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Infections Associated with Personal Service Establishments: Aesthetics

Prabjit Barn, Tina Chen

evidence review

Summary

- Bacterial infections, particularly mycobacterium infections, are most commonly reported for aesthetic services while viral infections are less reported. No studies associating fungal infections with personal service establishments (PSE) services were found.
- Limited evidence is available for some infection risks services, including manicures, hair styling, and barbering.
- Studies related to pedicures, although few, do establish a clear link between mycobacterium infections of the lower legs and the use of re-circulating footbaths; shaving legs prior to a pedicure is an important risk factor for infection.
- Waxing has been implicated in bacterial infection outbreaks due to poor infection control practices.
- The majority of studies identified were case reports, which provide limited information on the transmission pathways of infection and do not allow for assessment of the PSE-related burden of illness.

Introduction

Personal Service Establishments (PSEs) encompass a large range of businesses offering services such as aesthetics, tattooing, piercing, and body modification. Services provided by such establishments may pose potential health concerns to their clientele, including risk of infection and injury. These health risks will vary depending on the nature of the service, the tools and equipment used, the health status of the clients and service providers, as well as the infection control procedures implemented. While invasive procedures, such as piercing and tattooing, are clearly associated with bacterial and viral infection risks, even non-invasive procedures, such as pedicures, can result in infections.[1] Any service with the potential to break the skin's surface can be associated with infections. Infections can then be transmitted to and between clients if proper infection control procedures are not implemented.

To understand the infection risks of PSEs, it is useful to take a look at specific services. Manicures are treatments involving the nails and hands. Tools and equipment commonly used during manicure treatments include nail and cuticle clippers, nail files, and callus removers. Although it is not the intent, these tools can potentially break skin and can therefore lead to infections. Similar to manicures, pedicures

are treatments of the feet and toe nails, but are potentially more invasive since they involve removal of dead skin and calluses. Tools typically used in pedicures include callus removal blades, cuticle removers, nail clippers, and nail files. Additionally, recirculating or non-recirculating footbaths are used to soak the client's feet. Waxing is a treatment used to temporarily remove body hair. During the procedure, melted wax or sugar is applied to the skin's surface and then stripped away; in some cases, cold wax is used. Infections can be spread through practices, such as double-dipping of melted wax and moisturizers.[2] Finally, barbering and hairdressing/styling are hair-related services offered in PSEs. Barbering involves the use of razor blades or straight razors to shave hair off the face, head, and neck. Razors can be either single-use (disposable) or multiple-use (non-disposable). Hairdressing also requires the use of a variety of tools for hair styling, including razors, scissors, combs, clippers, and hairpins. Because all of these tools can potentially break the skin's surface, infection risks exist with their use.

Many Canadian provinces and territories currently have or will be establishing regulations, guidelines, and best practices for PSEs[3]; the goal is to protect the health of the public. One important aspect of minimizing health risks is the implementation of infection control practices and, in order to establish and enforce effective measures, there needs to be a clear understanding of the risks associated with PSE services. For example, specific questions need to be considered, concerning: which services are associated with the highest risks, how infection risks of some services can be lowered through specific infection control practices, and who is most susceptible. To better understand these risks, we conducted a review of the scientific literature on infections associated with manicures, pedicures, waxing services, hair styling, and barbering.

In this document, we summarize the infection risks of manicures, pedicures, waxing, and hairstyling/barbering services, as identified through case-control studies, cross-sectional surveys, and case reports. No studies on infection risks for facials, microdermabrasion, electrolysis or laser hair removal were identified. Additionally, no studies identified fungal infections associated with these services. Please see Appendix for methodology. Due to the ever-changing nature of this rapidly growing industry, this review does not provide comprehensive information on infections associated with all services offered by PSEs.

