



BIOFEEDBACK IN THE UROLOGY DEPARTMENT


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1.0 Introduction

Biofeedback is a treatment option carried out in the Urology department for the management of urinary voiding dysfunction in children. The focus of this treatment is on retraining the pelvic floor muscles. Biofeedback uses monitoring devices attached to strategically placed electrodes to obtain and relay to the child visually on a computer game when the bladder empties and which muscles are used (Liberati, 2005). Biofeedback in conjunction with therapeutic exercise has been shown to be very effective. There are no side effects, it is a non-invasive therapy and is recommended as an adjunct to standard behavior modification (Hulme, 2012). The goals of biofeedback vary with the etiology of the problem (Liberati, 2005).

Teaching children about voiding is challenging and the success of this teaching depends on the parent and child's willingness to participate and compliance with the training. Richardson and Palmer (2009) identify that biofeedback is time consuming and requires a commitment by the child and family.

2.0 Definition of Standard Operating Procedure

The term '**Standard Operating Procedure**' is a way of carrying out a particular course of action and includes operations, investigations, pharmaceutical treatment, examinations and any other treatment carried out.

3.0 Applicable to

The clinical staff in the urology


4.0 Objectives of Standard Operating Procedure

To guide the nursing staff in the urology department in the process of Biofeedback for urinary voiding.

The timing and frequency of the treatments will be determined by the progress of the individual child. Depending on where the child lives and how often they can attend will also be a feature.

Frequency of sessions is not well documented in the literature. Timing essentially depends on progress and retention of training. An initial session lasts approx. 90 minutes while follow up sessions are 60minutes depending on how well the child grasps the concept and practices at home (Liberati 2005).


3 sessions, 4-6 weeks apart initially	(Liberati, 2005)
Minimum 10, maximum 15 sessions weekly	(Ladi-Seyadian et al, 2015)
Average of 6 sessions to achieve positive results	(Drzewiecki et al 2009)

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6.0 Procedures

Biofeedback Process


ACTION	RATIONALE & REFERENCE
<p>Discuss the treatment process in detail with the child and family.</p> <p>At the initial session obtain an accurate voiding history and provide a review of anatomy and function of the bladder and bowel, pelvic floor, voiding and defecating dynamics. Discuss with the child and family standard Urotherapy including details about appropriate fluid intake and diet, timed voiding, voiding diary, correct toileting position to facilitate abdominal and pelvic muscle relaxation, double voiding technique and awareness of constipation where applicable (Drzewiecki et al 2009, Ladi-seyedian et al 2015).</p> <p>Individualize the programme timing/frequency to accommodate the needs of the child and family.</p> <p>The session must be individualized and developmentally appropriate. At the beginning of each session the nurse will obtain a voiding history and in the case of return visits, assess their progress, compliance with home exercises and motivation.</p>	<p>This will assist the child and family during the procedure.</p> <p>Specific child and programme goals are established from the history provided.</p> <p>This will ensure there are no other stressors to take the focus off the programme.</p> <p>Teaching children the dynamics of voiding can be challenging. The success of biofeedback depends greatly on patient and parent compliance, motivation to learn and willingness to participate (Liberati, 2005).</p> <p>Drzewiecki et al (2009) identify that for a successful outcome, not only must the staff be enthusiastic, but the child and family must be and stay committed.</p>
<p>Decontaminate hands prior to and following all patient contact.</p>	<p>Hand hygiene and ANTT Technique are essential to prevent infection <i>OLCHC 2013, Gould et al. 2009, SARI 2014</i></p>

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<p>Electrodes are connected to a small portable external wireless device which relays the image to the computer screen.</p> <p>Inside thigh (black lead)</p> <p>Channel 1 perianally, 3 o' clock and 9 o clock position.</p> <p>Channel 2 Abdomen each side of the midline on lower abdomen.</p>	<p>Reference electrode, this provides the accuracy to the measurement.</p> <p>These electrodes evaluate and record the electrical activity produced by skeletal muscles.</p> <p>These electrodes monitor abdominal/accessory muscle activity (Liberati 2005, Drzewiecki 2009, Ladi-Seyedian et al, 2015).</p>
<p>Set programme</p> <p>New patient Or new investigation Click on Biofeedback logo</p> <p>Select the specific programme for the child (sea world/forest/simple/curves)</p> <p>Biofeedback investigation options (Biofeedback on 2 EMG channels)</p> <p>Set challenge options: none (quick flicks) Obstacle to pass over (strengthen) Obstacle to pass under (relaxation) Set the resting time and challenge time. Start investigation. Investigation memo icon to type report. MMS reporter icon to print. If using Uroflow during the session the main flowmaster must be turned off for the flow to pick up in the biofeedback programme.</p>	<p>Fill in patient details.</p> <p>Existing patient.</p> <p>Aimated screen used to represent the appropriate muscle responses in the child (Ladi-Seyedian et al 2015)</p>
<p>Positioning</p> <p>Ask the child to sit comfortably with feet flat on the floor or supported on a stool. Knees open to relax the perineum. Hands on the knees or thighs. Re-engage the child as required using distraction techniques.</p> <p>Ensure the child's privacy needs are met.</p>	<p>Relaxed positioning to prevent accessory muscle use (Liberati, 2005).</p> <p>Reassure the child that once the electrodes are in place they are fully dressed for the duration of the session.</p>

