Hippotherapy as an Intervention for Children with Residual Primitive Reflexes

MeOTA Fall Conference ~ 2019
Christine C. Hubbard, MA, OTD

Learning Objectives

**Primitive Reflexes:**
1. Review primitive reflexes; how they aid infant development; how residual primitive reflexes impact development; and how to test for the presence of residual primitive reflexes
2. Identify which children may experience residual primitive reflexes

**Hippotherapy:**
1. Examine hippotherapy as an intervention method
2. Apply intervention principles for integrating reflexes through the use of hippotherapy

**References:**
1. Review reference materials for presentation; programs; therapists; and research
Primitive Reflexes

- **Primitive**: movement patterns that emerge prenatally and are present at birth; brain stem functions
- **Automatic**: facilitate development; indicate level of neurological maturity at birth
- **Change**: posture and tone changes occur with each reflex
- **Inhibition**: reflexes are dampened down as functional movement patterns emerge due to cortex maturation

- **Maturation**: reflexes that are ‘incorporated’ into complex, learned motor patterns support coordinated and automatic movements as a result of cortex maturation
- **Integration**: these movements include whole body balance movement patterns, bilateral integration, visual motor integration
- **Learning**: reflex integration requires a child to be able to move and explore; he must RECOGNIZE when he has made an error in movement; he must have adequate visual motor integration and sensory processing and modulation
## Moro Reflex

<table>
<thead>
<tr>
<th>Age</th>
<th>Reflex aids in development</th>
<th>Residual reflex impedes development</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 wks gestation</td>
<td>Facilitates development of vestibular system in preparation for righting responses and balance. The moro reflex is an involuntary reflex to threat and acts as a survival mechanism</td>
<td>• Disruption to the development of the vestibular system:</td>
</tr>
<tr>
<td>4 months Support infant in semi-reclined position, release support momentarily: arms abduct, extend, &amp; externally rotate, followed by flexion and adduction.</td>
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<td>• Poor balance and coordination</td>
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<td>• Muscle tone issues; low endurance</td>
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<td></td>
<td></td>
<td>• Poor visual control of eye movements and visual perception</td>
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<td>• Poor information processing, decision making &amp; problem solving</td>
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<tr>
<td></td>
<td></td>
<td>• Hypersensitivity to light, sound, tactile input (body and mouth), temperature and movement (external stimuli perceived as a threat).</td>
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<td></td>
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<td>• Difficulty focusing, distractibility, poor impulse control, emotional immaturity</td>
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<td></td>
<td></td>
<td>• Mood swings, anxiety, poor behavioral regulation</td>
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<tr>
<td></td>
<td></td>
<td>• Anxiety, particularly anticipation anxiety</td>
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<td></td>
<td></td>
<td>• Emotional and social immaturity</td>
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<tr>
<td></td>
<td></td>
<td>• Difficulty with transitions between tasks or environments</td>
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<tr>
<td></td>
<td></td>
<td>• Low self esteem</td>
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<tr>
<td></td>
<td></td>
<td>• Dyscalculia (difficulty with math)</td>
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<td></td>
<td></td>
<td>• Difficulty with new or stimulating experiences</td>
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<td></td>
<td></td>
<td>• Adrenal fatigue, leading to allergy, asthma or chronic illness</td>
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### Testing for Moro Reflex

**Method A:**
1. Have the child lift their arms out straight on the right and left sides of the body
2. Ask the child to balance on one foot and then switch to balancing on the opposite foot
3. If the child wobbles or falls over it could be a sign they have retained the Moro reflex

**Method B:**
1. Help the child cross one foot over the other and lift their arms above their head
2. Have the child take their arms and touch their toes
3. When they have completed the first exercise, help them repeat the same exercise by switching legs. If the child displays poor balance and falls over, it could be a sign the child has retained the Moro reflex.