Manicures

Little scientific evidence is available on infections resulting from manicure services; we identified only one case report of infections related to manicures[4], two cross-sectional surveys,[5,6] and one broader review of nail diseases.[7] De Souza et al. (2004) described three cases of nail bed infections related to acrylic nail application.[4] Although little information is provided on the individual cases, authors discuss risk factors for infection, including the use of skin irritating glues and a drill (to file nails)[4]; both can irritate the skin and increase the moisture level of the nail, creating an environment of microbial growth. Generally, any damage to the nail beds and cuticles can increase the risk of infection.[7]

Studies have investigated the presence of pathogens, as well as infection control practices of establishments, to better characterize potential hazards in nail salons. Sekula et al. (2002) conducted an environmental survey of four nail salons providing manicure and pedicure services.[5] Swab samples, collected from randomly selected nail instruments at each salon, were analyzed for the presence of bacteria, fungi, and yeast. Results showed that all instruments (three from each salon) from three of the four salons were contaminated with micro-organisms, including *Rhizopus arrhizus*, *Candida albicans*, *Pseudomonas aeruginosa*, as well as several *Bacillus* species micro-organisms. Eight instruments from the fourth salon were sampled; three were positive for bacteria, yeast, and fungi. All four salons used different disinfecting solutions on their equipment, including an unlabeled blue liquid, benzyl alconium chloride, and 99% isopropyl alcohol. Due to the presence of these pathogens, the author concluded that current disinfection techniques used at each salon were inadequate in preventing health risks among clients.[5] In a survey of manicure and pedicure salons in North York, Ontario, Johnson et al. (2001) described infection control procedures used by 70 randomly selected service providers.[6] Researchers found that glove use among service providers was inconsistent; only 35% reported wearing gloves before conducting a manicure. Most tools were reused, even if they were recommended by the manufacturer to be single-use, including razor blades on callus removers. Similarly, disinfection techniques were inconsistent. Although the most commonly reported disinfecting ingredient was isopropyl alcohol, the concentration of isopropyl alcohol ranged from 14-99% in disinfecting solutions. Sterilization techniques also differed among service providers with 38% reporting the use of ultraviolet (UV) light, 18% using glass beads, and 1% using ultrasonic

cleaners,[6] all of which are not approved methods of sterilization in many jurisdictions.[3]

Pedicures

We identified one case-control study, one surveillance report, one cross-sectional survey, two outbreak investigations, one clinical study, and two case reports (see Table 1). In their case-control study, Winthrop et al. (2002) described the first recognized outbreak of *mycobacterium fortuitum* in nail salons.[8] A physician, who treated four cases of persistent skin infections below the knee, notified the local health department about a possible outbreak. Further investigation identified an additional 106 patients with similar infections, all of whom had received pedicures in the same nail salon. Forty-eight of these patients were enrolled in a case-control study to investigate potential risk factors of infection. Shaving of legs, the night or morning before a pedicure, was found to be significantly associated with the occurrence of an infection; an adjusted odds ratio of 4.8 (95%Confidence Interval, 2.1 to 11.1). No other risk factors, including receiving a leg massage, were significantly associated with infection. Environmental swab samples were taken from each of the 10 whirlpool footbaths at the salon; all were positive for *M. fortuitum*. Swab samples taken from oils, lotions, whirlpool disinfectants, and soap were all negative. A subset of this population was later enrolled in a study by Winthrop et al. (2004) to better understand the clinical management of *M*. *fortuitum* infections.[9]

Recently, Stout et al. (2011) investigated the incidence of pedicure-related mycobacterium infection, resulting in furunculosis in two North Carolina counties.[1] Researchers looked at all rapidly growing mycobacterium (RGM) positive cultures of skin and/or soft tissue specimens collected from January 2005 to December 2008 and contacted treating clinicians of each case, to determine which cases were potentially pedicure-related. In total, 40 cases (suspected and confirmed) of pedicure associated mycobacterial furunculosis were identified; incidence rates of 1.00, 0.96, 0.83, and 0.89 cases per 100, 000 populations in the years 2005, 2006, 2007, and 2008 respectively. Environmental samples were collected at 13 case salons (salons which had been visited by patients prior to their infection) and 11 control salons (salons randomly selected from 202 licensed salons in the two counties); samples included tap water, footbath water, and footbath surface swabs. Additionally, footbaths were visually inspected (n=126). All footbath cultures (from case and control salons) grew mycobacterium in both water and biofilm samples; additionally, all tap water samples were positive for mycobacterium. Organic debris or visible biofilm was observed for 64 (51%) footbaths. Researchers suggest that suboptimal cleaning potentially contributed to the reported furnunculosis infections.

