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**Stomas, Ostomies, and Appliances:
Implications for Aquatic Therapy**

**Using an Underwater Exercise Bike:
Therapeutics and Fitness Combined**

**Implementing the
Burdenko Method With Children**

**Aquatic Therapy for
Individuals with Fibromyalgia:
A Look at a Literature Sample**

Aquatic Therapy Journal

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ATRI Mission Statement

The Aquatic Therapy & Rehab Institute, Inc. (ATRI) is a non-profit, educational corporation dedicated to the professional development of health care providers in the area of aquatic therapy. Offering educational courses, ATRI provides opportunities to advance the competencies, knowledge and skills of the aquatic therapist.

AEA Mission Statement

The Aquatic Exercise Association is a not-for-profit educational organization dedicated to the growth and development of the aquatic fitness industry and the public served.

On the Cover:

Learn more about utilizing the Burdenko Method with children in the article by Paula Ray and Terra Galloway, found on page 17.



Stomas, Ostomies, and Appliances: Implications for Aquatic Therapy

Sue Skaros, BA, BS, PA-C
 Sarah Lundeen, MSN, NP
 Charles Mathison, BSN, CWOCN
 Mary Otterson, MD, MS

In the exam room was a middle-aged woman returning to our clinic after having part of her bowel removed. She was adapting well to having a stoma, and felt “fine”, but still seemed a bit “down-in-the-dumps”. When asked what her biggest concern was about having a stoma, she replied, “I can’t go swimming anymore, and I really miss it!” Staff tried to reassure her she certainly could go swimming, but she continued to be skeptical. She was afraid her appliance (bag) might fall off, or she might leak material into the water. She said she would be “absolutely mortified” if this happened and was afraid to even try.

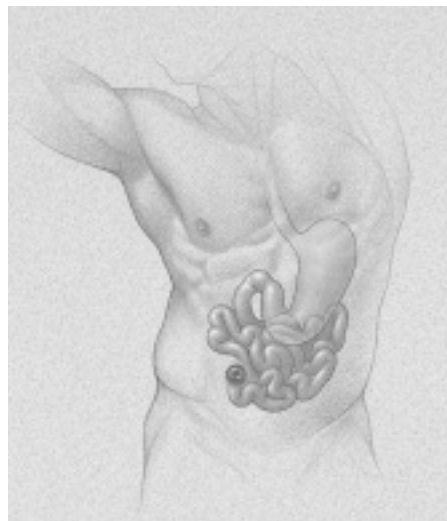
Her concerns are very real concerns. However, are they realistic? Can people with stomas engage in aquatic activities? What about clients with indwelling catheters or tubes? What are the risks? What if an appliance leaks? Worse yet, what if it falls off or comes out? Is it better to just avoid problems and have these individuals stay out of pool water? Or, is the fear greater than reality?

Stomas

A **stoma** is a surgically created opening in the skin to allow drainage of urine or fecal material. (See Figure 1*) It results from surgery to remove the urinary bladder, or part of the bowel because of disease or injury. The type of surgery an individual undergoes determines the appliance system which must be used in place of natural human anatomy. Once an appliance is functional, and all surgical sites are healed, an individual is expected to resume regular activities. While excretion of waste is no longer controlled by the individual, presence of an appliance which catches this waste allows them to be considered continent.

With a **urostomy**, urine no longer empties from the bladder. Instead, a section of small bowel is separated out to create a new bladder, and urine drains out of the stoma into a disposable appliance or collection bag. Some urostomies are continent, meaning they do not drain into a bag. Instead, they require periodic catheter insertion to empty the neo-bladder. Initially, there are bacteria in the urine from normal bowel flora, but within a very short time, unless there is an infection, urine in this bowel segment becomes sterile. Stool no longer enters this part of the bowel (Hollister, 2003). However, urine in the collection bag is considered contaminated.

With an **ileostomy** or **colostomy** stool is no longer evacuated through the rectum and anus. Instead, it is collected in a disposable appliance that must be periodically emptied. People with ileostomies and colostomies are unable to control the elimination process. They are, however, able to prevent spillage and leakage of fecal contents by using an appliance, thus having their elimination under control.



*Figure 1— Ileostomy Anatomy supplied courtesy of Hollister Incorporated, 2000 Hollister Drive, Libertyville, IL 60048-3781

An ileostomy involves fecal drainage from the last part of the small intestine. Evacuated material will be quite liquid. A colostomy drains fecal contents from the large bowel or colon. Because this is the part of the bowel where water is reabsorbed, evacuated matter will be less liquid, and thicker than that from the small intestine (Hollister 2003).