**Method C:**
1. Stand behind the child, have them close their eyes and stand up straight with their hands touching their chest (elbows bent)
2. Tell the child to fall backward into your arms (catch them under the armpits)
3. When the child falls backward, if they flail their arms outward instead of keeping them toward their chest, this is a sign they still have the Moro reflex present
4. While their eyes are closed you can also snap your fingers close to their ears. If the noise startles them and they flail their arms outward, this is another sign of a retained reflex.
Testing for Moro Reflex

**Method D:**
- Pigeon walk forward and back
- Cross over test

Intervention for Integrating Moro reflex

1. Sit in a chair in a fetal position, with the right wrist crossed over the left and the right ankle crossed over the left ankle. Fists should be closed.
2. Ask the child to inhale and make like a starfish by swinging his arms up and out and thrusting his legs out while extending the head back and opening hands. Have him hold this position for 5 to 7 seconds while holding his breath.
3. Then tell him to exhale and return to the same position, crossing the left wrist and ankle over the right wrist and ankle.
4. Repeat this again until they are back to the original position. Do this 6 times in a row a few times a day until the reflex is inhibited fully.

- Once the reflex has been fatigued, engage the child in occupational activities where he has to extend the head and use the UE & LE in functional movement patterns (ball or toy play, dance, sports, gross moor games).
Basic Intervention Approach for integrating residual primitive reflexes:

The simple basic method for integrating reflexes:
1. Position the child in order to elicit the reflex
2. Repeat this process until the reflex begins to fatigue
3. Change the child’s position or activity to counteract the reflex position
4. Repeat and reinforce with occupational based activities or fictional tasks

Asymmetric Tonic Neck Reflex

<table>
<thead>
<tr>
<th>Age emerge / age fade</th>
<th>Reflex aids in development:</th>
<th>Residual reflex impedes development:</th>
</tr>
</thead>
</table>
| In utero/ 4 weeks – 4 months | Needed at birth so infant can rotate itself through the birth canal. Important for development skills that require integration of both sides of the body. | • Poor hand-eye co-ordination  
• Poor handwriting  
• Awkward pencil grip  
• Difficulty copying from a blackboard  
• Missing parts of a line when reading  
• Difficulty catching a ball  
• Unable to cross the vertical midline  
• Discrepancy between oral and written performance  
• Disturb the development of visual tracking  
• Poor balance  
• Poor bilateral integration, poor establishment of a dominant hand, eye or ear  
• Poor judgment of distance  
• Poor at sports  
• In adults there can be chronic shoulder and/or neck problems  
• Poor true standing and walking security  
• Poor Isolation of Individual Body Movements |
Testing for ATNR

Methods A:
1. Ask child to get on all fours with the arms straight, fingers pointing forward and the head in neutral. With their weight over their hands
2. OT rotates child’s head left or right
3. If the child’s elbow bends on the opposite side of head rotation (as would in the infant) OR the weight shifts posteriorly (i.e. off the hands) then the reflex is probably present

Method B:
1. Have child stand with arms straight out in front of them at shoulder height
2. Ask the child to turn their head fully to the left or fully to the right while maintaining the position of the arms out front
3. If the child’s torso and arms turn in the direction of the head or if the arms drop this reflex is likely present

Presence of the reflex signifies that the child has not yet disassociated neck movement from shoulder movement

Intervention for ATNR

1. Lie infant or child on his stomach face down.
2. Turn his head to left, slowly flex his left arm and leg
3. Turn his head right, slowly straighten left arm and leg – pause for 5 seconds
4. Flex right arm and right leg
5. Turn head to left, slowly straighten right arm and leg – pause for 5 seconds
6. Repeat cycle 2 more times

- Once the reflex has been fatigued, engage the child in occupational activities where he has to extend the head and use the UE & LE in functional movement patterns (ball or toy play, dance, sports, gross moor games).
Symmetric Tonic Neck Reflex

<table>
<thead>
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<th>Age emerge / age fade</th>
<th>Reflex aids in development:</th>
<th>Residual reflex impedes development:</th>
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</table>
| 4 months 10 months    | Hands to mouth, convergence of the eyes, crawling and reaching | • Poor visual skills  
• Learning challenges  
• Poor balance  
• Anxiety  
• Decreased self-esteem  
• Hyperactivity  
• Delay in crawling; W sitting  
• Poor hand-eye co-ordination; poor writing & key boarding; poor ball and tool skills  
• An ape-like walking pattern  
• Tendency to slump at a desk and/or poor posture due to a decrease in muscle tone, especially of the spinal muscles  
• The eyes fatigue sooner than normal when focusing on near then far objects (copying from the blackboard may be slow and tedious, thus missing a lot of information gathered in class)  
• Poor organization and planning skills |

Testing for the Symmetrical Tonic Neck Reflex (STNR)

Method A:
1. Have child on all fours with the weight forward over their hands
2. The OT flexes the neck fully (looking down) and hold for 5 seconds, then slowly extend the neck (looking up) and hold for 5 seconds
3. Repeat 3 times. If the child alters their body posture then the reflex is probably present.