Gira et al. (2004) reported two cases of *M.mageritense* infections on the lower legs of two females; both cases had received pedicures at the same nail salon and both had shaved prior to their visit.[10] As part of the investigation, 7 of the 23 whirlpool footbaths were randomly swab sampled; three were found to be positive for *M. mageritense*. Similarly, Christie and Christie (2006) described a mycobacterium infection on the lower legs of a 16-year old female who had received pedicures at two nail salons, prior to the infection.[11] Site visits were conducted at both salons and swab samples of footbaths were collected; all samples were found to be positive for *M. fortuitum*.

Sniezek et al. (2003) described three cases of rapidly growing mycobacteria (RGM) infections among three females (ages 25, 34, and 12) who received pedicures prior to the presentation of infection.[12] The two latter cases were a mother and daughter who had visited the same nail salon. Environmental sampling data were available only for the first case; cultures collected from all four whirlpool footbaths in the salon were positive for mycobacterium. Finally, Redbord et al. (2006) report on four cases of *M. furunculosis* infections occurring in women within one to six months of receiving pedicures.[13] In all four cases, the women had shaved their legs the night before the treatment. No sampling was conducted at the nail salons visited by the patients.

Environmental sampling studies have found the presence of bacterium species in nail salons. Vugia et al. (2005) collected swab samples from 30 whirlpool footbaths in 18 randomly selected salons located in five California counties and analyzed them for mycobacterium isolates.[14] Researchers noted that one potential source of mycobacterium is the municipal water supply. Twenty-nine (97%) of the samples were positive for mycobacteria with the most common being *M. fortuitum*. The only negative sample was collected from a footbath that had been in service for only 11 days. Finally, all footbaths were visually inspected; 25 footbaths (83 %) had visible debris and/or slime on the re-circulation screen cover. Researchers suggested that footbaths, including the screens, should be cleaned and disinfected after each use and again at the end of each day.

Waxing

We identified two outbreak investigations and three case reports related to waxing (see Table 2). In an outbreak reported by Watts and Dall (1986), four women suffered from *Pseudomonas* folliculitis after visiting the same cosmetologist within a 36-hour period.[2] Infections were attributed to the use of contaminated moisturizer between clients. The moisturizer was contained in a pot and most likely was contaminated through the action of double-dipping; most jurisdictions require that moisturizers be dispensed in a pump bottle to prevent double-dipping. A fifth woman had received waxing services from the cosmetologist over the same time period but did not have an infection; the cosmetologist had not applied moisturizer on this individual, as she had with the other four women. Additionally, the cosmetologist reused melted wax between clients; wax samples were negative for bacteria. A site visit revealed *dirty and untidy* hygienic conditions.[2] Huijsdens et al. (2008) reported an outbreak of Methicillin-resistant *Staphylococcus aureus* (MRSA) infections which occurred in a service provider and two customers at a salon in the Netherlands.[15] Although the route of transmission of the infection was not confirmed, researchers did identify waxing as a possible route. The service provider had been suffering from re-occurring MRSA infections over a one-year period. The medical microbiologist from the regional medical microbiology laboratory alerted health authorities about the infection and the authorities conducted a follow-up with the service provider, including a site visit of the establishment. Further follow-up identified MRSA infections with two customers, as well as eight individuals who were indirectly in contact with the service provider or customers.[15] The site visit included observation of a waxing procedure being conducted by the service provider, screening of the other six employees at the establishment, and collection of environmental samples. It was noted that: a post-waxing disinfection solution, applied to clients' legs, was diluted after complaints from clients about stinging; glove use was inconsistent; and the service provider's hands were not washed after the waxing procedure. All employees were negative for MRSA. Researchers also collected 10 swab samples of used wax, tools, and surfaces of the waxing room; all samples were negative for MRSA.

Dendle et al. (2007) described a case of a young woman who presented at an emergency room with life-threatening *Streptococcus pyogenes* and *Herpes simplex* infections two weeks after receiving a Brazilian waxing procedure.[16] The authors described the woman as having poorly controlled Type 1 diabetes, which may have been a risk factor for infection. Mimouni-Bloch et al. (1997) described the occurrence of folliculitis, an inflammation of the hair follicle, among two females after waxing of the legs, face, and/or bikini line.[17]

Finally, Woollons and Price (1997) described skin damage resulting from waxing conducted on two individuals who were both concurrently taking anti-acne medication.[18] The patients suffered a loss of large areas of the epidermis (top layer of skin) along with hair on their legs and face. Although no infection was reported, removal of skin can increase the risk of infection; authors suggested that service providers should inform clients about the risks of waxing when taking certain medications to treat acne.

