

Gary Landry

From: Ihsan Azzam
Sent: Monday, June 22, 2015 3:18 PM
To: Gary Landry
Cc: Jeffrey Green; Adam Higginbotham; Marta E. Jensen; Linda C. Anderson; Martha Framsted
Subject: RE: Fish Manicure/Pedicure Information

Dear Mr. Landry

Thank you very much for referring this important question to us. Over the past several years the Nevada Division of Public and Behavioral Health (DPBH) received many inquiries regarding this unhealthy "cosmetic" procedure known as the "Fish Manicure/Pedicure." As you know this procedure involves customer/s placing hands/feet in a hand/foot bath in which fish eat "dead" skin tissues on the customer's hands/feet. The concern is : does such a cosmetic procedure meet the most elementary standards of public health conventional practices? And - Is it reasonably safe to be offered in Nevada to customers in cosmetology establishments?

In order to explore potential answers to the above concerns, the DPBH conducted literature reviews, consulted with staff from the National Council of State and Territorial Epidemiologists (CSTE), and networked with several public health professionals in neighboring states. Based on this research it appears that this procedure does not meet even the most elementary disinfection concepts of antisepsis and asepsis, is grossly inadequate for human use, and it may pose an unnecessary risk to the customers, and could present a threat for public health and disease control activities. Our aim is to fully protect the health and safety of the public by carefully considering the potential risk of services and communicating those risks to cosmetology practitioners and the public. We also encourage cosmetologists who are planning to practice fish manicure/pedicures to seek and provide documentation indicating that fish used for this procedure are disease-free of potentially transmissible pathogens that could pass from fish to customers and vice-versa; especially that obtaining and verifying such documentation is proven to be a very challenging task. However, assuming that the fish were originally disease-free and did not carry any biological agents (i.e. viruses, bacteria, parasites), just by using the same group of fish for multiple times (more than once without the ability to "disinfect" them) on different customers will ultimately expose the fish itself to infections (assuming that the fish was not already infected) from the customer feet and may pose an increasing risk for a vector-borne transmission of pathological agents causing infectious diseases to subsequent clients.

Additionally, the multiple uses of live fish does not allow for the hand/foot baths and the holding fish tank to be adequately cleaned and disinfected in between clients; posing an increasing risk for disease transmission through direct contact with contaminated surface/s and/or water.

In order to prevent disease transmission, all equipment used in cosmetic pedicures must be properly sanitized and disinfected before and after services on each client. If sanitation or disinfection cannot be achieved, single-use tools should be discarded after a service on one single client. In the fish manicure/pedicure procedure/s animals are regarded as tools and subsequently should be subject to sanitization. Fish, however, are vertebrates and are not tools or cosmetic equipment that we can sterilize or disinfect. Appropriate care for the skin of the hands and feet requires that all tools and equipment be properly sanitized, disinfected or disposed of after use on each client. Due to the inability to meet these requirements and in order to protect consumers from the possibility of infection and contracting a communicable disease we recommend against the use of fish pedicures.

It is important to emphasize that not all foot (skin) infections are obvious to the naked eye or clinically manifest. Additionally, not all foot lesions are infectious. Allergies, eczema or psoriasis may appear threatening but are not infectious. On the other hand infectious fungal diseases such as athlete's foot and other infections such as methicillin-resistance staphylococcus aureus (MRSA) skin infections are common foot diseases that may have non-threatening appearances but could be extremely challenging for a cosmetician to identify. Furthermore, diabetics and individuals with compromised immunity could be more susceptible for contracting communicable diseases through a fish-manicure/pedicure and such a "high-risk" cosmetic procedure may increase their risk for infections.

It is a public health responsibility to protect the people from potentially unsafe and unsanitary procedures performed in cosmetology or any other establishments including healthcare settings and facilities. Procedures such as the fish manicure/pedicure are relatively new procedures and currently we don't have any national or international population-based data to evaluate the many potential negative health outcomes that could be associated with their use. However, due to the fact that such procedures are not amenable to existing effective sanitization practices, they will certainly pose potential risks to the health and safety of customers.

Should you have any additional questions, please do not hesitate to contact me.

Thank you again and have a great day

Ihsan A. Azzam

Ihsan A. Azzam, PhD, MD, MPH
Nevada State Medical Epidemiologist
4126 Technology Way, Suite 200
Carson City, Nevada 89706

IAzzam@Health.NV.Gov

Phone: (775) 684-5946
Fax: (775) 684-5999

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From: Gary Landry
Sent: Wednesday, June 17, 2015 11:57 AM
To: Ihsan Azzam
Cc: Jeffrey Green; Adam Higginbotham
Subject: Fish Manicure/Pedicure Information

Dear Dr. Azzam,



Nevada State Board of Cosmetology
Item 10 – Petition to Appear – Fish Pedicure
August 3, 2015

Executive Summary	Lior Hansen, through legal counsel from Jennifer Gaynor and Greg Gemignani, is requesting an advisory opinion or declaration allowing Garra rufa fish pedicures in the State of Nevada.
Legislative History	Assembly Bill 171 to allow fish pedicures in the State of Nevada was presented to the Nevada Board of Wildlife Commission, Special Commission Meeting on Legislation on April 6, 2009. Commissioner Lurie moved to oppose AB 171, Commissioner Wallace seconded the motion. The motion to oppose the legislation was passed unanimously.
Mission Statement	The mission of the Nevada State Board of Cosmetology is to protect the public health, safety and welfare through education and insuring only qualified persons are granted licenses to perform cosmetology in the State of Nevada and that all areas where cosmetology services are provided are kept clean, sanitary and safe.
ABC News – May 16, 2012 Fish Pedicures: Bacteria in Your Foot Soak	<p>Scientists began to get indications of the kinds of microbes that could be bathing fish spa patrons' feet in April 2011, when British authorities investigated a reported bacterial outbreak among 6,000 Garra rufa fish imported from Indonesia to British salons and pedicure spas. Tests revealed the fish had been infected with Streptococcus agalactiae (group B Streptococcus), bacteria that can cause pneumonia and serious infections of the bones, joints and blood in people of all ages and life-threatening infections in newborns.</p> <p>Last spring, British fish inspectors went to London's Heathrow Airport and intercepted Indonesian shipments of the silver, inch-long freshwater carp destined for British "fish spas." Sampling and testing revealed those fish carried strains of several bacteria that could cause soft tissue infections, including Vibrio vulnificus, Vibrio cholerae and S. agalactiae. The strains were resistant to many important antimicrobial medications, including tetracyclines, aminoglycosides (drugs like gentamicin, neomycin and streptomycin), said Verner-Jeffreys, an aquaculture health specialist with the Center for Environment, Fisheries and Aquaculture Science, Weymouth Laboratory in Weymouth, England.</p> <p>The bacteria findings appear today in Emerging Infectious Diseases, a journal published by the federal Centers for Disease Control and Prevention in Atlanta, which has been monitoring</p>



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	<p>health effects associated with fish pedicures.</p> <p>More than 10 states have banned the practice for a variety of reasons, the CDC said, including the inability to sufficiently clean fish pedicure tubs between patrons; the impossibility of disinfecting or sanitizing live fish; regulations that specify fish in a salon must be kept in an aquarium, and a humanitarian justification that to entice the fish to feed on dead human skin, they must be starved "which might be considered animal cruelty."</p>
<p>CDC – May 17, 2012 Fish Pedicures and Fish Spas</p>	<p>Each state has the authority to ban fish pedicures. Currently, over 10 states have banned the use of fish pedicures. Most of the bans are based on at least one of the following reasons:</p> <ul style="list-style-type: none"> • The fish pedicure tubs cannot be sufficiently cleaned between customers when the fish are present. • The fish themselves cannot be disinfected or sanitized between customers. Due to the cost of the fish, salon owners are likely to use the same fish multiple times with different customers, which increases the risk of spreading infection. • Chinese Chinchin, another species of fish that is often mislabeled as Garra rufa and used in fish pedicures, grows teeth and can draw blood, increasing the risk of infection. • According to the U.S. Fish and Wildlife Service External Web Site Icon, Garra rufa could pose a threat to native plant and animal life if released into the wild because the fish is not native to the United States. • Fish pedicures do not meet the legal definition of a pedicure. • Regulations specifying that fish at a salon must be contained in an aquarium. • The fish must be starved to eat skin, which might be considered animal cruelty.
<p>Daily Mail – October 18, 2009 Fears fish foot spa pedicures could spread HIV and hepatitis C</p>	<p>Fish foot spa pedicures could spread diseases such as HIV and hepatitis C, health experts have warned.</p> <p>The government's Health Protection Agency said those with diabetes, psoriasis or a weak immune system are particularly vulnerable and should not take part in the beauty craze at all. In new guidance to be published today, they said the risk of infection for users of the increasingly popular treatment, in which dozens of tiny fish nibble dead skin from customers' feet,</p>



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Ecouterre.com – May 8, 2012
Fish Pedicures Could Cause
Serious Bacterial Infections,
Warns CDC

is 'low but could not be completely excluded'.

It's official: Fish pedicures aren't just a bizarre beauty ritual with shady animal-welfare considerations, they're also downright dangerous to your health, according to the U.S. Centers for Disease Control and Prevention. On Wednesday, the federal agency published a report by U.K.'s Centre for Environment, Fisheries & Aquaculture Science, which examined the types of bacteria associated with *Garra rufa*, an inch-long toothless carp that nibbles away at dead skin. Native to Southeast Asia, the so-called "doctor fish" soared in popularity in 2008, when salons across the nation began offering them as an alternative to razors for scraping away calluses.

The ick factor was one thing, but public-health officials also cautioned against the procedure, citing the risk of dangerous skin and soft-tissue infections for people with open sores, skin cuts, underlying medical conditions such as diabetes, and compromised immune systems as a result of AIDS, cancer, or advanced age.

But although the warnings led at least 14 states, including California, Florida, and Texas, to ban fish pedicures, actual data regarding the bacteria carried by the fish has been slim—till now, at least. "Our study identified some of the species of bacteria associated with this fish species, including some that can cause infections in both fish and humans," lead researcher David Verner-Jeffreys told a wire service.

Water, he added, is a fertile breeding ground for all manner of nasties. Couple that with bacteria living on fish scales or waste and the tiniest cut could make the risk of infection a reality. In April 2011, a bacterial outbreak among 6,000 *G. rufa* imported from Indonesia to British salons and spas revealed colonies of *Streptococcus agalactiae*, a group of bacteria that can lead to sepsis, meningitis, or pneumonia.

"The [strep] strain we isolated typically only causes disease in fish," Verner-Jeffreys said. "We then went on to look at other consignments of apparently healthy imported *G. rufa* and found some other species of bacteria that can cause disease in humans and fish."