Every stoma is just a little bit different. Some protrude, others don’t. They should never be painful, but they should be bright pink and moist. Because of the significant blood supply to the bowel, they may bleed easily if bumped or rubbed. This is not abnormal, usually occurs in small amounts, and stops within a very short time. Of course, persistent or vigorous bleeding would necessitate a phone call to the client’s Wound, Ostomy and Continence Nurse (WOCN) or physician (Hollister, 2004).

Stomas are usually ready for immersion in water, whether bath or swimming, by the time the surgical wound has completely healed. However, a stoma **should not be immersed without first obtaining clearance from the surgeon**. All clients with fresh (less than two months old) stomas should obtain a release from their surgeon before engaging in aquatic activities. Open water activities (as opposed to pool-centered ones) should be undertaken with caution. The higher load of bacteria and parasites found in open water may preclude those individuals who are immunosuppressed or who have medical conditions, such as kidney failure which can predispose them to infection.

Appliances and Aquatic Participation

Appliances are devices used when normal anatomy is no longer able to perform its usual function. Prosthesis is

the term used when a device is used to replace a missing part of the anatomy. For the purpose of this article, the term “appliance” will be used for both conditions.

There are two main types of **pouching systems** used with stomas—One-piece system and Two-piece system. The one-piece system has the tape, skin, barrier, and pouch in layers and adheres directly to the skin. This system requires complete removal whenever the pouch needs to be changed. However, it can be emptied without removing the device. The two-piece system has a separate adherent skin barrier with a plastic flange on it. The pouch has a reciprocal flange, which allows it to be attached to the skin barrier, and it can be removed for changing without disrupting the skin barrier. This device can also be emptied without removing the pouch (Hollister, 2003).

In addition, there are disposable, temporary bags that can be used by clients who have continent stomas or drainage catheters, and choose not to, or cannot cover them with an occlusive dressing. Mini-bags and non-drainable low profile bags are also available, and might be preferable for aquatic activities. Pouches with built in filters for releasing gas need to be avoided for use during aquatic activities because they allow the drainage bag to fill with water, and cause effluent to leak back out through the filter. (Ostomy Association of Southwestern Indiana, 2006). People with ostomies, or their caregivers, are taught how to care for, empty, clean, and change their appliances before and after their surgical procedures (CaregiverPA, 2006).

Pouches may be **closed** and require removal and disposal, or **drainable** which can be emptied repeatedly. Drainable devices are designed for fecal systems using either a clamp or plastic fasteners and for urinary systems using a drain valve with or without an extension (Hollister, 2003). Draining these pouches immediately before entering the pool minimizes possibility of leakage. Depending upon how quickly the appliance fills, the client may need to leave the pool periodically to empty the bag. Usually, this would only be the

case for individuals with urostomies, as it is a known physiologic response that urine output is increased when people are immersed in water which is cooler than normal body temperature.

Catheters are another type of drainage system. Some clients may have a tube protruding from the stoma, such as a supra-pubic tube for draining the bladder, a gastrostomy tube into the stomach, or a jejunostomy tube into the small bowel. The last two of these are for nutrition purposes. These catheters may be capped when not in use. In addition, if these devices are very pliable, they can be covered with an occlusive dressing to keep them away from water exposure.

Indwelling catheters are considered to be contaminated. Bacteria most often associated with this contamination are usually opportunistic skin flora which, more often than not, pose more of a threat to the client than to others. However, individuals who have associated illnesses such as diabetes, kidney failure, or cancer, or are immunosuppressed may also have contamination with Methicillin Resistant Staphylococcus aureus (MRSA) and Pseudomonas species, which may cause problems to others in aquatic settings (Maki, 2001). For additional information on working with individuals with MRSA, please refer to Skaros, S. (2006). MRSA – Shark or Guppy? *Aquatic Therapy Journal*. 8(1), pp 11-15, February.

Ideally, rigid or non-pliable tubes should be removed, with the approval of the client’s physician, and the stoma covered with an occlusive dressing (Op-Site™ or Tegaderm™) before engaging in any aquatic activities. Another option is to have the client place the tube inside of an attached temporary ostomy appliance, creating a closed system while they engage in aquatic activities. If they cannot be covered or enclosed, clients should not engage in aquatic activities, including aquatic therapy.