Barbering and Hairstyling

Very limited evidence is available concerning infection risks for barbering and hairdressing services. We identified one case-control study that investigated the relationship between hepatitis B and C infections, and beauty treatments, including barbering. Additionally, we identified two case reports of nosocomial infections resulting from barbering and hairdressing in hospitals.

A case-control study in Italy, by Mele et al. (1995), identified barber shop shaving as a risk factor associated with hepatitis B and hepatitis non-A, non-B (now known as hepatitis C) infections using data collected from a national viral hepatitis surveillance system from 1985 to 1993.[19] Researchers compared hepatitis B and hepatitis C (cases) against hepatitis A (controls) infections to investigate exposure to risk factors, including tattooing, ear-piercing, manicures, pedicures, electrolysis, and barbering before the onset of the disease (six weeks for the cases and six months for controls to account for incubation periods of these infections). An odds ratio, (OR) of 1.61 (95% Confidence Interval, 1.35-1.92) and 1.27 (95% CI, 1.02-1.58) for hepatitis B and hepatitis C respectively, were found for those receiving services in barber shops.[19]

Wihelmi et al. (1987) described an outbreak of *Serratia marcescens* among 10 immuno-suppressed male patients in a hospital cardiac surgery unit.[20] Follow-up investigation by hospital staff found that all ten patients had been shaved by the same team of barbers prior to their surgeries. Sampling of the barbers' hands and tools revealed the same strain of *S. marcescens* as those found in the patients. Additionally, the barbering team's equipment was found to be of poor hygiene; brushes and razor blades were reused between patients without proper disinfection.

Ruddy et al. (2001) discuss a case where routine screening, after hospital ward transfers, revealed a Methicillin-resistant *Staphylococcus aureus* (MRSA) infection on a patient's hairline.[21] The patient previously had tested negative for MRSA, but had recently visited the hospital hairdresser. Further investigation revealed that inadequate disinfection of hairdressing equipment led to cross-contamination between MRSA-positive patients to MRSA-negative patients.

Discussion

We reviewed the infection risks for various PSE services reported in the scientific literature. While any service with the potential to break the skin's surface carries some degree of risk, these infection risks vary by specific services. Infection risks associated with manicures are poorly defined in scientific literature. Only a single case report was identified,[4] although two environmental sampling studies of nail salons do indicate the presence of pathogens which can potentially be transmitted to clients.[5,6] Infections related to pedicures are well documented. [1,8,10,11,13] *Mycobacterium* species are the most common micro-organism attributed to pedicure-related infections. Mycobacteria, which can be introduced through the municipal water supply in some cases, can accumulate in re-circulating footbaths if proper cleaning and disinfection of footbaths does not occur after every use. Researchers and public health staff have identified re-circulation screens as important harbourers of bacteria, recommending that they be dismantled, cleaned, and disinfected on a daily basis.[1,8] Evidence indicates that shaving prior to a pedicure is an important risk factor for infection.[8]

Waxing procedures have also been associated with bacterial and viral infections.[2,15,16] Reuse of melted wax and double-dipping of moisturizers between multiple clients are important risk factors.[2,15]

Barbering and hairdressing-related infection risks are not well defined in the literature. In one study, researchers used Italian surveillance data of hepatitis infections to identify barbering as an important risk factor for infection.[19] Aside from this study, we identified only two case reports of barbering or hairstyling related services, both of which reported on infections occurring in hospitals. [20,21]

The scientific literature provides valuable information about risks associated with PSE services and, for some services, points to specific routes of transmission or possible risk factors for infection. Studies illustrate that poor infection control procedures, including inadequate cleaning and disinfection, and unhygienic practices, such as double-dipping, increase the risk of infections among clients. Shaving legs prior to receiving pedicures is identified as an important risk factor,[8] while case reports point to potential vulnerabilities to waxing-related infection among diabetic individuals[16] or those taking certain medications.[18] Generally, infection risks for PSE services are not well characterized and further research is needed to better understand and assess PSE-related risks. However, information provided here can be used by environmental health practitioners and policy-makers to better inform programs, policies, and practice to minimize public health risks in PSEs.