These bacteria included *Aeromonas*, which causes wound



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	<p>infections and gastrointestinal problems in humans, and Mycobacteria, which Verner-Jeffrey’s team recognized as responsible for skin infections in some pedicure clients in the United Kingdom. Worse, the researchers found that most of the bacteria were resistant to multiple drugs.</p> <p>“To date, there are only a limited number of reports of patients who might have been infected by this exposure route,” the report reads. “However, our study raises some concerns over the extent that these fish, or their transport water, might harbor pathogens of clinical relevance.”</p>
<p>U.S. News and World Report – June 14, 2012 Pedicure or Pedicure? Proceed with Caution</p>	<p>4. Don't feed your feet to the fish. The trend of using so-called "doctor fish" to eat up dead skin on people's feet is one you might want to skip—if your state hasn't already banned the practice. A letter published this month in Emerging Infectious Diseases found that these fish, imported from Asia to salons in the United Kingdom, carried a range of potentially dangerous bacteria.</p>
<p>Dr. Ihsan A. Azzam Nevada State Medical Epidemiologist</p>	<p>In an email sent to Gary K. Landry, Executive Director of the Nevada State Board of Cosmetology, dated June 22, 2015, Dr. Azzam states “in order to protect consumers from the possibility of infection and contracting a communicable disease we recommend against the use of fish pedicures”</p>
<p>NRS 644.110</p>	<p>NRS 644.110 Regulations. The Board shall adopt reasonable regulations: 1. For carrying out the provisions of this chapter.</p>
<p>NRS 644.120</p>	<p>NRS 644.120 Regulations governing sanitary conditions. 1. The Board may adopt such regulations governing sanitary conditions as it deems necessary with particular reference to the precautions to be employed to prevent the creating or spreading of infectious or contagious diseases in the practice of hair braiding, in establishments for hair braiding, in the practice of a cosmetologist, in cosmetological establishments or schools of cosmetology, in the practice of threading and in any facility in this State in which threading is conducted. 2. No regulation governing sanitary conditions thus adopted has any effect until it has been approved by the State Board of Health.</p>
<p>NRS 644.472</p>	<p>NRS 644.472 Unlawful for animal to be on premises of licensed establishment for hair braiding or cosmetological establishment; exception. 1. Except as otherwise provided in subsection 2, it is unlawful for any animal to be on the premises of a licensed establishment</p>



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	<p>for hair braiding or cosmetological establishment.</p> <p>2. An aquarium may be maintained on the premises of a licensed establishment for hair braiding or cosmetological establishment.</p>
NAC 644.340	<p>NAC 644.340 Sanitizing and infection control solutions; instruments, implements and other tools; sterilization equipment; disposable articles; single-use items. (NRS 644.110, 644.120)</p> <p>1. In each cosmetological establishment or school of cosmetology:</p> <p>(a) Sanitizing and infection control solutions must be available for immediate use at all times and must be registered with the Environmental Protection Agency as a bactericide, fungicide or virucide.</p> <p>(b) All instruments, implements and other tools must be cleaned and disinfected in the following manner before use:</p> <p>(1) All hair and other adherent foreign material must be removed from the instrument, implement or other tool; and</p> <p>(2) The instrument, implement or other tool must be:</p> <p>(I) Thoroughly washed with soap and hot water;</p> <p>(II) Rinsed in clear hot water; and</p> <p>(III) Placed in a covered wet sanitizer which is large enough for complete immersion of the instrument, implement or other tool, and which contains an infection control solution that is registered with the Environmental Protection Agency and approved by the Board. During each service, all instruments, implements and other tools must be kept free of contamination by immersion in an infection control solution approved by the Board.</p> <p>(c) All disinfected instruments, implements and other tools that are not in use and not in the process of wet disinfection in a wet sanitizer must be stored in a clean, dry sanitizer. A dry sanitizer consists of a clean, closed container, drawer or storage unit with a fumigant that contains only disinfected instruments, implements and other tools.</p> <p>(d) Any instrument, implement or other tool dropped on the floor or otherwise made unsanitary must be deposited in a separate labeled container for soiled articles only and must not be used until it has been thoroughly disinfected as specified in paragraph (b). A container for the disinfectant used that includes the manufacturer's label must be available at all times in the cosmetological establishment or school of cosmetology.</p> <p>(i) Single-use items must not be used on more than one client and must be disposed of after use on a client.</p>



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	(j) All single-use items and other items that cannot be disinfected must be stored in closed containers at all times while not in use.
Staff's Recommendation	Based on the numerous warnings from the Center for Disease Control, the U.K. Health Protection Agency, the U.K. Centre for Environment, Fisheries & Aquaculture Science, and the recommendations from Dr. Azzam, State of Nevada Epidemeologist coupled with the cited laws and regulations found in NRS 644 and NAC 644 the Board staff recommends denial of the petition to approve the use of Garra rufa fish and the practice of fish pedicures in the State of Nevada.



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Fish Pedicures and Fish Spas

What is a fish pedicure?

A fish pedicure, also known as a fish spa, involves patrons dipping their feet in a tub of water filled with small fish called *Garra rufa*. *Garra rufa* are sometimes referred to as “doctor fish” because they eat away dead skin found on peoples’ feet, leaving newer skin exposed.

Garra rufa are native to the Middle East, where they have been used as a medical treatment for individuals with skin diseases, like psoriasis (1) (#one). One study has illustrated the effectiveness of fish pedicures in the treatment of psoriasis; however, this treatment was performed in a controlled setting at a medical university in Austria, not at a nail salon (2) (#two).

CDC is not aware of any published reports on illnesses resulting from fish pedicures. Nail salon foot baths, however, have caused outbreaks of nontuberculous mycobacterial infections that left infected pedicure customers with boils and scars (3) (#three).

Why have some states banned the use of fish pedicures?



Each state has the authority to ban fish pedicures. Currently, over 10 states have banned the use of fish pedicures.

Most of the bans are based on at least one of the following reasons:


- The fish pedicure tubs cannot be sufficiently cleaned between customers when the fish are present.
- The fish themselves cannot be disinfected or sanitized between customers. Due to the cost of the fish, salon owners are likely to use the same fish multiple times with different customers, which increases the risk of spreading infection.
- Chinese *Chinchin*, another species of fish that is often mislabeled as *Garra rufa* and used in fish pedicures, grows teeth and can draw blood, increasing the risk of infection.
- According to the U.S. Fish and Wildlife Service (<http://www.fws.gov/>) (1) (#one) (<http://www.cdc.gov/Other/disclaimer.html>), *Garra rufa* could pose a threat to native plant and animal life if released into the wild because the fish is not native to the United States.
- Fish pedicures do not meet the legal definition of a pedicure.
- Regulations specifying that fish at a salon must be contained in an aquarium.
- The fish must be starved to eat skin, which might be considered animal cruelty.

Resources

- Verner-Jeffreys DW, Baker-Austin C, Pond MJ, Rimmer GSE, Kerr R, Stone D, et al. Zoonotic disease pathogens in fish used for pedicure [letter]. (http://wwwnc.cdc.gov/eid/article/18/6/11-1782_article.htm) Emerg Infect Dis. 2012;18(6).
- Health Protection Agency Fish Spa Working Group. Guidance on the management of the public health risks from fish pedicures: draft for consultation. (http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317131045549) (2) (#two) (<http://www.cdc.gov/Other/disclaimer.html>) London: Health Protection Agency; 2011.

- USEPA/ CDC. Preventing Pedicure Foot Spa Infections (<http://www.epa.gov/oppo0001/factsheets/pedicure.htm>) 
(<http://www.cdc.gov/Other/disclaimer.html>)
- USEPA. Recommended Cleaning and Disinfection Procedures for Foot Spa Basins in Salons (http://www.epa.gov/oppo0001/factsheets/footspa_disinfection.htm) 
(<http://www.cdc.gov/Other/disclaimer.html>)

References

1. Undar L, Akpınar MA, Yanıkoglu A. "Doctor fish" and psoriasis. *Lancet* 1990;335:470-1.
2. Grassberger M, Hoch W. Ichthyotherapy as alternative treatment for patients with psoriasis: a pilot study. (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1697753/?tool=pubmed>) 
(<http://www.cdc.gov/Other/disclaimer.html>) *Evid Based Complement Alternat Med.* 2006;3(4):483-8.
3. Vugia DJ, Jang Y, Zitek C, Ely J, Winthrop KL, Desmond E. Mycobacteria in nail salon whirlpool footbaths, California. (http://wwwnc.cdc.gov/eid/article/11/4/04-0936_article.htm) *Emerg Infect Dis.* 2005;11(4):616-8.

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Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA
30329-4027, USA
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [Contact CDC-INFO](#)



Main Office:

STATE OF NEVADA
Board of Cosmetology
1785 E. Sahara, #255
Las Vegas, Nevada 89104
(702) 486-6542
Fax (702) 369-8064



Branch Office:

STATE OF NEVADA
Board of Cosmetology
4600 Kietzke Lane, Bldg O Suite 262
Reno, Nevada 89502
(775) 688-1442
Fax (775) 688-1441

WWW.COSMETOLOGY.NV.GOV
COSMO@NVCOSMOBD.NV.GOV

Nail Salon Safety Guide

A manicure or pedicure should be a wonderful, relaxing experience for everyone to indulge in. Since there are sequential consumers contacting the warm, moist environment of a manicure or pedicure service, we would appreciate your assistance in keeping sanitation practices diligent and infection control practices followed. We want to keep Nevada safe from bacterial skin infection outbreaks that have harmed hundreds of customers of nail salons in other states. We are thankful that Nevada has avoided these outbreaks. We want to keep it that way, but we need your help. We have an active public education campaign that highlights nail salon safety, health, and infection control. For detailed information on all aspects of cosmetology and salon safety you should visit our website www.cosmetology.nv.gov.

Nail Technology is one of six individual branches of cosmetology licensed and regulated in Nevada. The other five are Aesthetics, Electrology, Demonstrators of Cosmetics, Hair Braiding, and Hair Design. We also license Cosmetologists, who are authorized to practice all branches of cosmetology (except electrology).

Nail Technologists are licensed practitioners who may provide the following services in a licensed salon:

- a. Care a of consumer's fingernails or toenails
- b. Beautification of a consumer's nails
- c. Massage of a consumer's hands, forearms, feet, or lower legs

Look for Licenses

Salons are required to post a facility license in plain view of the public. Nail technologists are required to display their licenses in plain view of the public at the position where the nail technologist performs his or her work. These licenses must be posted in public view and cannot be photocopies. The license issued by the Nevada State Board of Cosmetology has the name and recent photo of the licensee printed on the license.

Unlicensed salons and unlicensed nail technologists servicing nails on the public are illegal and prohibited by Nevada Law.