Attempts to place non-pliable devices under an occlusive dressing may involve folding the catheter, causing pressure on the bladder, stomach, or bowel wall. This can cause spasming and extrusion

of infected matter around the catheter into the water, as well as erosion of catheter tip and balloon into the wall, with subsequent bleeding. In addition, every time the drainage system is opened to disconnect the catheter from a drainage bag, bacteria are reintroduced into the system causing more contamination (WOCN, n.d.). Simply wrapping an occlusive dressing around the catheter where it enters through the skin is insufficient to reduce spread of potentially infectious material into the water. Therefore, clients who cannot remove these catheters or place them inside of an ostomy appliance adhering directly to the skin, should not participate in aquatic activities.

Aquatic Pre-participation Precautions

Clients with stomas can take precautions to minimize likelihood of having a leak. **After changing the flange**, at least several hours, preferably overnight, should lapse before engaging in aquatic activities. This allows adequate adherence of the adhesive substance to the skin. The flange can be reinforced with waterproof tape if the client is still concerned about leakage. An **optional belt** may be added to many appliances which will keep the appliance close to the body. Rubber belts are preferable to cloth ones as cloth belts have a tendency to stretch when wet (Ostomy Association of Southwestern Indiana, 2006). A **pouch cover** can be worn to help disguise the pouch, in addition to keeping it close to the body (Hollister, 2003). Wearing a **second swim suit** or a **tighter undergarment**, such as biking shorts or a stretch panty girdle, under a swim suit can help hold the appliance in place, and reduce chance of it falling off. However, undergarments should not be tight enough to restrict flow of effluent into the bag (Ostomy Association of Southwestern Indiana, 2006).

Male clients might consider wearing a boxer-style suit with an added appliance pouch on the inside. Females should choose suits made of “busy” patterned fabric with ruffles, sashes, or bows to help camouflage the presence of an appliance (Ostomy Association of Southwestern Indiana, 2006).

Other tips include—

- Clients should not eat or drink for several hours before engaging in aquatic activities as this will increase fecal output. At the least, they should refrain from chewing gum, drinking carbonated beverages and beer, or drinking through a straw within two hours of going in the water because this will increase gas output, and cause the bag to fill more quickly.
- Clients who have concerns about odor from their bags can consider using some mint mouthwash (not red as this can look like blood) or Certs™ in the pouch (Ostomy Association of Southwestern Indiana, 2006).
- Clients should empty their pouch when it is 1/3 to 1/2 full, making sure to clean off the outside of drainage tabs before resealing (Hollister, 2003). This should be done even if it means briefly leaving the pool during aquatic activity.
- Female clients should consider wearing a “tankini” or two-piece type of suit to allow for ease of “burping” the collection bag if it fills with gas.
- Clients with colostomies should, if possible, irrigate their ostomies in order to remove accumulated fecal matter prior to entering the water.
- Remember, heat and exposure to water will shorten life of the skin barrier, requiring more frequent changing (Ostomy Association of Southwestern Indian, 2006).
- Skin barriers require changing at least every seven days—more often if there are skin problems, liquid effluent, or in warm, humid environments.
- Soaps which may interfere with the adhesives should be avoided. The client’s WOCN is a good resource regarding this concern.
- Clients should keep a spare appliance with them in case of problems.
- If the skin appears red, becomes painful, or the appliance is not staying attached, the WOCN or physician should be contacted for advice and care (Hollister, 2003).

Following these few hints will help the client feel more secure and comfortable with their aquatic experience, and minimize risk of an adverse event.

Contraindications to Aquatic Activity

When is aquatic activity, including aquatic therapy, contraindicated for clients with stomas or tubes? Even though chlorine, ozone, and bromine are effective disinfectants, not all potential pool contaminating organisms are able to be destroyed in a timely manner (MMWR, May 25, 2001). Therefore, before answering this question, several factors need to be considered—

- What kind of facility is involved? Large, small, indoor, outdoor, open water, or pool? There is far less risk of infection in a large community size swimming pool than in a small therapy pool, as the larger quantity of water dilutes contaminants. Open water facilities are more likely to have larger quantities of bacteria and parasites than are pool facilities, thus posing a risk of infection for individuals with appliances.
- What is the temperature of the water? There is far less risk of infection with minimal exposures in regular use pools with cooler water temperatures than in therapy pools with warm water temperatures.
- Is the client continent? If not, can their incontinence be confined and controlled by an appliance?
- Can the client, or their caregiver, be compliant with good stoma hygiene and care?
- Are clients with stomas or catheters being held to the same hygiene standards as anatomically intact clients? “Normal” clients can experience episodes of fecal incontinence when passing flatus (gas). Individuals may pass small amounts of urine either in or out of the water. Babies, prior to being toilet-trained, are participating in infant swim programs even though they have no control over their bowel or bladder functions. So, if no effort is being made to check for “skid marks” and yellow stains on the underwear of anatomically intact individuals, the same standard of continence must apply to those with stomas and catheters.