Gaps and Limitations

The information presented here is limited in several ways. The major limitation is that most of the studies identified were case reports. Case reports provide detailed information about the symptoms, diagnosis, and treatment of individual cases of infection but do not provide information on the specifics of the services. Additionally, information gathered from case studies does not allow for an assessment of the PSE-related burden of disease, because case reports and outbreak investigations do not provide a complete picture of PSE-related infections in Canada. Without an accurate estimate of the number of people receiving these services and, of these, the number obtaining medical treatments it is difficult to establish a quantitative notion of risk. Many people may not seek medical advice and instead may choose to self-medicate symptoms, if an infection results. Even if they do seek medical advice, they or the treating physician may not associate the infection with PSE services, particularly in cases where incubation periods take weeks or months. Further follow-up in the form of outbreak investigations and case-control studies was conducted in instances where potentially PSE-related infections were reported by physicians to the local health authorities. Such a relationship between the medical and the public health community is needed for better identification and reporting of PSE-related infections. One obvious challenge is that many infections may not be reportable.

Despite their limitations, case reports do provide direction on research priorities, through the identification of PSE-related infections. Apart from case reports, some outbreak investigations involving follow-up with an establishment were identified; primarily for waxing-related infections. These studies are more informative than case reports because they typically involve the collection of environmental samples which can shed light on the route(s) of infection transmission. In some

cases, the recognition that an infection was likely PSE-related led to the investigation of risk factors through case-control studies. Investigations of footbath-related infections have most consistently involved environmental sampling at facilities to identify not only the organism of concern but also the route of transmission, as compared with other PSE-related infections.[1,8,14] Such information provides guidance on risk reduction measures, which in turn can lead to specific recommendations, including recommending against the use of re-circulating footbaths or the need to flush and disinfect footbaths after every use.

Finally, our review only included published data from scientific studies. Information gathered from site inspections by local health units can provide valuable information about infection risks related to specific services and practices and would complement evidence found in scientific literature.

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Appendix 1

Methods

A search of scientific literature was conducted primarily through the Ebsco database collection, available through the University of British Columbia Library. To capture activities related to PSEs, the following terms were used as keywords, either alone or in combination: piercing, tattooing, body modification, body art, scarification, ear stapling, tongue splitting, salons (tanning, nail, hair styling, beauty), spa, manicure, pedicure, foot baths, facials, barbering, hair removal, waxing, and permanent make-up. Word variants were considered along with outcomes for practices, such as infection and disease. No date restriction was imposed. Additional research studies were identified through the reference list of studies. Studies on acupuncture were not included in the review since this practice falls under the Registered Health Professionals Act (and therefore not inspected by Environmental Health Officers/Public Health Inspectors) in many provinces and territories. Only bacterial, viral, and fungal infection risks were considered, whereas non-infectious health risks, including risk of injury, allergic reactions, and respiratory hazards, were excluded. In total, 20 studies were included in this review.

Table 1. *Summary of Studies on Footbath-Related Infections*

Authors	Type of Infection	Study Size	Comments
Case – Control Studies			
Winthrop et al. (2002)[8]	Mycobacterium fortuitum	48 cases, 56 controls	- Physician reported 4 similar cases of lower leg infections to the local health department; - 110 patients identified, 48 enrolled in a case-control study; - Controls were friends and family members of cases who had also received pedicures but were asymptomatic; - Shaving legs before a pedicure was a risk factor for infection; adjusted odds ratio 4.8 (95%CI, 2.1 to 11.1); - Cultures from all 10 whirlpool (i.e., re-circulating) footbaths were positive for *M. fortuitum*; - Site visit showed large amounts of hair and skin debris in inlet suction of footbath; cultures were positive for M. fortuitum, *M. mucogenicum*, *M. smegmatis*; - All samples taken from oils, lotions, disinfectant, soap were negative.
Surveillance Studies			
Stout et al. (2011)[1]	Rapidly growing mycobacteria (RGM)	40 potential and confirmed cases 13 case salons, 11 control salons	- Between 2005-2008, researchers conducted surveillance to identify suspected and confirmed cases of mycobacterial furnunculosis in 2 North Carolina counties; - 40 cases identified; - Environmental sampling (tap water, footbath water, footbath surfaces) collected for 13 case salons (salons visited by cases prior to infection) and 11 randomly selected control salons; - All tap water samples (cases and controls) positive for RGM; - Footbath water was positive for RGM for 7 case salons, 6 control salons; - Footbath surface (swab samples) positive for RGM for 10 cases salons and 9 control salons; - 64 of 126 visually inspected footbaths had organic debris or visible biofilm at intake screens.