Disinfect or Dispose

After washing with soap, nail technicians are required to take the following steps between each customer:

- Clean and disinfect tools approved for reuse, or
- Dispose of tools not approved for reuse

It is prohibited for salons to keep a customer's nail files, buffer blocks, cuticle sticks, sanding drums, sanding wheels, bands, or any other tool.

Safety in the nail salon

Sandal season is year round in Nevada, and you may be tempted to rush to your favorite salon for a foot soak and pedicure so that your feet will look their best. But it's important to be vigilant as you sit in the pedicure chair — your health and safety may depend on it. Spas and salons are where we go to feel relaxed and pampered — stress and worry are not supposed to be part of the picture, especially when the concern is infection, which is exactly what can happen if these facilities don't maintain sanitary conditions as required by health and safety regulations. Lurking in the depths of that foot spa may be bacteria, fungal strains, and even far more dangerous microorganisms that typically thrive in warm, moist environments. The screens and tubes of foot spas are particularly good places for bacteria to collect and grow, often forming dense layers of cells and proteins called biofilms, which can be very hard to remove. If open sores or skin wounds are present (including insect bites, scratches, scabbed-over wounds, or any condition that weakens the skin barrier) this gives the germs a pathway into the body.

In October 2000, California health officials received complaints about a large outbreak of skin boils from customers who soaked their feet in foot spas as part of their pedicure services. It was determined that the boils were caused by contaminated whirlpool foot spas that had not been properly cleaned in a California nail salon. Officials with the Centers for Disease Control swabbed 30 footbaths in 18 nail salons from five California counties and found mycobacterium in 29 of the 30 samples, according to a CDC abstract published in 2005.

At particular risk are those with diabetes. According to WebMD, if you're diabetic you need to take extra precautions when getting foot treatments. Any break in the skin (including ones caused by callous removal or aggressive cuticle cutting) can let in bacteria, leading to infection.

The Nevada State Board of Cosmetology, which licenses nail technicians and nail salons and enforces the State laws covering the beauty industry, has found that the most common violations found in nail salons include:

- Not posting safety rules conspicuously.
- Not totally immersing tools in disinfectant registered with the Environmental Protection Agency (EPA) with demonstrated bactericidal, fungicidal, and virucidal activity.
- Not disinfecting all non-electrical instruments.
- Not covering disinfectant solution nor changing it often enough.
- Not placing used instruments in properly labeled containers.
- Not storing cleaned instruments in properly labeled containers.

Pedicure Pointers

Here are some tips from the Board to help insure you have a satisfying and safe pedicure experience:

- Do a visual check of the salon: Look at the general cleanliness of the salon. Floors, walls, counters, and chairs should be clean and in good condition. Are towels scattered around the salon? Soiled towels must be stored in a labeled container and not used until properly laundered and sanitized. Clean towels need to be stored in a closed, clean cabinet. Is there an accumulation of waste? Avoid any salon that is visibly dirty.
- Disease and infection: If you have some sort of infectious disease, stay home. Salons are prohibited from knowingly serving clients with infectious or communicable conditions. If you're healthy, help stay that way by not shaving your legs at least 24 hours before a service. Also, don't get a pedicure if you have bug bites, scratches, or cuts. These steps will help prevent any possible infection.
- Foot spas: Any foot basin that holds water needs to be cleaned with liquid soap and water, and then disinfected with an EPA-registered hospital-liquid disinfectant between customers, at the end of each day, and at the end of each week according to the instructions shown on the salon's Health and Safety poster (be sure your salon has one posted on the premises, as required by the Board). Keep in mind that proper disinfection takes time. For example, in the case of whirlpool foot spas and air jet basins, the foot spa is washed and the disinfectant is used to sanitize the foot spa between patrons. Some new foot spas have disposable liners that are thrown away after each use. If the salon is not doing this between customers, take your business elsewhere.
- Illegal tools: No razor-edged tool or other device can be used to remove calluses. Callus removal should not be performed by a nail technician, but rather a qualified medical professional. Salon technicians, while skilled and trained in cutting, trimming, polishing, coloring, tinting, cleansing, or manicuring nails, may never perform any act that affects the structure or function of living tissue of the face or body. Other tools that cannot be disinfected such as buffers, cotton pads, and emery boards must be thrown out immediately after a single use — make sure that if these tools are used on you that they are new and haven't been used before. If you have any doubt, don't be bashful about asking the nail technician.
- Cleaning and storage: Tools that can be disinfected, such as nail clippers and metal cuticle pushers, must be cleaned with soap or detergent and water and then completely immersed in an EPA-registered disinfectant. Containers need to be large enough so that all non-electrical items being disinfected can be thoroughly and completely immersed in disinfectant. The disinfectant solution must remain covered at all times and be changed at least once a week or whenever it is visibly cloudy or dirty. Tools that have been used on a client or soiled in any manner must be stored in a container clearly marked as "soiled" or "dirty." Disinfected tools must be stored in a clean, covered place and labeled "clean."
- Don't shave your legs 24 hours or less before a pedicure to avoid creating microscopic cuts that increase the risk of infection
- Avoid receiving a pedicure if you have any open cuts or sores on skin where services will be performed
- Observe the foot spa before receiving a pedicure. Has it been properly cleaned and disinfected? Ask if you are not sure.

- Be particularly observant of the screen in the circulating foot spas. Screens **MUST** be cleaned and sanitized after each customer.
- Finally, consider bringing your own tools – at least you’ll know where they’ve been and how they’ve been handled.

Fish pedicures are illegal

A fish pedicure is a procedure in which a consumer places his or her feet in a foot bath or tub that contains live fish. The fish then eat dead skin cells off the consumer’s feet.

The U.S. Centers for Disease Control (CDC) says that infections have been reported in the United Kingdom by people who have had a fish pedicure. The CDC also says that little is known about the types of bacteria and other potential pathogens that might be carried by these fish and the potential risks that they might pose to customers. The procedure has now been banned not only in Nevada, but in other states and Canadian provinces as well because of sanitary concerns.

The Nevada State Board of Cosmetology has determined that fish pedicures are not permitted in Nevada under the Board’s health and safety regulations. This is primarily because the Nevada Administrative Code requires that before use on a patron, “all hair and other adherent foreign material must be removed from the instrument, implement or other tool; and the instrument, implement or other tool must be: thoroughly washed with soap and hot water; rinsed in clear hot water; and placed in a covered wet sanitizer which is large enough for complete immersion of the instrument, implement or other tool, and which contains an infection control solution that is registered with the Environmental Protection Agency and approved by the Board. During each service, all instruments, implements and other tools must be kept free of contamination by immersion in an infection control solution approved by the Board. All disinfected instruments, implements and other tools that are not in use and not in the process of wet disinfection in a wet sanitizer must be stored in a clean, dry sanitizer. A dry sanitizer consists of a clean, closed container, drawer or storage unit with a fumigant that contains only disinfected instruments, implements and other tools.” The Board has also concluded that the use of live fish does not allow foot basins or tubs to be adequately cleaned and disinfected as required by law.

Nevada State Board of

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NAIL SALON CONSUMER SAFETY GUIDE

A manicure or pedicure should be a wonderful, relaxing experience for everyone to indulge in. Since there are sequential consumers contacting the warm, moist environment of a manicure or pedicure service, we would appreciate your assistance in keeping sanitation practices diligent and infection control practices followed. We want to keep Nevada safe from bacterial skin infection outbreaks that have harmed hundreds of customers of nail salons in other states. We are thankful that Nevada has avoided these outbreaks. We want to keep it that way, but we need your help. We have an active public education campaign that highlights nail salon safety, health, and infection control. For detailed information on all aspects of cosmetology and salon safety you should visit our website <http://cosmetology.nv.gov>.

Nail Technology is one of six individual branches of cosmetology licensed and regulated in Nevada. The other five are Aesthetics, Electrology, Demonstrators of Cosmetics, Hair Braiding, and Hair Design. We also license Cosmetologists, who are authorized to practice all branches of cosmetology (except electrology).

Nail Technologists are licensed practitioners who may provide the following services in a licensed salon:

1. Care a of consumer's fingernails or toenails
2. Beautification of a consumer's nails
3. Massage of a consumer's hands, forearms, feet, or lower legs

Look for Licenses

Salons are required to post a facility license in plain view of the public. Nail technologists are required to display their licenses in plain view of the public at the position where the nail technologist performs his or her work. These licenses must be posted in public view and cannot be photocopies. The license issued by the Nevada State Board of Cosmetology has the name and recent photo of the licensee printed on the license.

Unlicensed salons and unlicensed nail technologists servicing nails on the public are illegal and prohibited by Nevada Law.

Disinfect or Dispose

After washing with soap, nail technicians are required to take the following steps between each customer:

- Clean and disinfect tools approved for reuse, or
- Dispose of tools not approved for reuse

It is prohibited for salons to keep a customer's nail files, buffer blocks, cuticle sticks, sanding drums, sanding wheels, bands, or any other tool.

Safety in the nail salon

Sandal season is year round in Nevada, and you may be tempted to rush to your favorite salon for a foot soak and pedicure so that your feet will look their best. But it's important to be vigilant as you sit in the pedicure chair — your health and safety may depend on it. Spas and salons are where we go to feel relaxed and pampered — stress and worry are not supposed to be part of the picture, especially when the concern is infection, which is exactly what can happen if these facilities don't maintain sanitary conditions as required by health and safety regulations. Lurking in the depths of that foot spa may be bacteria, fungal strains, and even far more dangerous microorganisms that typically thrive in warm, moist environments. The screens and tubes of foot spas are particularly good places for bacteria to collect and grow, often forming dense layers of cells and proteins called biofilms, which can be very hard to remove. If open sores or skin wounds are present (including insect bites, scratches, scabbed-over wounds, or any condition that weakens the skin barrier) this gives the germs a pathway into the body.

In October 2000, California health officials received complaints about a large outbreak of skin boils from customers who soaked their feet in foot spas as part of their pedicure services. It was determined that the boils were caused by contaminated whirlpool foot spas that had not been properly cleaned in a California nail salon. Officials with the Centers for Disease Control swabbed 30 footbaths in 18 nail salons from five California counties and found mycobacterium in 29 of the 30 samples, according to a CDC abstract published in 2005.

At particular risk are those with diabetes. According to WebMD, if you're diabetic you need to take extra precautions when getting foot treatments. Any break in the skin (including ones caused by callous removal or aggressive cuticle cutting) can let in bacteria, leading to infection.

The Nevada State Board of Cosmetology, which licenses nail technicians and nail salons and enforces the State laws covering the beauty industry, has found that the most common violations found in nail salons include:

- Not posting safety rules conspicuously.
- Not totally immersing tools in disinfectant registered with the Environmental Protection Agency (EPA) with demonstrated bactericidal, fungicidal, and virucidal activity.
- Not disinfecting all non-electrical instruments.
- Not covering disinfectant solution nor changing it often enough.
- Not placing used instruments in properly labeled containers.
- Not storing cleaned instruments in properly labeled containers.