Look for:
- shifting of weight backward
- arching back
- bending arms
Testing for the Symmetrical Tonic Neck Reflex (STNR)

Method B:
1. This one may work best if it is performed with music
2. Place a like-coloured sticker on the right hand and left knee and a different like-coloured sticker on the left hand and right knee
3. Ask the child to march on a marked spot on the floor as they tap their hand to their opposite knee as if to match up the stickers
   - If they turn on the spot, their rhythm is off, or if they begin to tap the same-sided leg, this reflex is likely to be retained
   - This is a great way to detect gross motor control issues and if the child displays more difficulty when moving to the beat of the music it may signify auditory processing issues.

Tonic Labyrinthine Reflex

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<tr>
<th>Age emerge / age fade</th>
<th>Reflex aids in development:</th>
<th>Residual reflex impedes development:</th>
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</table>
| 40 wks gestation 3 months | Facilitates development of vestibular system in preparation for righting responses and balance. | • Low muscle tone or exaggerated muscle tone
• Fluctuation in muscle tone based on changes in head position
• Center of balance that changes with head position: may move cautiously while walking or climbing stairs, maneuvering curbs or uneven terrain
• Poor posture and balance; slouches in chairs when writing
• Visual problems
• Motion sickness
• Orientation and spatial difficulties
• Difficulty judging space, distance, depth and speed
• Poor concentration
• Fatigue while reading or when working or studying at a desk
• Bad posture when working over a desk
• Difficulty coordinating movement
• Sports performance below capability |
Testing for the Tonic Labyrinthine Reflex

1. Have child lie face down on a mat with palms facing down
2. Ask the child to lift the head off the mat and raise the legs simultaneously keeping the legs straight (aka the superman).
3. If the child is unable to keep their legs straight then the TLR is probably present.

Spinal Galant Reflex

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<th>Age emerge / age fade</th>
<th>Reflex aids in development:</th>
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<tr>
<td>20 wks gestation 9 months</td>
<td>Used in the birthing process: helps the baby work its way down the birth canal. Enables the fetus to hear &amp; feel sound vibrations amniotic fluid in uterus.</td>
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<tr>
<td>Place infant in prone, run finger lightly along back near spine: infant will laterally flex trunk and hip toward stimuli</td>
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<tr>
<th>Residual reflex impedes development:</th>
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<tbody>
<tr>
<td>• May lead to poor bladder control and bed wetting (stimulation of bedsheets may activate the related urination reflex)</td>
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<td>• May lead to irritable bowel syndrome</td>
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<td>• Fidgeting in seat at school</td>
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<td>• A dislike of tight clothing around the waist</td>
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<td>• Poor attention span; child may be distracted by movement caused by reflex</td>
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<td>• Difficulty coordinating normal walking gait</td>
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<td>• Clumsiness while trying to manipulate objects</td>
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<tr>
<td>• May affect fluency and mobility in physical activities or sports</td>
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</table>
Testing for the Spinal Galant Reflex

1. Place the child on all fours (quadruped position)
2. Lightly stroke down one side of the lumbar spine towards the sacrum
   - If the child moves their back (typically arching or away from the stroke) then the reflex is probably present

Treatment for Spinal Galant Reflex

- Have the child lie on her back and move her limbs in a “snow angel” shape, until her hands meet at the top of her head and her feet come together
- Do this five times in a row, at least twice a day, until the Spinal Galant reflex can no longer be elicited by stroking the low back
- The goal of this exercise is to move all four limbs at the same rate in order to encourage the child to progress through the motion as slowly as necessary.
Delayed integration of primitive reflexes impedes the adequate development of righting and equilibrium responses