Taking the above questions into consideration, when are aquatic activities, including aquatic therapy, contraindicated? These criteria apply to all individuals,

not just those with stomas or catheters. Aquatics is contraindicated for anyone—

- who has had recent open surgery (having an incision and open wound), and has not been released by his or her surgeon.
- with open sores, open wounds, or active skin infections.
- with skin breakdown—areas where the skin is red, raw, and painful.
- with active infection and/or fever involving any body system.
- with diarrhea, defined as other than normal, healthy fecal output of an individual with a small bowel stoma and appliance, whether or not it may be infectious (Healthy Swimming, 2006).
- who is incontinent of either feces or urine—even if they wear diapers. Individuals with properly functioning appliances are considered to have continence under control. Diapers are not designed for exposure to large amounts of water that aquatics participation provides. They are inadequate for preventing spills and leaking when soaking wet, even with a rubberized outer pant (CDC, 2002).
- who require an indwelling catheter which cannot be covered by an occlusive dressing or temporary appliance, and/or in whom covering results in possible injury to the client.

Putting It All Into Perspective

The biggest problem an individual with a stoma or catheter faces is their own self-esteem. Initially, they live in constant fear of “being different” and/or having the appliance fall off or leak. In reality, a well-fitted appliance is very secure. If clients are reluctant to participate in aquatic activities, they might be encouraged to observe pool activity while dressed in their pool attire. Advising them to spend a little extra time shopping for clothing which will be “just right” can go a long way in helping them to adjust to engaging in aquatic activities. There are many resources available on the internet, as well as through their WOCNs, which can be of great help in addressing their concerns.

While changes in weight, certain soaps and lotions, and improper application



of the skin barrier can predispose clients to have accidents, once they become used to the device, there are few problems. Experts at ConvaTec (Bristol-Meyers, Squibb, 2005) even note risk of having an appliance fall off in water is extremely small. Most adhesives have been designed to not only be secure in water, but also bond more tightly when exposed to water. Additionally, they state, "You could dive in the water off the highest diving board and your bag will stay in place—your shorts may come down, but the bag won't!" (ConvaTec, 2005, Chapter 12). However, the authors advise against trying this.

With today's adhesives and appliances, risk of leakage is even less likely. Making sure the appliance fits well and is properly applied is a major step in preventing leakage. Reinforcing the skin barrier with water proof tape, wearing a belt, pouch cover, and close fitting garments, frequent emptying of the bag,

and immaculate skin care are key to maintaining a continent appliance. The more experience and positive results stoma and catheter users have, the more their self-esteem will grow and their fears lessen.

Should the worst possibility, a large leak or an appliance falling off with fecal exposure, occur, decontamination of the facility should be undertaken following Centers for Disease Control and Prevention (CDC) guidelines, under supervision of the facility's certified pool operator (MMWR, 2001). Anatomically intact participants who fail to take a naked, hot, soapy shower before entering the water are constantly depositing, into the water as they swim, small amounts of fecal matter which has adhered to their bottoms. This poses a far greater, and more frequent threat of pathogenic exposure than does an occasional, rare, small leakage incident from a client with a stoma or catheter (CDC, 2006).

Conclusion

Individuals with stomas are far less likely to cause contamination of swimming and therapy pools than are those who are anatomically intact. Concerns about clients with stomas, catheters, and tubes are generally unfounded. Because anatomical differences of individuals with stomas are visible, they cause concern. But, in reality, with only a few exceptions, individuals who have these appliances are not only quite able to participate in aquatic activities, but also pose no risk to themselves or others while doing so. In fact, aquatic participation, including aquatic therapy for other conditions, can be most beneficial. Participation in aquatics, particularly for someone who has always enjoyed water activity, is part of the normalization process. Aquatic activity improves overall fitness, including strengthening of abdominal muscles, important for support of internal organs. Gastrointestinal system function is improved through



Your reading and study of **Stomas, Ostomies, and Appliances: Implications for Aquatic Therapy** by Skaros, et. al. can result in 2 ICATRIC/AEA approved CECs. First, study the article. Then complete the study guide assignments as described below. Send your completed assignment and the course fee to Aquatic Consulting & Education Resource Services, 7252 W. Wabash Avenue, Milwaukee, WI 53223.