Pedicure Pointers

Here are some tips from the Board to help insure you have a satisfying and safe pedicure experience:

- Do a visual check of the salon: Look at the general cleanliness of the salon. Floors, walls, counters, and chairs should be clean and in good condition. Are towels scattered around the salon? Soiled towels must be stored in a labeled container and not used until properly laundered and sanitized. Clean towels need to be stored in a closed, clean cabinet. Is there an accumulation of waste? Avoid any salon that is visibly dirty.
- Disease and infection: If you have some sort of infectious disease, stay home. Salons are prohibited from knowingly serving clients with infectious or communicable conditions. If you're healthy, help stay that way by not shaving your legs at least 24 hours before a service. Also, don't get a pedicure if you have bug bites, scratches, or cuts. These steps will help prevent any possible infection.
- Foot spas: Any foot basin that holds water needs to be cleaned with liquid soap and water, and then disinfected with an EPA-registered hospital-liquid disinfectant between customers, at the end of each day, and at the end of each week according to the instructions shown on the salon's Health and Safety poster (be sure your salon has one posted on the premises, as required by the Board). Keep in mind that proper disinfection takes time. For example, in the case of whirlpool foot spas and air jet basins, the foot spa is washed and the disinfectant is used to sanitize the foot spa between patrons. Some new foot spas have disposable liners that are thrown away after each use. If the salon is not doing this between customers, take your business elsewhere.
- Illegal tools: No razor-edged tool or other device can be used to remove calluses. Callus removal should not be performed by a nail technician, but rather a qualified medical professional. Salon technicians, while skilled and trained in cutting, trimming, polishing, coloring, tinting, cleansing, or manicuring nails, may never perform any act that affects the structure or function of living tissue of the face or body. Other tools that cannot be disinfected such as buffers, cotton pads, and emery boards must be thrown out immediately after a single use — make sure that if these tools are used on you that they are new and haven't been used before. If you have any doubt, don't be bashful about asking the nail technician.
- Cleaning and storage: Tools that can be disinfected, such as nail clippers and metal cuticle pushers, must be cleaned with soap or detergent and water and then completely immersed in an EPA-registered disinfectant. Containers need to be large enough so that all non-electrical items being disinfected can be thoroughly and completely immersed in disinfectant. The disinfectant solution must remain covered at all times and be changed at least once a week or whenever it is visibly cloudy or dirty. Tools that have been used on a client or soiled in any manner must be stored in a container clearly marked as "soiled" or "dirty." Disinfected tools must be stored in a clean, covered place and labeled "clean."
- Don't shave your legs 24 hours or less before a pedicure to avoid creating microscopic cuts that increase the risk of infection.
- Avoid receiving a pedicure if you have any open cuts or sores on skin where services will be performed.
- Observe the foot spa before receiving a pedicure. Has it been properly cleaned and disinfected? Ask if you are not sure.
- Be particularly observant of the screen in the circulating foot spas. Screens MUST be cleaned and sanitized after each customer.
- Finally, consider bringing your own tools – at least you'll know where they've been and how they've been handled.

Fish pedicures are illegal

A fish pedicure is a procedure in which a consumer places his or her feet in a foot bath or tub that contains live fish. The fish then eat dead skin cells off the consumer's feet. The U.S. Centers for Disease Control (CDC) says that infections have been reported in the United Kingdom by people who have had a fish pedicure. The CDC also says that little is known about the types of bacteria and other potential pathogens that might be carried by these fish and the potential risks that they might pose to customers. The procedure has now been banned not only in Nevada, but in other states and Canadian provinces as well because of sanitary concerns.

The Nevada State Board of Cosmetology has determined that fish pedicures are not permitted in Nevada under the Board's health and safety regulations. This is primarily because the Nevada Administrative Code requires that before use on a patron, "all hair and other adherent foreign material must be removed from the

instrument, implement or other tool; and the instrument, implement or other tool must be: thoroughly washed with soap and hot water; rinsed in clear hot water; and placed in a covered wet sanitizer which is large enough for complete immersion of the instrument, implement or other tool, and which contains an infection control solution that is registered with the Environmental Protection Agency and approved by the Board. During each service, all instruments, implements and other tools must be kept free of contamination by immersion in an infection control solution approved by the Board. All disinfected instruments, implements and other tools that are not in use and not in the process of wet disinfection in a wet sanitizer must be stored in a clean, dry sanitizer. A dry sanitizer consists of a clean, closed container, drawer or storage unit with a fumigant that contains only disinfected instruments, implements and other tools." The Board has also concluded that the use of live fish does not allow foot basins or tubs to be adequately cleaned and disinfected as required by law.

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Guidance on the management of the public health risks from fish pedicures



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Foreword

One of the primary roles of Environmental Health Practitioners in local authorities is to control the spread of infection. So called 'special treatments' require careful auditing to ensure that staff and customers are properly protected from infection.

This type of treatment is relatively new and I am delighted to recommend and endorse this guidance which will be of great value to members of the Chartered Institute of Environmental Health as they seek to address the infection control issues presented by the growth of businesses seeking to offer this treatment service to customers.

I am grateful to members of the CIEH and all the other organisations involved in its production and I commend its use.



G. Jukes
Chief Executive
Chartered Institute of Environmental Health

I am honoured to have been invited to provide a foreword to this guidance and take this opportunity to congratulate all who were involved in its production.

The guidance provides valuable support and assistance for Environmental Health Officers and technical support staff working in Scotland's local authorities and will, I've no doubt, be of assistance to the owners of establishments offering this novel treatment.

The production of the guidance is an excellent example of what can be achieved through positive inter-organisation co-operation and I have no hesitation in endorsing the guidance on behalf of Scotland's environmental health community.



Tom Bell
Chief Executive
The Royal Environmental Health Institute of Scotland

Introduction

An increasing number of establishments offering 'fish pedicures' are opening in the UK. This practice involves immersing the feet in a tank of water containing *Garra rufa* fish (a small toothless species of freshwater carp) that nibble off dead and thickened skin. The use of *Garra rufa* fish is long established in Turkey, India and the Far East where it has a history as a treatment for a variety of skin conditions and, more recently, as a cosmetic treatment for the removal of dead and hardened skin from the feet. In Turkey, a treatment centre near the town of Kangal is based around a series of thermal springs and can accommodate more than 1,000 people per day.

Fish pedicures involve the use of living fish. Therefore, conventional methods of sterilisation and disinfection of water and equipment are not applicable because they would kill the fish. This has led to concerns about the potential transmission of infection and, in addition, the welfare of fish. The practice has been banned in some countries on safety grounds. However, there is little evidence in scientific literature of the potential public health risk to users.

This guidance was produced by an expert group that included representatives from the Health Protection Agency, Health Protection Scotland, the Health and Safety Laboratory and local authorities. It is intended for public health and environmental health practitioners who may be asked to provide advice on fish pedicures in the UK. The guidance may also be of interest to the industry. It has been agreed by the Department of Health, Social Services and Public Safety in Northern Ireland and Public Health Wales.

1.1 Aim and scope

This guidance aims to provide easily accessible advice, based on evidence, or expert consensus where this is lacking, on the potential public health risks from fish pedicures, and the practical measures that should be taken to mitigate these.

The scope of this guidance is restricted to the use of *Garra rufa* fish for fish pedicures as a cosmetic treatment. A minority of premises are also offering fish manicures and the guidance is equally applicable to manicures. It does not consider the medicinal use of *Garra rufa* fish, whole body immersion, or the use of other types of carp with teeth such as Chin Chin fish.

Concerns about fish welfare have also been raised. Whilst these issues are outside the scope of this document, there is evidence that poor environmental conditions affect fish health, which in turn may potentially increase the risk of infection in humans. These guidelines do not provide advice on the use and care of *Garra rufa*, and further advice should be sought from appropriate veterinary experts (see Appendix 1).

1.2 Acknowledgements

Many agencies and individuals across the UK contributed to the consultation process. These included public health professionals, the Chartered Institute for Environmental Health, various local authorities, Local Government Regulation, Defra, Centre for Environment Fisheries and Aquaculture Science, Health and Safety Executive, Royal Society for Prevention of Cruelty to Animals, Ornamental Aquatic Trade Association, National Companion Animal Forum, Fish Veterinary Society, and Hairdressing and Beauty Industry Authority. Their contributions are gratefully acknowledged.

2 Background

2.1 Definitions

For the purpose of this document a fish spa is taken to be any premises offering fish pedicures. A fish pedicure is the process in which the user places their feet in a tank of water (which may be for individual use or shared) to mid-calf level and *Garra rufa* fish preferentially 'nibble' the thickened skin from the feet, usually for between 15 to 30 minutes. This time limitation is in place to ensure that the fish do not nibble too far into skin and cause bleeding, although bleeding has been anecdotally reported in UK fish spas. However, longer durations have been used in other settings without reported significant adverse effects.^{1,2}

2.2 Current UK situation

There has been a rapid expansion in the number of premises providing fish pedicures in the UK over the past 12 months. A recent (Spring 2011) survey among environmental health practitioners identified 279 fish spas in 119 local authorities across the UK, with further spas planned. As this represents approximately 1/3 of all local authorities it is likely that the total number of fish spas in the UK is considerably greater. In addition to the spas themselves, at least a dozen new companies have been established supplying fish spa systems and equipment.

Fish spa premises include dedicated salons, hairdressers, beauty therapists, as well as mobile spas in shopping centres and other locations. Reports from environmental health practitioners indicate that the level of health and safety awareness, infection control and risk assessment varies considerably between establishments. In addition, some operators are actively promoting fish pedicures for persons with medical conditions such as eczema, psoriasis and diabetes.

2.3 International situation

Whilst the use of *Garra rufa* fish is long established in parts of the Middle and Far East, there are few formal publications regarding their use, and those that do exist relate to treatment for psoriasis. One study in Turkey¹ described the use of prolonged immersion (approximately seven hours per day) in the Kangal hot springs containing *Garra rufa* for 87 patients with psoriasis. No information on adverse events was included. An Austrian study² involved 67 patients with moderate to severe chronic plaque psoriasis who underwent three weeks of therapy involving immersion in a bathing tub containing *Garra rufa* fish for two hours per day, combined with a short course of UV-A sunbed treatment. Each patient was allocated to a single bathing tub for the duration of the three-week treatment, and fish were used on a single client only. The water in the tubs was constantly (700 l/hr) filtered and disinfected by a filter pump and a UV-C water disinfection device. The water was exchanged on a continuous basis three to four times a day and the temperature was maintained at 36-37°C. Although water testing was undertaken, no results were reported. No adverse events were noted, although 'mild transient bleeding' was reported in one patient with eczema. These two small studies suggested that ichthyotherapy under the direction of a dermatologist could have a beneficial effect, however, as both used fish therapy in conjunction with other medical therapies, the relative benefit of the fish therapy is far from clear.