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<p>Test squeeze Determine the connection by asking the child to squeeze the buttocks and to cough. The level of muscle relaxation/contraction is measured and displayed on screen in microvolts. Set the challenge level.</p> <p>Investigation The scale and challenge value can be adapted during the investigation. The actual measured value is displayed in the panel on screen. The biofeedback EMG test uses EMG channel 1 to control the animated object.</p> <p>The child is instructed to isolate the pelvic floor muscles by focusing on squeezing the leads on the buttocks. The child observes changes in the EMG tracing on the screen and waits for cues from the nurse to elicit a contraction or relaxation (Liberati, 2005).</p> <p>The programme is tailored to work with the child's condition and the symptoms they present with.</p> <p>Uroflowmetry and bladder scan for post void residual urine may be performed.</p>	<p>To check the EMG signal (MMS, 2014).</p> <p>Adjust the scale and/or the challenge value as required depending on the child's ability. Reduce if too difficult; increase if too easy and not challenging (MMS 2014).</p> <p>The higher the EMG value, the higher the object appears on screen. Therefore, with relaxation of the muscles the object descends and with straining it ascends (MMS, 2014).</p> <p>Resting level, quick contractions and 10 second hold contractions are measured. Muscle recruitment patterns can also be assessed. Based on information obtained from the voiding history and assessment an appropriate treatment protocol is developed (Hulme, 2012).</p> <p>The common goal of biofeedback is to make the child aware of their pelvic floor muscles and to teach them functional ways of using these muscles with voiding (Liberati, 2005).</p> <p>To assess and evaluate bladder dynamics and emptying ability initially and subsequent improvements post therapy (Liberati, 2005, (Drzewiecki et al, 2009).</p>
<p>Remove electrodes and clean the biofeedback unit/leads.</p> <p>Discard any suitable consumables in Healthcare. Non-risk waste (Household Waste) unless contaminated with blood.</p> <p>Praise and thank the child</p> <p>Record the intervention in the child's healthcare record</p>	<p>It takes time for exercise to strengthen the muscles therefore it must be done regularly and consistently (<i>Bladder and Bowel Foundation, 2008</i>).</p> <p>To maintain the trusting relationship with the child (<i>Hockenberry and Wilson, 2012</i>). To ensure effective communication through accurate recording of care (<i>An Bord Altranais 2002</i>)</p>

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Printed report	
Parent information leaflet given to the child and family detailing individualised home exercise programme	

7.0 Implementation Plan


The use of this document will be part of the implementation plan

8.0 Evaluation and Audit

This document will be used as guidance for this procedure. However, it is not possible to monitor all procedures. Consideration needs to be given here as to the risk presented should this procedure not be complied with.

9.0 References

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10.0 Appendices

The important skeletal muscles involved (Hulme, 2012)

Breathing diaphragm

During inhalation the diaphragm pulls down compressing the abdominal contents and increasing pressure on the bladder and bowel. During exhalation, the diaphragm returns to its dome shape, decreasing intra-abdominal pressure.

Pelvic Diaphragm / Levator Ani Muscles

Supports and stabilises the internal organs. During contraction there is increased support and stabilisation of the bladder and bowel. There is improved closure of the urethral and anal sphincters.

These muscles form a hammock from the front to the back of the pelvis and have relatively high resting tone. This constant tone at rest helps to keep the bladder and bowel outlets closed until it is time to go to the bathroom.

Urogenital Diaphragm Muscles

More superficial of the diaphragm muscles. Triangle of 3 muscles which interlock with the pelvic diaphragm and external anal sphincter.

The muscle fibres of the pelvic and urogenital diaphragms are divided into 2 types.


1. Fast twitch fibres approximately 35%. They act fast and intensely when coughing or sneezing or doing something unexpected that increases pressure on the urethra. They are powerful, explosive and fatigue quickly. The urogenital diaphragm is primarily fast twitch to stop sudden urine release.
2. Slow twitch fibres approximately 65%. Act at a slow constant tone for postural support. These fibres contract at a constant low level. The pelvic diaphragm is primarily slow twitch fibres supporting the bladder and urethra in optimum position for continence.

Pelvic and urogenital diaphragm muscles act together. In resting position, they gently support the internal organs. During physical activity or when withholding voiding is required until you can get to the bathroom their resting tone increases to help prevent leaking.

Sphincter Muscles

External/internal urinary and anal sphincters.

Sphincter muscles can tighten to pucker and relax to open. The only muscles not connected to bone. The urinary sphincter attaches to the urogenital diaphragm and the anal sphincter attaches to the pelvic and urogenital diaphragm and on contraction, change the tone and action of the sphincters.