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ACERS #ATJ503/AEA #6832 H
CEC Study Guide

Assignment Preparation – All assignments must be typed. Handwritten material will not be accepted. Start with a cover sheet including your name, mailing address, phone, e-mail address, and CEC article title. Then, begin another sheet of paper and answer the following questions/complete the following applications. If answering a question, state the question prior to supplying the answer. If documenting an application, state the application requirement and then provide your response.

Comprehension –

1. What is a stoma?
2. Following surgery, when can an individual with a stoma go swimming?
3. What types of aquatic venues pose least risk to an individual with an appliance?
4. What type of collection bag is recommended for aquatic participation?
5. Related to aquatic participation, when should an individual be advised to drain and/or change their appliance?

Application –

List 10 hints to give an individual with an appliance to facilitate aquatic participation.

regular exercise. To exclude individuals with stomas from the aquatic environment without evidence of a real contamination risk, would be unfounded and discriminatory. ♦

References

- CaregiverPA. (2006). **Personal Care Skills Development: Ostomy Care.** Philadelphia, PA: Pennsylvania Department of Aging. <http://caregiverpa.psu.edu/manual/text/s5-13-ostomy.htm>. January 22.
- Centers for Disease Control. (2002). **Questions and Answers for Aquatic Staff.** Atlanta, GA: CDC, Division of Parasitic Diseases. <http://www.cdc.gov/healthyswimming/faq/operators4.htm>. June 4.
- _____. (2001). Responding to Fecal Accidents in Disinfected Swimming Venues. *Morbidity and Mortality Weekly Report.* 50(20),416-417. May 25.
- _____. (2002). **Healthy Swimming: Why is Diarrhea in the Pool a Problem?** Atlanta, GA. <http://www.cdc.gov/healthyswimming/faq/operators2.htm>. June 4.
- _____. (2002). **Healthy Swimming: Questions and Answers for Aquatic Staff; What Do I Need to Know About Swim Diapers and Pants?** Atlanta, GA. <http://www.cdc.gov/healthyswimming/faq/operators4.htm> June 4.
- _____. (2001). Prevalence of Parasites in Fecal Material From Chlorinated Swimming Pools – United States 1999. *Morbidity and Mortality Weekly Report.* 50(20),411. May 25.
- Convatec. (2005). **Living with a Colostomy: The Interactive Colostomy Lifestyle Website.** Bristol-Meyers Squibb 1999-2005, Chapter 12, 18. <http://www.ostomysupport.info/leak.html>.
- Healthy Swimming. (2006). **Fecal Accident Response Recommendations for Pool Staff.** Atlanta, GA: Centers for Disease Control. www.healthyswimming.org. January, 20.
- Hollister. Inc. 2003). **Ileostomy: What's Right for Me?** Libertyville, IL: Hollister Incorporated.
- _____. (2004). **Managing Your Ileostomy.** Libertyville, IL: Hollister Incorporated.
- _____. (2003). **Urostomy: What's Right for Me?** Libertyville, IL: Hollister Incorporated.
- Maki, D. and Tambyah, P. (2001). Engineering out the Risk for Infection with Urinary Catheters. *Emerging Infectious Diseases.* 7(2), 342-346. March/April.
- Ostomy Association of Southwestern Indiana. (2006). **Hints and Tips.** Evansville, IL: Evansville Ostomy Chapter. <http://www.ostomy.evansville.net/hints.htm>. January 16.
- Wound, Ostomy, and Continence Nurses Society. (n.d.) **Clinical Fact Sheet: Indwelling Catheters.** Glenview, IL: <http://www.wocn.org>.

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Feature Column: Pool Problems

Chlorine Smell

Alison Osinski, Ph.D.
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Question: *Why do some pools smell like chlorine? Is there really too much chlorine in the water?*

Answer: *Chloramines*

Chlorine is a yellowish-green gas made by passing an electrical current through a solution of salt water. Chlorine is the

17th atomic element and a member of the family of elements known as halogens. Chlorine is highly reactive, and found in nature only in combination with other products. It is neither flammable nor explosive, but chlorine is combustible if it reacts with other incompatible materials. Chlorine gas is a respiratory irritant, about 2.5 times heavier than air, and can be deadly if

you are exposed to high concentrations in the air.

Interestingly though, today few pools actually use chlorine for sanitation and oxidation, and the odor most bathers associate with swimming pools is not chlorine. In addition to elemental chlorine gas, there are five chlorine compounds commonly used for pool water