Despite the paucity of scientific evidence, fish pedicures have been banned in a number of US states, and Canadian provinces and territories. In the US, the procedure has been banned in 18 states³ by the respective State Boards of Cosmetology mainly on the grounds that it contravenes regulations applicable to beauty procedures. State bans are based on a combination of the following: equipment (i.e. the tanks and fish) used in the workplace cannot be disinfected; animals, including fish, are prohibited from salons; and concerns around animal welfare (due to reports that the fish may be starved to eat skin). Whilst the US

Centers for Disease Control (CDC) has not undertaken a national risk assessment, it has confirmed that it is not aware of any documented infections associated with fish spas.⁴

In Canada³, the procedure has so far been banned in Ontario, British Columbia, Alberta and Manitoba on the grounds that fish used as 'instruments' for pedicures cannot be cleaned and disinfected or sterilised between clients. Guidance from Ontario states that "water samples collected from the intended footbath-type tanks showed an overgrowth of *E. coli*, total coliforms, *Staphylococcus* and *Pseudomonas* bacterial species. As no fish pedicures had been performed, it is likely that the fish themselves were the source of these bacterial species." Fish spas remain legal in other Canadian provinces and territories, although the issue has not specifically been addressed by all of them.

Within Europe, the issue has been addressed in Germany where spas planned to offer the service for psoriasis.⁵ Extensive requirements were placed on the service provider by the authorities, including: written patient consent; proof that patients are free of hepatitis B and C viruses and HIV, and not colonised with named bacteria; specified technical requirements for equipment and spa management; premises to have a specialist vet; and an extensive quality assurance programme. No information is available from other EU member states as to whether the practice takes place and if so what control measures are implemented.

3 Public health risks from fish spas

The main public health concern about the use of fish spas relates to the potential for the transmission of infection. Depending on the route of transmission this may include bacterial, viral and parasitic infections. Fish tank water has been shown to contain a variety of bacterial species.⁶ The water in the spa tank is heated to maintain a temperature of 25-30°C (suitable for fish health) which will encourage bacterial growth and increase skin porosity on prolonged immersion.

There are three potential routes of transmission: fish to person, water to person, and person to person. These are considered in more detail below. In each case, the risk of infection will be increased if the client has an underlying health condition that reduces the effectiveness of their natural defences against infection, or if there is broken skin.

Whilst fish welfare is not the primary focus of this guidance, there is evidence that handling, poor water quality and overcrowding can lead to chronic stress, deteriorations in fish health, compromised immune function and mortality.⁷ Many apparently healthy fish can harbor pathogens without obvious signs of disease, but outbreaks in fish can occur when they are subjected to poor environmental conditions.⁸ Outbreaks of disease in fish could potentially increase the numbers of water-borne bacteria and increase the risk of transmission to fish spa clients.

3.1 Transmission from fish (or fish tank surface) to person⁹

3.1.1 Bacterial infections

Erysipelothrix rhusiopathiae and *Streptococcus iniae* are both typically associated with handling fish out of water and zoonotic infection is rare even in those who handle fish frequently. Fish infected with *Streptococcus iniae* have a high mortality and are likely to die quickly. In this setting, both bacteria are considered to be low risk human pathogens.

Aeromonas species are found in many aquatic habitats (including drinking water) and in association with fish. Some can cause infection in situations where there is invasive contact with the skin, for example following water-related trauma¹⁰, and infections associated with medicinal leech treatment have been reported from a number of countries.^{11,12} Reports of serious infections are rare and have been associated with immunocompromised patients. This organism more typically causes diarrhoeal disease via a food-borne route and is likely to be a low risk pathogen in this setting.

Streptococcus agalactiae (a Group B streptococcus) has recently been identified in the UK as the cause of death of consignments of *Garra rufa* destined for fish spas.¹³ It is not yet known how frequently it is associated with *Garra rufa*, but further inspections of consignments may yield more information in the future. Human infections with *S. agalactiae* usually occur in neonates or as a cause of puerperal sepsis, and the organism is a well recognised pathogen in patients with diabetes. The organism is generally considered to be a low risk human pathogen in this setting.

Mycobacteria, principally *Mycobacterium marinum*, cause cutaneous infections such as 'fish tank granuloma' or 'swimming pool granuloma'. *M. marinum* is associated both with the presence of fish¹⁴ and in situations consistent with the presence of a biofilm (as seen in non-chlorinated swimming pools). The organism is typically transmitted to the skin when an open wound, graze or cut comes into contact with the organism in the biofilm. Other non-tuberculous mycobacterial infections associated with footbaths have been reported in salons, with shaving prior to foot bathing identified as a risk factor for mycobacterial furunculosis.^{15,16} These pathogens therefore pose a greater risk than other microorganisms in the fish spa setting.

Other bacteria such as salmonellae (which have been reported in association with fish tanks and tropical fish) and non-toxicogenic *Vibrio cholerae* (which has been identified in consignments of *Garra rufa*) are generally associated with ingestion and are unlikely to feature when only the feet are in contact with water. There would, however, be a possibility of hand-mouth transmission following a fish manicure. This would be substantially reduced by hand washing after the procedure.

3.1.2 Parasitic Infections

Fish flukes and tapeworms can be transmitted to people by eating undercooked fish. These are not therefore a hazard in the context of a fish pedicure. Although potentially zoonotic species of *Giardia* and *Cryptosporidium* have been found in fish, there is no evidence that these could be transmitted via the mouths of *Garra rufa*, nor via the water, as ingestion will not occur.

3.2 Transmission from water to person

3.2.1 Bacterial infections

Pseudomonas aeruginosa may be present in the water, most likely associated with its ability to colonise biofilms on underwater surfaces. In other spa situations, investigations have indicated that duration or frequency of exposure, bather loads, bather age and using the facility later in the day can be significant risk factors for folliculitis.¹⁷⁻¹⁹ This usually manifests itself as a self-limiting pustular rash and prior shaving is an additional risk factor. In the fish spa setting the client is likely to have transient contact. It is probable that the biofilms giving rise to planktonic (free-flowing) *P. aeruginosa* and other bacteria will be grazed by the fish, if accessible, and overall levels may thus be reduced.

Rapidly growing mycobacteria are ubiquitous in water, including tap water supplies. A number of these non-tuberculous species have been associated with furunculosis following footbath use in nail salons. Shaving and waxing prior to footbath use has been identified as a risk factor for these infections.^{15,16}

Other bacterial species may be present in the tank water⁶ following contamination by both fish and clients but are unlikely to pose a significant health risk as they rarely cause infections where skin is intact. *Legionella* species may also be present but will not pose a risk of disease in this setting because fish pedicures do not generate the profuse aerosols seen with whirlpools and hot tubs.

3.3 Person to person, via water

3.3.1 Bacterial infections

Although *Staphylococcus aureus* is shed from skin, the lower limbs and feet are not generally preferential sites of colonisation (usually the nose, axilla and groin). The exception to this might be colonised patients with active eczema or psoriatic plaques on the lower limbs. If this organism does pose a risk, this is more likely from skin contact with surfaces outside the water where inocula would not be diluted (seating and towels for example); the risk here would be similar to that in a gym. The dilution that would occur in the water makes water-borne transmission very unlikely by comparison.

3.3.2 Blood-borne viruses

Blood-borne viruses (BBVs) including hepatitis B and C, and HIV can be transmitted via blood and other body fluids from one person to another. Of the UK population, it is estimated that around 0.5% are chronically infected with hepatitis C (HCV) and therefore infectious, and a similar proportion (around 0.4%) are infectious for hepatitis B (HBV). An estimated 0.14% of the UK population are HIV positive. However, many people are unaware of their BBV status.

Of the BBVs, HBV is the most readily transmissible and capable of surviving in the environment. However, relevant transmission data are scant. There are few papers on HBV survival beyond the needlestick context, though a small risk has been associated with injuries acquired in contact sports.²⁰ Survival of hepatitis B virus has been reported in the environment for seven days on dry surfaces²¹ although there are no data on survival in water. Hepatitis C virus remains viable for a few days in moist environments, although infectivity declines at room temperature.²²

Whilst *Garra rufa* are said to only nibble dead skin, anecdotally fish spa clients are said to have bled into the tank water, indicating that skin breaks could occur. Any BBVs contaminating fishes' mouths are not likely to remain on their mouths to effect subsequent transmission. However, there is theoretical potential for BBV transmission to occur if blood from one client gets into an open cut, abrasion or wound on another client using the same tank. While the risk of BBV transmission via this route is likely to be minimised due to the dilution factor in the water, there are no useful models corresponding to this situation.

There was, however, a large outbreak of hepatitis B in Sweden in the 1960s, where one of the suggested routes of transmission was associated with bleeding into shared washing water.^{23,24} During this outbreak more than 500 cases were seen over a two to three year period. Cases were 'track-finders', runners who ran bare-legged through rough terrain including woodland, frequently sustaining wounds and scratches that would bleed. Communal water and washing vessels were used at the end of some races. Improved washing facilities and protective clothing brought the outbreak to a close. The applicability of this incident to occasional, minor bleeding in fish spas is doubtful, although it may be a model should more major bleeding occur.

Based on the available evidence, the risk of infection with a BBV as a result of a fish pedicure is likely to be extremely low, however, this cannot be completely excluded.

3.4 Person to person, via surface contact

Many pathogens, including fungi (such as those that cause athlete's foot) and papillomaviruses (the cause of verruca), are known to survive on inanimate surfaces for prolonged periods.²⁵ Transmission could therefore occur person to person via contact with the floor in the spa area if clients walk barefoot. Note that this route of transmission is not unique to fish spas.

4 Interventions and Quality Assurance/Testing

Maintenance of water quality is important to reduce the risk of infection to clients, and for fish welfare. Guidance on water quality for fish welfare is available from the Ornamental Aquatic Trade Association (OATA)²⁶ (see Appendix 1).

4.1 Interventions for water quality

A variety of interventions exist to improve water quality. However, they all have limitations in the fish spa setting, and whilst they may benefit fish welfare and customer aesthetic considerations, they are unlikely to affect microbiological parameters. They include chemical water treatments, UV light and filtration.

4.1.1 Microbicidal chemical water treatments

Chemical water treatments used in other settings such as spa baths and conventional pedicures include chlorine, other chemicals or ozone. In general, chemicals typically treat the whole body of treated water and will be toxic to fish at microbiologically effective concentrations, so are therefore not applicable in this situation.

Ozone treatment has been used in both aquaria and fish spas, however, levels that are considered safe for the fish may have little microbicidal effect, particularly on established biofilms. Operators using ozone have to comply with workplace exposure limits, a process requiring its own risk assessment.

