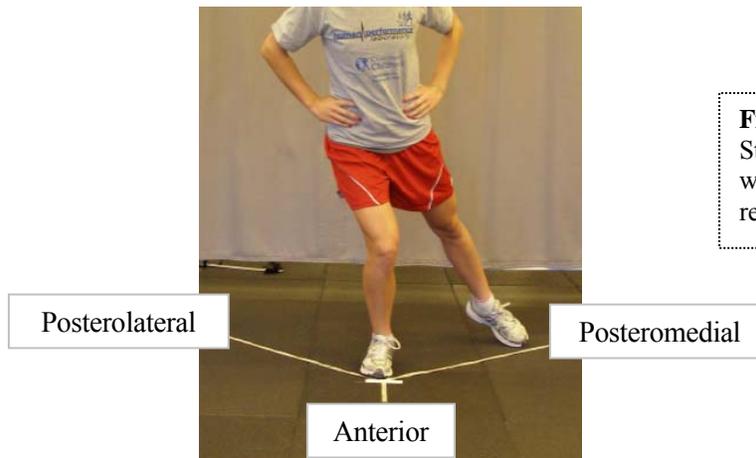


Figure 4. Performance of Star Excursion Balance Test with directions labeled in reference to stance limb.

Performance-based Assessment, Activity-specific maneuvers: A number of additional activity- and sport-specific performance based measures may be used to assess performance and technique. See Table 4.

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Development Process

The process by which this guideline was developed is documented in the [Guideline Development Process Manual](#); a Team Binder maintains minutes and other relevant development materials. The recommendations contained in this guideline were formulated by an interdisciplinary working group which performed systematic and critical literature reviews, using the quality level scale that follows, and examined current local clinical practices.

To select evidence for critical appraisal by the group for the development of this guideline, the Pubmed, OVID (Medline, Cinahl, EmBase and Cochrane databases), and Pedro databases were searched between the dates of January 2008 to June 2008 to generate an unrefined, “combined evidence” database using a search strategy focused on answering clinical questions relevant to return to sport, return to activity, or rehabilitation. The search strategy employed a

combination of Boolean searching on human-indexed thesaurus terms (MeSH headings using an OVID Medline interface) and “natural language” searching on searching on human-indexed thesaurus terms (MeSH headings using an OVID Medline interface) and “natural language” searching on words in the title, abstract, and indexing terms. The citations were reduced by: eliminating duplicates and non-English articles. The resulting abstracts were reviewed by team members to eliminate irrelevant citations. During the course of the guideline development, additional clinical questions were generated and subjected to the search process, and some relevant review articles were identified.

Note: Full tables of evidence grading system available in separate document:

- [Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality](#) (abbreviated table below)
- [Grading a Body of Evidence to Answer a Clinical Question](#)
- [Judging the Strength of a Recommendation](#) (abbreviated table below)

<i>Quality level</i>	<i>Definition</i>
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5	Other: General review, expert opinion, case report, consensus report, or guideline

†a = good quality study; b = lesser quality study

Table of Recommendation Strength (see note above)

<i>Strength</i>	<i>Definition</i>
“Strongly recommended”	There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations).
“Recommended”	There is consensus that benefits are closely balanced with risks and burdens.
No recommendation made	There is lack of consensus to direct development of a recommendation.

Dimensions: In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.

1. Grade of the Body of Evidence (see note above)
2. Safety / Harm
3. Health benefit to patient (*direct benefit*)
4. Burden to patient of adherence to recommendation (*cost, hassle, discomfort, pain, motivation, ability to adhere, time*)
5. Cost-effectiveness to healthcare system (*balance of cost / savings of resources, staff time, and supplies based on published studies or onsite analysis*)
6. Directness (*the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome]*)
7. Impact on morbidity/mortality or quality of life

Tools to assist in the effective dissemination and implementation of the guideline may be available online at <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/ev-based/default.htm>. Once the guideline has been in place for three years, the development team reconvenes to explore the continued validity of the guideline. This phase can be initiated at any point that evidence indicates a critical change is needed.

The guideline was externally appraised by three reviewers^b using the AGREE instrument and the results by domain are:

- Scope and Purpose 96%
- Stakeholder Involvement 50%
- Rigor of Development 87%
- Clarity and Presentation 94%
- Applicability 19%
- Editorial Independence 100%

Recommendations have been formulated by a consensus process directed by best evidence, patient and family preference and clinical expertise. During formulation of these recommendations, the team members have remained cognizant of controversies and disagreements over the management of these patients. They have tried to resolve controversial issues by consensus where possible and, when not possible, to offer optional approaches to care in the form of information that includes best supporting evidence of efficacy for alternative choices.

The guideline has been reviewed and approved by clinical experts not involved in the development process, distributed to senior management, and other parties as appropriate to their intended purposes.

The guideline was developed without external funding. All Team Members and Clinical Effectiveness support staff listed have declared whether they have any conflict of interest and none were identified.

Copies of this Evidence-based Care Guideline (EBCG) and any available implementation tools are available online and may be distributed by any organization for the global purpose of improving child health outcomes. Website address:

<http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/ev-based/default.htm> Examples of approved uses of the EBCG include the following:

- copies may be provided to anyone involved in the organization's process for developing and implementing evidence-based care guidelines;
- hyperlinks to the CCHMC website may be placed on the organization's website;
- the EBCG may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at HPCEInfo@cchmc.org for any EBCG, or its companion documents, adopted, adapted, implemented or hyperlinked by the organization is appreciated.

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NOTE: These recommendations result from review of literature and practices current at the time of their formulations. This guideline does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this guideline is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

For more information about this guideline, its supporting evidence and the guideline development process, contact the Division of Occupational Therapy and Physical Therapy Office at: 513-636-4651.

References

Note: When using the electronic version of this document,  indicates a hyperlink to the PubMed abstract. A hyperlink following this symbol goes to the article PDF when the user is within the CCHMC network.

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