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External sphincters are controlled by the voluntary and autonomic nervous systems. We can relax and tighten these circular muscles. Most of the time the external sphincters are resting closed as directed by the autonomic nervous system.

The internal sphincter in males, the bladder angle in females and the internal anal sphincter in both males and females serve the same function but are not under our voluntary control.

Obturator Internus Muscle (Hip Rotators)

Function to

- Rotate the legs out from midline
- Facilitate increased pelvic and urogenital diaphragm muscle tone
- Lengthen the adductors

Adductor Muscles (Inner thigh)

Function to

- Bring legs towards each other
- Facilitate pelvic and urogenital diaphragm muscle tone
- Lengthen to obturator internus muscle

Abdominal Muscles

During contraction they increase intraabdominal pressure which increases pressure on the bladder, pelvic and urogenital diaphragm muscles. Transverse abdominal muscle automatically contracts with the pelvic muscles facilitating their action. If chronically contracted, the breathing diaphragm cannot descend during inhalation and there is constant pressure on the bladder.

Gluteal Muscles

These are frequently tightened when attempting to contract the pelvic muscles. As a large muscle group they can overpower the pelvic muscles. Therefore, they need to be relaxed during most exercises related to incontinence.

Pelvic Muscle Isolation


Sit comfortably, squeeze to tighten the anus as if trying not to pass wind.

Then feel the sensation of the muscles. You should feel the muscle pulling inward and upwards.

Keep the tummy, bottom and thighs relaxed. The lower tummy may draw in gently as if pulling away from the zip of tight trousers.

Remember to maintain a normal breathing pattern.

Place your hand on your tummy/bottom to ensure they are relaxed.

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This is an exercise you should feel rather than see.

This is a learning process and takes practice. It is not always an easy task.

Practice until you are just isolating the pelvic muscles (Bladder and Bowel Foundation, 2008).

Practice

- Sit comfortably or lie on your bed.
- Relax into the support of the chair/bed.
- Let arms and legs go floppy and sink into the bed/chair.
- Breathe slowly, release and relax all muscles.
- Connect your mind to the hammock of pelvic muscles.
- Gently lift up and in to tighten the muscles, then release gently.
- Make sure tummy and bottom remain relaxed and you maintain your breathing (Hulme, 2012).

Kegal Pelvic Floor Muscle Exercises

Training Principles

1. Overload
2. Specificity
3. Maintenance
4. Reversibility
5. Motor control

Overload

For pelvic muscles to strengthen, they must be pushed to the limit and slightly beyond.

If over exercised they fatigue and tire and accessory muscles will try to compensate. Abdominal and gluteal muscles will activate.

If under exercised they are not challenged to increase in strength, endurance or speed. Length and resting tone remain the same.


Specificity

Pelvic muscles are made up of fast and slow twitch fibres in approximately a 35:65 ratio.

Some muscles have a combination of fast and slow twitch components.

Fast Twitch - Improve in speed and strength with quite explosive contractions. Fatigue quickly (Quick Flicks, 1-2 second rapid contraction and release, 5-10 reps adequate)

Slow Twitch - Strengthen and gain optimal resting length and tone with longer squeeze contraction (10 second hold, 10 second rest periods). Designed for endurance and postural tone, more repetitions possible before fatigue occurs.

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Maintenance

Exercising for continence as a lifelong endeavour. Integrate exercise into daily routine. Pelvic muscles need exercise to remain healthy.

Reversibility

After exercising and becoming dry, if you stop it will take 3 times as long for the pelvic muscles to return to their original strength as it did to reach the continent level of strength.

Example-3 months to continence. 9 months of not exercising to decrease tone and strength of pelvic floor muscles to again experience leaking.

Motor control

Exercise designed to improve functional activity involves exercising the muscle group using submaximal contraction of muscles, equal work and rest periods and low number of reps done several times a day. A consistent and effective exercise programme is an important commitment.

Roll for Control series is developed in four levels. The levels are designed to progress in body awareness, muscle fibre type, and level of difficulty. Work through the levels sequentially. Exercise length and duration is determined by initial evaluation of pelvic muscle function. In general start with 5-10 reps TDS, working up to 10 reps TDS (Hulme, 2012).

LEVEL 1 - Relaxes awareness of the pelvic muscles. Sets the stage for integrated body awareness and breathing with isolated pelvic muscle exercises.

LEVEL 2 - Assisted pelvic muscle tightening. Facilitates improved function of slow twitch, postural fibres of the pelvic diaphragm/levator Ani, obturator internus and adductors.

- Adductors/Inner thigh
- Obturator Internus/hip rotator
- Combination of both

LEVEL 3 Quick Flicks

Strengthens fast twitch fibres primarily of the urogenital diaphragm and external sphincter muscles. These fibres are important to prevent leaking on increased IAP (cough/sneeze).

LEVEL 4 Standing plie small knee bends

Facilitates pelvic rotator cuff action in functional activities.

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