4.1.2 High intensity UV light

This would be damaging to both clients' skin and the fish. The use of ultraviolet (UV) light is not always an effective method of water treatment because organic matter or sediment can be inhibitory. It can be used within a recirculation chamber external to the main tank, but here it would have no effect on the biofilms that generate planktonic microbes, nor on any microbes carried on the fish, unless they came under direct UV illumination. Even a regular treatment of the water with UV light cannot ensure the maintenance of water quality once fish are reintroduced.

4.1.3 Filtration

Many types of water filters are available for fish tanks, but these will be comparatively coarse and will not remove planktonic micro-organisms. Filters, even those that do retain microbes, will have no effect on the biofilms that generate planktonic microbes, nor on any microbes carried on the fish. Fine filters become blocked readily and may rapidly cease to be effective. The presence of particulate matter, such as skin cells and fish faeces, means that clogging of filters is likely to occur, and unless such filters receive continuous monitoring (by continuous measurement of the pressure differential across the filter) and maintenance, they will be unreliable in practice. Variation in effectiveness is likely dependent on client numbers, size of water system, and efficiency and maintenance of the filtration unit.

4.1.4 Water heating

Additional heating of the water (to 70°C once daily for an hour) has been proposed as a way of managing mycobacteria in waters that cannot be disinfected.²⁷ Obviously, this could not be achieved with fish *in situ*, and would require specialist heating equipment and long cooling times before fish could be reintroduced. Any system incorporating a biofilter could not be heated without compromising the biofilter's effectiveness.

4.1.5 Water changing

Whilst a complete change of water between clients would not be tolerated by the fish (due to thermal shock), a continual or proportional water exchange may be an acceptable alternative. This has a gradual but continued dilution effect and a diminishing proportion of the original contaminated water remains. For example, after five complete changes of water <1% of the original load will be left, assuming no further recontamination. Unfortunately, in practice new contamination is continually introduced while the tank is in use, and preliminary data indicated no improvement in microbiological water quality in one fish spa that increased the daily water change from 20% to 40%.

The rate of water change that fish are able to tolerate will vary depending on tank volume, types of filter, stocking density and behavioural stressors. Water change raises particular problems for those shopping mall fish spas where there is no readily accessible piped water supply, and those where there are large daily numbers of clients. In these settings, maintenance of water quality is especially important.

4.2 Water testing standards

Various guidelines exist²⁷⁻³¹ for microbiological testing of different categories of recreational water, for example spa pools, swimming pools, and bathing waters, however, none of these are directly applicable to fish spas. Fish pedicure spas are different from all other recreational water exposures in that the user is not at risk of ingesting water, the user is not exposed to aerosols and the water cannot be chemically treated. In addition, facilities are not in hospital settings and therefore standards for hospital hydrotherapy pools are inappropriate.

Guidelines for water quality in aquaria exist²⁶ but these are based on pH and chemical parameters important for fish welfare, rather than microbiological measures. No validated tests are available for measuring virus contamination of water.

Results of testing to date by environmental health practitioners at different fish spas show contamination with *E. coli*, other coliforms, mixed aerobes, and *P. aeruginosa*. From the limited data available there is no clear evidence that the water treatment measures instituted have been effective in reducing the bacterial load. As pathogens are likely to be present in biofilms, and additional contamination continually occurs from the fish and clients' feet, testing the water is likely to have poor predictive quality with regards to client safety.

There are other possible means of assessing the apparent microbiological quality, such as clarity, odour, and colour. However, it should be noted that, in samples collected so far water appearance has been variable and did not necessarily correlate with subsequent water testing results.

5 Legislation

The Health and Safety at Work etc. Act 1974, and the Control of Substances Hazardous to Health (COSHH) Regulations 2002, both require operators to assess risks and put appropriate control measures in place to ensure the health and safety of employees and other persons. Health and safety enforcement officers have a range of powers to ensure compliance with the legislation.

Under the Animal Welfare Act 2006, fish spa operators have a legal duty of care³² for fish at their salons. Under this Act, an appointed inspector can take action if premises fail to comply with its requirements.

It is an offence under the Wildlife and Countryside Act 1981, and the Salmon and Freshwater Fisheries Act 1975, to release live fish into the wild. Legislation applicable to the safe and legal disposal of dead fish is contained within the Animal By-Products Regulations 2005. Fish that have died of unknown cause would be classified as Category 1 Animal By-Products and disposed of accordingly.

Equivalent provisions to all the above named acts and regulations will apply in other parts of the UK.

Spa facilities offering fish pedicures for cosmetic purposes fall outside regulation by the Medicines and Healthcare products Regulatory Agency, even if medical claims are made for the treatment.

6 Conclusions

On the basis of the evidence identified and the consensus view of experts, the risk of infection as a result of a fish pedicure is likely to be very low, but cannot be completely excluded. In order to reduce this risk even further, premises providing fish pedicures should implement the measures outlined in the Recommendations (section 7).

Certain groups of clients such as those who are immunocompromised or have underlying medical conditions including diabetes and psoriasis (for a complete list see Section 7.2.1), are likely to be at increased risk of infection and fish pedicures are not recommended for such individuals. There is a lack of clear evidence of therapeutic benefit from fish pedicures, and operators of fish spas should not actively promote treatment for these groups.

Existing interventions to improve water quality all have limitations in the fish spa setting, and there is little evidence that they affect microbiological parameters. However, maintenance of water quality remains important for fish welfare and customer aesthetic considerations. To date, there are insufficient data from fish spa water sampling to identify an acceptable range for detectable micro-organisms in fish spa tanks. It is therefore recommended that a well structured sampling programme be undertaken nationally in order to compile the required evidence base for the development of fish spa microbiological standards.

Whilst not considered here, Chin Chin fish should not be used as an alternative to *Garra rufa*. Chin Chin fish develop teeth as they age and thus the public health risk from these is likely to be greater. It is therefore recommended that they should not be used for this purpose.

7 Recommendations

7.1 Premises and facilities

- Spa owners should have a "suitable and sufficient" risk assessment in place (such as that described in HSE document *Five steps to risk assessment*³³), which includes infection control issues. Whilst the requirement to record the risk assessment specifically applies to premises with five or more employees, keeping a written record would be useful for all premises.
- Spas should have a procedures document which records company policy for use, cleaning and maintenance of the fish spa, and associated staff training procedures.
- General standards of hygiene and infection control as required for beauty salons should be followed as a minimum standard.³⁴ Towels used to examine or dry feet should be white, and washed at 60°C.³⁴
- Washbasins with running water should be provided so that parts of the body (hands or feet) which are to be treated can first be washed with soap and water, then rinsed and dried. Where the provision of mains-fed washing facilities is impractical, mobile washing stations with running water are a suitable alternative. A supply of non-running water, cold water alone, or the use of wipes or sprays are not acceptable.
- Floors and other surfaces near the pedicure tanks should have suitable slip-resistant coverings that are non-absorbent and readily cleanable. They should be regularly cleaned throughout the day to prevent transfer of contamination while walking barefoot.
- An incident log should be maintained which details adverse events such as bleeding detected (i.e. on client, in tank, on surfaces), or fish showing signs of ill health, and any actions subsequently taken.
- Local authorities should develop their own checklists for use as an aide-memoire when visiting fish spa premises. A sample list is provided in Appendix 2.

7.2 Client Interactions

7.2.1 Preparation for treatment

- Clients should be provided with information about fish pedicures including contra-indications prior to treatment. This should include advice on medical conditions that may increase the risk of infection, or pose an infection risk to other clients. These may include, without limitation:
 - Leg waxing or shaving in last 24 hours (micro-abrasions increase infection risk).
 - Any open cuts/wounds/abrasions/broken skin on the feet or lower legs.
 - Infection on the feet (including athlete's foot, verruca).
 - Psoriasis, eczema or dermatitis affecting the feet or lower legs.
 - Diabetes (increased risk of infection).
 - Infection with a blood-borne virus such as hepatitis B, hepatitis C or HIV.
 - Any immune deficiency due to illness or medication.
 - Bleeding disorders or on anticoagulant medication (e.g. heparin or warfarin).
- Clients should be asked to sign a form (similar to that used prior to other salon treatments) to confirm they have read and understood the information given, and are not aware of any contraindications to treatment. If any client is unsure about answers to any of the questions, they should seek advice from their GP before having the procedure.

- Pre-immersion foot examination: specific training on how to inspect feet should be provided by a suitably trained individual. This could be a podiatrist or a beauty therapist with a nationally recognised qualification in pedicure. Staff should document that a foot inspection has been carried out.
- As a minimum, staff should be competent to: confirm skin integrity, detect any signs of fungal infection between the toes or of nails, or any lesions, ulcers, verrucas, or poor circulation (discolouring). As with all training, this should be documented. Staff should wear single-use, non-latex gloves to perform foot inspections.
- Clients should remove jewellery, false nails and nail polish that may mask signs of infection.
- Washing feet with soap and water is necessary before the treatment partly to remove any lotions or chemicals present on the skin which could be toxic to the fish, but also as good practice to minimise shedding of micro-organisms into the water.²⁷ This should be followed by thorough rinsing to remove any traces of soap.

7.2.2 Following treatment

- Post-immersion foot inspection: staff should perform foot inspection to look for evidence of bleeding. Staff should wear single-use, non-latex gloves, and use a fresh white towel to dry the feet so as to aid visualisation of low level bleeding
- Hands should always be washed after contact with the water to prevent inadvertent hand to mouth transmission of any possible gastrointestinal pathogens present.

7.3 Actions in the event of bleeding

- If, following treatment, there is visual evidence of blood in the tank or a client has evidence of bleeding, the fish should be removed to a holding tank while the spa tank is cleaned and refilled. Fish present in a tank where bleeding has occurred must remain in the holding tank for a minimum of 48 hours. They may then be re-used
- The following approach should be used for cleaning the tank if a bleed has occurred. These steps will remove most of the organic matter that would inactivate the hypochlorite, and ensure effective disinfection: 1) drain the tank; 2) clean with detergent and warm water; 3) rinse thoroughly; 4) treat with hypochlorite made up freshly at a concentration of 1,000 parts per million available chlorine (use hypochlorite in tablet form and follow manufacturer's instructions); 5) rinse very thoroughly. Because residual chlorine will adversely affect fish, standardised test strips for measuring chlorine may be useful to confirm adequate rinsing.
- Suitable Personal Protective Equipment including gloves, apron and plastic safety spectacles to avoid eye splash (refer to the cleaning products safety data sheet), must be worn by the operator while carrying out the above procedures.
- If bleeding has occurred, any visible blood on surfaces where other clients could walk barefoot should be cleaned and then the area disinfected with hypochlorite solution at 10,000 parts per million available chlorine. This must be left in contact for 10 minutes and then rinsed off.