Delayed Righting & Equilibrium Reaction development

Functional Issues:
- If primitive reflexes are poorly integrated then righting and equilibrium reactions will mature slowly and may ultimately be impaired
- The child may need to use her hands to prop herself due to poor balance, this may affect bilateral coordination and skill development

Intervention considerations:
- Activities that facilitate the development of postural responses (righting and equilibrium reactions)
- Activities that increase trunk rotation
- Activities that encourage reach and move across midline of the body
- Activities that encourage balance development without the use of the arms
- Activities that narrow child’s lower extremity or upper extremity base of support (e.g., while a child is using his/her arms while prone, skillfully minimize the amount of abduction and external rotation at one, then both hips, while weight bearing on arms, facilitate prone extension with elbows positioned just below the child’s ears, rather than supporting his/her self on forearms of widely abducted arms)
- Activities that require the use of movable equipment such as balls, swings, tilt boards, bolsters, or T stools that offer a dynamic vs. static surface
Poor postural control and trunk strength

Functional issues:
- Poor trunk extension with accompanying shoulder elevation to compensate for reduced strength (rib cage may be high in the chest and flared; child may not spontaneously rotate his/her trunk completing functional tasks; instead will over rely on symmetrical flexion/extension patterns).
- Poor efficient movement when completing functional tasks (may result in a tight latissimus dorsi and pectoral muscles)

Intervention considerations:
- Activation of muscles antagonistic to those activated by the primitive responses
- E.g.: to counteract the effects of the tonic labyrinthine (prone), provide intervention designed to increase strength in the posterior trunk musculature. To counteract the effects of the tonic labyrinthine (supine), provide intervention designed to increase strength by moving against gravity with rotation
- Regarding flexibility, determine if stretching the muscle groups that “fix” for stability is needed
- E.g.: to stretch the pectorals child stretches arms behind back, stretch the latissimus by externally rotating and reaching up with both arms, stretch the hamstrings by long sitting and touching toes.

Positions for proving Intervention Activities
- Prone
- Supine
- Side lying
- Side sitting
- Long leg sitting
- Quadruped
- Half kneeling
- Kneeling
- Tall kneeling
- Stand to squat
- Stand to walk
Clinical Conditions associated with residual primitive reflexes

- Attention Deficit Hyperactivity Disorder
- Autism Spectrum Disorder
- Cerebral Palsy
- Developmental Coordination Disorder
- Emotional Disorders
- Learning Disabilities
- Sensory Processing Disorders

Hippotherapy

- Hippotherapy involves the use of horses by occupational, physical and speech therapists helping clients with motor, sensory and cognitive issues to improve function and independence.
- The therapist uses activities on the horse that are meaningful to the client and that address motor, sensory, or cognitive issues.
- The movement of the horse is intended to help the client to adapt and develop functional improvements. It can used as the primary activity or as a way of getting the client ready to do other functional activities.
Hippotherapy

- Occupational therapists use hippotherapy to address sensory processing issues. It provides proprioceptive, vestibular, tactile, visual, and auditory input. The OT regulates the input to facilitate the client’s sensory modulation and ensure the achievement of functional goals. Hippotherapy is intended to help the client demonstrate adaptive responses that indicate improved sensory, cognitive, behavioral, communication, and social emotional outcomes.

- Physical therapists use hippotherapy to improve client’s postural and motor responses. Positive effects from the movement of the horse can be seen in motor coordination, muscle tone, postural alignment, stiffness/flexibility, and strength.

- Speech language pathologists use hippotherapy to improve respiration, cognition, and speech/language production functions. These changes may be a consequence of the postural and motor changes. For instance, the client’s respiration and speech will improve as a result of improvements in trunk alignment and motor coordination.

Requirements

- A licensed & registered PT, OT, or SLP
- Should receive training in the principles of Hippotherapy, equine movement and equine psychology (one way that this can be achieved is through attendance at an AHA approved 3-4 day course “Introduction to Hippotherapy”).
**Therapy Standards**

- The activity is experiential, functional and in a natural environment.
- The movement of the horse, as the tool, can be compared to other therapy tools such as balls, scooters or swings.
- The variability of the horse’s movement, the rhythm, dimensionality, regularity, and the ability of the therapist to modify these movement qualities, is where the horse, as a tool, supersedes other tools with dynamic surfaces.