7.4 Equipment and maintenance

- Specialist advice should be sought on the equipment and conditions required to achieve and maintain suitable conditions for fish health (see Appendix 1 and OATA Code of Conduct³⁵).
- Tanks and other equipment including filters should be cleaned and maintained according to supplier or manufacturer's advice. This process should be documented in the risk assessment (see section 7.1).

- Cleaning should be undertaken in such a way as to minimise splashes, droplets or aerosol generation.
- Direct visual inspection of water quality should ensure that water is clear and odourless, and any particles or debris visible in the tanks after use should be removed.
- Water should be changed according to manufacturers' instructions, or as frequently as tolerated by the fish. This will depend on the tank volume, types of filter, stocking density and behavioural stressors. Further advice should be sought (Appendix 1). Water quality monitoring should comply with the OATA water quality criteria.²⁶
- Staff should receive appropriate training in the basic care and welfare of fish.³⁵
- Advice must be sought on the safe and legal disposal of unwanted, sick or dead fish (from the local authority in the first instance).

7.5 Monitoring for adverse events

- Clients should be informed of the potential risks and encouraged to report any ill-effects to their GP or the local Health Protection Unit. Complaints should be made to the local Environmental Health department
- GPs and other clinicians, microbiologists, public health practitioners, chiropodists and beauty therapists should be made aware of the potential risks from fish spas, and to consider this exposure in patients presenting with foot or other unusual infections. Any such cases seen should be reported to the local Health Protection Unit.

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9 Appendix 1. Sources of information and advice

Fish welfare

Local veterinary practice

Fish Veterinary Society: www.fishvetsociety.org.uk (This is a general website, but members can be contacted for specialist advice on aspects of fish welfare.)

Ornamental Aquatic Trade Association (OATA): www.ornamentalfish.org

- Code of Conduct (2008), available at <http://www.ornamentalfish.org/association/code/Code.pdf>
- Water Quality Criteria (2008), available at <http://www.ornamentalfish.org/association/code/Water%20Quality%20Final.pdf>

"Your Legal Duty Of Care For Keeping Fish Under The Animal Welfare Act" 2008. Available from the Federation of British Aquatic Societies website at <http://www.fbas.co.uk/FISH%20CARE%20and%20LAW.pdf>

British Veterinary Association: www.bva.co.uk/default.aspx

Royal Society for the Prevention of Cruelty to Animals (RSPCA): www.rspca.org.uk

Local authority (for advice in the first instance on disposal of sick or dead fish under the Animal By-Products Regulations)

The Centre for Environment, Fisheries and Aquaculture Science (CEFAS)
www.cefas.defra.gov.uk

Legislation

- Animal Welfare Act 2006: <http://www.legislation.gov.uk/ukpga/2006/45/contents>
- Animal By-Products Regulations 2005: <http://www.legislation.gov.uk/uksi/2011/881/introduction/made>
- Control of Substances Hazardous to Health Regulations 2002 <http://www.legislation.gov.uk/uksi/2002/2677/introduction/made>
- Health and Safety at Work etc. Act 1974 <http://www.legislation.gov.uk/ukpga/1974/37/introduction>
- Salmon and Freshwater Fisheries Act 1975: <http://www.legislation.gov.uk/ukpga/1975/51/introduction>
- Wildlife and Countryside Act 1981: <http://www.legislation.gov.uk/ukpga/1981/69/introduction>

NB. Equivalent provisions to all the above named acts and regulations will apply in other parts of the UK.

Spa management

Advice may be sought from Habia, the government-appointed, standards-setting body that provides guidance on legislation and salon safety for beauty therapists. www.habia.org

10 Appendix 2. Sample local authority checklist

Completed by:

Position:

Premises name:

Date of visit:

Address:

Contact person (manager / owner) Name:

Phone:

Facilities

Number of tanks

- *Single* client
- *Multiple* client
- Average number of treatments per tank, per day

Equipment supplier

Tank construction and condition

Are tanks covered when not in use?

Are tanks checked for leaks?

Type(s) of filter present

Does each tank have its own filter system or are multiple tanks fed by the same filter system?

Filter cleaning method

Are the filter(s) changed according to manufacturer's instructions?

UV treatment system

- Daily bulb checks recorded
- Hours of use of UV bulbs recorded

Ozone treatment system

- Risk assessment done and recorded

Electrical safety appropriate?

Residual Current Device on electrical appliances (as appropriate)

Other testing required (Specify)

Slip-resistant, non-absorbent flooring

Washing facilities:-

- Hand washbasins
- Foot washing facilities
- Hot and cold running water
- Mobile washing units

Water

Is the water temperature checked daily and recorded [optimum for fish welfare 30 – 35°C]?

Is the water microbiologically tested? If so, who by and what frequency?

Are there records of microbiological testing results?

Is the water quality checked for appropriate fish welfare standards? If so, who by and what frequency?

What action is taken if the quality is not optimal?

Are there records of water quality testing (for fish welfare)?

Is the water changed at a frequency and in manner suitable for fish health?

Is the water clear, colourless and odourless?

Fish

- *Garra rufa*
- Other (specify)
- Unknown type

Name of fish supplier
Records of dates and numbers of fish supplied
Number of fish per tank
Stocking density
Frequency of fish inspection for evidence of infection
Is this done by a specialist? If so, their name and qualifications?
Are fish fed commercially available fish food?
Is the feeding regime recorded?
How is fish mortality managed?
Is fish mortality recorded?
How are dead fish disposed of?

Clients

Is an appropriate screening form completed by each client?
Are clients' feet/hands washed with soap and water before and after treatment?
Are nail polish/false nails removed prior to treatment?
Are clients feet inspected for intact skin and signs of infection?
Are clean white towels used for each client?
Are towels laundered at 60°C after each client?
Are feet observed after treatment to ensure no signs of bleeding?
Is the water checked for evidence that bleeding has occurred?
Is the water changed when there is evidence of blood after immersion/obvious contamination?

Staff

Are staff trained in

- use of fish tank
- cleaning of fish tanks
- welfare of fish
- signs of deteriorating fish health
- legal responsibilities under the Animal Welfare Act 2006
- assessment of clients' feet (If so, by who)
- procedures for dealing with bleeding incidents
- manual handling?

How often is this training reinforced?
Do staff wear gloves for normal cleaning of fish tanks?
Do staff wear gloves when inspecting clients' feet?
Do staff wear PPE for cleaning when there is obvious contamination or blood in water?

Documentation

Health and Safety risk assessment
COSHH risk assessment
Manual handling assessment
Staff training records
Client records
Electrical safety checks (including PAT testing)
Equipment maintenance and cleaning records (Pipework, UV treatment, Ozone treatment)
Written procedures (Bleeding incident, cleaning and disinfection, maintenance)
Cleaning check records
Water testing records (temperature, microbiology, quality for fish welfare, water changes)
Fish records (supplier, feeding, mortality, disposal)

Health Protection Agency
2nd Floor
151 Buckingham Palace Road
London
SW1W 9SZ
www.hpa.org.uk



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Guidance

Health spa pedicures: preventing infections

From: Public Health England (<https://www.gov.uk/government/organisations/public-health-england>)

First published: 31 August 2011

Part of: Zoonotic diseases (zoonoses): guidance, data and analysis (<https://www.gov.uk/government/collections/zoonotic-diseases-zoonoses-guidance-data-and-analysis>)

Guidance on the management of the public health risks from fish pedicures.

Document



Guidance on the management of public health risks from fish pedicures

(https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/322420/Fish_Spa_guidance.pdf)

PDF, 531KB, 22 pages

This file may not be suitable for users of assistive technology. Request a different format.

Detail

This guidance covers:

- precautions to prevent fish spreading infections from fish to person
- relevant legislation

and peninsulae corresponding to preserved cortex. There was variable preservation of the cerebrum, total liquefaction of occipital lobes, and irregular preservation of the outer layers of some parts of the temporal and frontal lobes. Altogether, the picture was compatible with severe porencephaly or hydranencephaly. The spine showed no sign of scoliosis, and movement of the limb joints was not restricted (i.e., no arthrogryposis).

Samples were removed from the remnants of the cerebrum, diencephalon, and organs (thymus, lung, myocardium, jejunum, ileum, mesenteric lymph node, liver, spleen, kidney, and striated muscle), and 3 independent real-time PCR protocols were conducted to detect genomes of bovine viral diarrhea/mucosal disease virus, bluetongue virus serotype 8, and the novel SBV. Initial retrotranscription of the RNA genomes was followed by quantitative (real-time) PCR. The process was conducted by using our procedures (2) and, for SBV, by following the protocol and using recently developed control reagents as described (1). The SBV genome was detected in only CNS samples (quantification cycle value 28.8); bovine viral diarrhea/mucosal disease virus and BTV-8 genomes were not detected. The new virus genome load was 1.61×10^4 copies per gram of cerebrum sample.

Taken together, the above data suggest that, like other Simbu serogroup viruses, the new virus crosses the placenta, contaminates the bovine fetus, infects the fetus' CNS, and causes necrosis and/or developmental arrest of the cerebral cortex. Unlike the viruses mentioned above (3,4), and provided this case is not an exception, the SBV genome seems to persist in the infected fetus and is detectable after birth by real-time reverse transcription PCR, despite gestation length. Although reliable reagents for detecting seroconversion are temporarily unavailable, the persistence of the

new virus in fetal tissue should greatly facilitate the epidemiologic monitoring of the emergence and spread of the new virus.

When calves from experimentally infected dams are infected with the closest phylogenetic relative to SBV, Akabane virus, porencephaly develops during gestational days 62–96 (5). If the same is true for the new virus, the above calf was probably infected during June 9–July 13, 2011. Therefore, it is hypothesized that infected arthropods were already circulating in the village of Hamois-in-Condroz (50°24'56"N, 5°8'7"E), which is ≈240 km southwest of Schmallenberg (51°8'42"N, 8°17'18"E), ≈2 months before the emergence of the clinical syndrome that led to the identification of the new virus.

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Author affiliations: University of Liège, Liège, Belgium (M.-M. Garigliany, M. Dive, A. Sartelet, C. Bayrou, D. Cassart, D. Desmecht); and Friedrich-Loeffler-Institut, Greifswald-Insel Riems, Germany (B. Hoffmann, M. Beer)

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Address for correspondence: Daniel Desmecht, Pathology, Faculty of Veterinary Medicine, University of Liège, Sart Tilman B43, Liège 4000, Belgium; email: daniel.desmecht@ulg.ac.be

Zoonotic Disease Pathogens in Fish Used for Pedicure

To the Editor: Doctor fish (*Garra rufa*) are freshwater cyprinid fish that naturally inhabit river basins in central Eurasia. They are widely used in the health and beauty industries in foot spas for ichthyotherapy (Kangal fish therapy or doctor fish therapy) (Figure); online Technical Appendix Figure 1, wwwnc.cdc.gov/EID/pdfs/11-1782-Techapp.pdf (1). During these sessions, patients immerse their feet or their entire bodies in the spas, allowing the fish to feed on dead skin for cosmetic reasons or for control of psoriasis, eczema, and other skin conditions.

A survey during the spring of 2011 identified 279 fish spas in the United Kingdom, and the number has probably increased since then (1). The Fish Health Inspectorate of the Centre for Environment, Fisheries & Aquaculture Science estimates that each week 15,000–20,000 *G. rufa* fish are imported from Indonesia and

other countries in Asia into the United Kingdom through London Heathrow Airport (the main border inspection post for the import of live fish). However, ichthyotherapy has now reportedly been banned in several US states and Canada provinces because of sanitary concerns (1). In the United Kingdom, a limited number of infections after fish pedicures have been reported (1). Unfortunately, little is known about the types of bacteria and other potential pathogens that might be carried by these fish and the potential risks that they might pose to customers or to ornamental and native fish.

On April 12, 2011, the Fish Health Inspectorate investigated a report of a disease outbreak among 6,000 *G. rufa* fish from Indonesia that had been supplied to UK pedicure spas. Affected fish showed clinical signs of exophthalmia and of hemorrhage around the gills, mouth, and abdomen. More than 95% of the fish died before the remaining fish were euthanized. Histopathologic examinations identified systemic bacterial infections with small gram-positive cocci, mostly in the kidneys, spleen, and liver. Bacterial isolates cultured from affected fish were identified as *Streptococcus agalactiae* (group B *Streptococcus*) according to a combination of biochemical test results (API Strep; bioMérieux, Marcy l'Étoile, France), Lancefield grouping with serotype B (Oxoid Limited, Basingstoke, UK), and molecular (partial 16S rRNA gene sequencing) testing methods.

Multilocus sequence typing of a representative isolate (11013; online Technical Appendix Table) (2) indicated that it was a sequence type (ST) 261 *S. agalactiae* strain (<http://pubmlst.org/sagalactiae>). This same ST261 profile was first identified in an isolate (ATCC 51487) from a diseased tilapia in Israel (3). The clinical appearance of the disease and the diagnostic results suggested that *S.*

agalactiae was the causative agent of the fish illness and deaths.

To determine whether *S. agalactiae* and other bacterial pathogens might be carried more widely by these fish, from May 5, 2011, through June 30, 2011, the Fish Health Inspectorate of the Centre for Environment, Fisheries & Aquaculture Science visited Heathrow Airport 5 times to intercept and sample consignments of *G. rufa* from Indonesia. A taxonomically diverse range of bacteria were identified (online Technical Appendix Table, Figure 2), including a variety of human pathogens capable of causing invasive soft tissue infections. These pathogens included *Aeromonas* spp. (4), potentially pathogenic clinical-type *Vibrio vulnificus* isolates (online Technical Appendix Figure 2) (5), non-serotype O1 or O139 cholera toxin-negative *V. cholerae* isolates (online Technical Appendix Figure 2) (6), *Mycobacteria* (7), and *S. agalactiae* (3,8). Isolates were resistant to a variety

of antimicrobial drugs, including tetracyclines, fluoroquinolones, and aminoglycosides (online Technical Appendix Table). Other studies have also reported high levels of multidrug resistance in bacteria associated with imported ornamental fish (9).

Water is a well-recognized source of bacterial skin infections in humans. *V. vulnificus* can cause wound infections and primary septicemia, resulting in high mortality rates, especially among persons with predisposing risk conditions (e.g., liver disease, diabetes, or impaired immune function) (5). *S. agalactiae* is a common cause of skin and soft tissue infections, especially in older adults and those with chronic diseases such as diabetes mellitus (8). Although *S. agalactiae* ST261 is not considered to be one of the genotypes typically associated with invasive disease in humans (3), a fish-adapted strain could eventually take advantage of the opportunity afforded by repeated exposure and thereby also affect



Figure. Doctor fish surrounding foot during ichthyotherapy.

humans. Additionally, *Mycobacteria* spp. can occasionally cause disease in humans through contact with fish (*M. marinum*), and pedicure treatments have previously been associated with *M. fortuitum* infections (10).

Recently, the risks associated with exposure to *G. rufa* fish were reported to be low (1). To date, there are only a limited number of reports of patients who might have been infected by this exposure route (1). However, our study raises some concerns over the extent that these fish, or their transport water, might harbor potential zoonotic disease pathogens of clinical relevance. In particular, patients with underlying conditions (such as diabetes mellitus or immunosuppression) should be discouraged from undertaking such treatments, especially if they have obvious breaks in the skin or abrasions. This risk can probably be reduced by use of certified disease-free fish reared in controlled facilities under high standards of husbandry and welfare.

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David W. Verner-Jeffreys,
Craig Baker-Austin,
Michelle J. Pond,
Georgina S. E. Rimmer,
Rose Kerr, David Stone,
Rachael Griffin, Peter White,
Nicholas Stinton,
Kevin Denham, James Leigh,
Nicola Jones,
Matthew Longshaw,
and Stephen W. Feist

Author affiliations: Centre for Environment, Fisheries & Aquaculture Science Weymouth Laboratory, Weymouth, UK (D.W. Verner-Jeffreys, C. Baker-Austin, M.J. Pond, G.S.E. Rimmer, R. Kerr, D. Stone, R. Griffin, P. White, N. Stinton, K. Denham, M. Longshaw, S.W. Feist); University of

Nottingham, Sutton Bonington, UK (J. Leigh); and Oxford Radcliffe University Hospitals, Headington, UK (N. Jones)

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Address for correspondence: David W. Verner-Jeffreys, Cefas Weymouth Laboratory, The Nothe, Barrack Rd, Weymouth, Dorset DT4 8UB, UK; email: david.verner-jeffreys@cefas.co.uk

***Rickettsia conorii* Indian Tick Typhus Strain and *R. slovaca* in Humans, Sicily**

To the Editor: Rickettsiae are vector-borne pathogens that affect humans and animals worldwide (1). Pathogens in the *Rickettsia conorii* complex are known to cause Mediterranean spotted fever (MSF) (*R. conorii* Malish strain), Astrakhan fever (*R. conorii* Astrakhan strain), Israeli spotted fever (*R. conorii* Israeli spotted fever strain), and Indian tick typhus (*R. conorii* Indian tick typhus strain) in the Mediterranean basin and Africa, southern Russia, the Middle East, and India and Pakistan, respectively (2). These rickettsioses share some clinical features, such as febrile illness and generalized cutaneous rash, and are transmitted to humans by *Rhipicephalus* spp. ticks (2).

MSF is endemic to Sicily (Italy); fatal cases occur each year, and the prevalence of *R. conorii* in dogs is high (3–6). Recently, *R. conorii* Malish strain and *R. conorii* Israeli spotted fever strain were confirmed in humans in Sicily in whom MSF was diagnosed (4), which suggests that other *R. conorii* strains might be present and diagnosed as causing MSF. The rickettsiae within the *R. conorii* complex, which are relevant for the study of bacterial evolution and epidemiology, can be properly identified only by appropriate genetic analyses.



Fish Pedicures: Bacteria in Your Foot Soak

U.S., U.K. Advise Anyone With Skin Cuts, Weakened Immune System, to Stay Away From the Feet Nibblers

JANE E. ALLEN, ABC News Medical Unit

May 16, 2012—

The tiny toothless carp that nibble away dead, callused skin from the feet of salon customers undergoing fish pedicures may carry bacteria responsible for a variety of dangerous skin and soft tissue infections, British scientists reported today.

The threat has remained largely theoretical ever since a spa in Alexandria, Va., brought the fishy foot treatments to U.S. shores in 2008 as a replacement for the razors typically used to scrape dead skin from callused toes and heels. More than 6,000 patrons flocked to the spa in its first five months for a fish pedi. But U.S. and British health officials continue to warn that anyone with open sores or skin cuts, an underlying medical condition such as diabetes or an immune system compromised by AIDS, cancer or advanced age should steer clear of a fish pedicure.

"The most important thing to stress at this point is that the U.K. Health Protection Authority considers the human health risks to be very low, and we would not want your readers to be unduly alarmed by our findings," David W. Verner-Jeffreys, lead author of the new report, told ABC News Tuesday.

Of course, there's always the ick factor in what's scientifically called ichthyotherapy: fish are living creatures that deposit their waste products in the very water in which people are soaking.

Scientists began to get indications of the kinds of microbes that could be bathing fish spa patrons' feet in April 2011, when British authorities investigated a reported bacterial outbreak among 6,000 *Garra rufa* fish imported from Indonesia to British salons and pedicure spas. Tests revealed the fish had been infected with *Streptococcus agalactiae* (group B *Streptococcus*), bacteria that can cause pneumonia and serious infections of the bones, joints and blood in people of all ages and life-threatening infections in newborns.

Last spring, British fish inspectors went to London's Heathrow Airport and intercepted Indonesian shipments of the silver, inch-long freshwater carp destined for British "fish spas." Sampling and testing revealed those fish carried strains of several bacteria that could cause soft tissue infections, including *Vibrio vulnificus*, *Vibrio cholerae* and *S. agalactiae*. The strains were resistant to many important antimicrobial medications, including tetracyclines, aminoglycosides (drugs like gentamicin, neomycin and streptomycin), said Verner-Jeffreys, an aquaculture health specialist with the Center for Environment, Fisheries and Aquaculture Science, Weymouth Laboratory in Weymouth, England.

The bacteria findings appear today in *Emerging Infectious Diseases*, a journal published by the federal Centers for Disease Control and Prevention in Atlanta, which has been monitoring health effects associated with fish pedicures.

More than 10 states have banned the practice for a variety of reasons, the CDC said, including the inability to sufficiently clean fish pedicure tubs between patrons; the impossibility of disinfecting or sanitizing live fish; regulations that specify fish in a salon must be kept in an aquarium, and a humanitarian justification that to entice the fish to feed on dead human skin, they must be starved "which might be considered animal cruelty."

There have been "only been a handful of infections reported" in Great Britain, said Georgina Fletcher, a senior spokeswoman for the Health Protection Agency, which has been evaluating public health risks of fish pedicures, also called doctor fish therapy, long practiced in Turkey, India and Southeast Asia.

In the United States, "there have been no published reports to date regarding illness from fish pedicures," the CDC said in a June 2011 document. "However, fish-free foot-baths in nail salons have been implicated in several outbreaks of nontuberculous mycobacterial infections, including the species *Mycobacterium abscessus* and *M. fortuitum*," which have left customers with boils and scars.

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