**Therapy Standards**

- Activities on the horse should be meaningful to the client & should address functional goals (goals are function oriented, and do not include skills associated with riding).
- It can be a preparatory activity: the movement of the horse can facilitate increased arousal, postural control, or musculoskeletal mobilization, the strategy is used first to prepare the client for a functional task or gait training.
Therapy Standards

- Hippotherapy can be used as a primary strategy to develop skills such as crossing midline, reciprocal weight bearing through the pelvis as is needed for gait, unilateral reaching, or improved sequencing/motor planning; improvement in these skills lead to improved function off of the horse.

- A client may be positioned astride the horse facing forward or backward, sitting sideways, lying prone or supine, standing in the stirrups, or riding without holding on. In addition, therapists have patients stretch, reach or play games — such as catch — while on the horse.

Therapy Standards

- The therapist must continuously analyze the client’s responses and adjust accordingly the horse’s movement or the therapy activity.

- The therapist must have sufficient understanding of the movement of the horse and be able to direct the horse handler to alter the tempo and direction of the horse.
Therapy Standards

- Hippotherapy is part of the integrated treatment plan: the initial evaluation, documentation, discharge criteria, and billing will all follow the structure consistent with the profession of the therapist who is using the movement of the horse as a treatment strategy.
- Long and short term goals are established which are functional, measurable and relevant to the patient’s needs.

Horses

- Horses used for client treatment must meet specific selection criteria regarding movement quality, temperament and training.
- Even when an ideal horse is used, the results are based on the training of the therapist, their clinical experience and expertise, and how well they integrate the use of the horse into a comprehensive treatment program.
Educational Videos

Hippotherapy used by OT, PT and Speech and Therapeutic riding

- [https://www.youtube.com/watch?v=20hcoI3NT-U](https://www.youtube.com/watch?v=20hcoI3NT-U)
- [https://www.youtube.com/watch?v=E__GjrYhi54](https://www.youtube.com/watch?v=E__GjrYhi54)
- [https://www.youtube.com/watch?v=moHJ09ICc6g](https://www.youtube.com/watch?v=moHJ09ICc6g)

Intervention ideas

The simple basic method for integrating reflexes:
1. Position the child in order to elicit the reflex
2. Repeat this process until the reflex begins to fatigue
3. Change the child’s position or activity to counteract the reflex position
4. Repeat and reinforce with occupational based activities or functional tasks

<table>
<thead>
<tr>
<th>Residual reflex</th>
<th>Age</th>
<th>Toy / activity</th>
<th>Position on horse</th>
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<tbody>
<tr>
<td>ATNR</td>
<td>24 months (2 years)</td>
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<td>MORO</td>
<td>36 months (3 years)</td>
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<td>STNR</td>
<td>48 months (4 years)</td>
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<tr>
<td>GALANT</td>
<td>60 months (5 years)</td>
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<tr>
<td>Tonic Labyrinthine Reflex</td>
<td>72 months (6 years)</td>
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Facilities

Carlisle Academy, Lyman Maine
➤ http://carlisleacademymaine.com/therapy-services/hippotherapy/

UpReach Therapeutic Equestrian Center, Inc., Goffstown, New Hampshire
➤ https://www.upreachtec.org/

The Bina Farm Center, Lexington, MA
➤ http://www.binafarm.org/

Greenlock Therapeutic Riding Center, Rehoboth, MA
➤ https://www.greenlock.org/

Therapists in Maine
https://americanhippotherapyassociation.org

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<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Email</th>
<th>Location</th>
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<tbody>
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### Therapists in New Hampshire

https://americanhippotherapyassociation.org

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<tr>
<th>Name</th>
<th>Credentials</th>
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<tr>
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### Therapists in MA

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<tbody>
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<td>Hopkinton</td>
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<td>Kat Rusnak</td>
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<td>Lexington</td>
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<td>Diana Lyman</td>
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<td>Lincoln</td>
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<td>Elizabeth Shealy</td>
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<td>Sudbury</td>
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<td>Tewksbury</td>
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<td>Pepperell</td>
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References for Presentation

Testing reflexes:

Intervention:

Hippotherapy:
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