Authors	Type of Infection	Study Size	Comments
Cross – Sectional Surveys			
Vugia et al. (2005)[14]	Rapidly growing mycobacteria (RGM)	30	- Collected 30 samples from whirlpool (i.e., re-circulating) footbaths in 18 randomly sampled salons; - 29 (97%) samples positive for mycobacteria; - Visual inspection of footbaths revealed 25 (83%) of footbaths had visible debris and/or slime on the recirculation screen; - Authors noted that rapidly growing mycobacteria (RGM) can be introduced to the salon environment through municipal water systems which commonly contain RGM.
Case Reports			
Christie and Christie (2006)[11]	Mycobacterium fortuitum	1	- 16-year old female with infection on lower legs; - Received pedicures at two Northern California salons prior to development of infection; - Site visit conducted, footbath cultures positive for *M. fortuitum*; no cultures were obtained from the patient; - Type of footbath not specified.
Gira et al. (2004)[10]	Mycobacterium mageritense	2	- *Case 1*: 43 year old female with a 3-month history of lesions on lower legs; diagnosed as *Mycobacterium mageritense* infection; - *Case 2*: 56 year old female with 3 ulcerating nodules on lower legs; diagnosed as *M. mageritense* infection; - *Cases 1 and 2* received a pedicure from same nail salon on multiple occasions; both had used footbaths during pedicure and both had shaved prior to their pedicures; - A site visit was conducted and 7 of 23 whirlpool (i.e., re-circulating) footbaths were randomly sampled; 3 were positive for *M. mageritense*.
Redbord et al. (2006)[13]	Mycobacterium furunculosis	4	- 4 women presented with painful nodules on lower legs within 1-6 months of receiving pedicures; - All had shaved prior to treatment; all received pedicures on a regular basis (e.g., every 3-weeks or every month); - No site visits of salons conducted; - Type of footbath (i.e., re-circulating versus non re-circulating) not specified.
Sniezek et al. (2003)[12]	Mycobacterium fortuitum	3	- Case 1: 25 year old female who had received 3 pedicures over a 3- month period; presented with an infection of the lower legs; had shaved legs before each pedicure; cultures obtained from all 4 whirlpool (i.e., re-circulating) footbaths in the facility were positive for mycobacterium; - *Case 2*: 34 year old female with 9-month history of papules and nodules on lower parts of both legs; - *Case 3:* 12-year old female presented with painful nodule at lower part of left leg; history of regular visits to same nail salon with mother (Case 2).
Clinical Studies			
Winthrop et al. (2004)[9]	Mycobacterium fortuitum	subset of sample in Winthrop et al. 2002	- Enrolled patients who received pedicures in salon during the outbreak described by Winthrop et al. 2002; - Study was conducted to understand the clinical management of infections.

Table 2. *Summary of Studies on Waxing Related Infections*

Reference	Type of Infection	Study Size	Comments
Outbreak Investigations			
Huijsdens et al. (2008)[15]	Methicillin-resistant *Staphylococcus aureus* (MRSA)	11	- Service provider had recurring MRSA infections over a year period; medical microbiologist reported infection to public health staff; - Site visit of the salon was conducted by public health staff including observation of a waxing procedure being conducted by the service provider: the service provider was not consistently wearing gloves or washing hands and a diluted post-waxing disinfection solution was being used on the clients' legs; - Further follow-up identified MRSA infections among two customers and eight individuals indirectly in contact with the service provider or customers; - 10 swab samples of melted wax, tools, and the waxing room surfaces were collected; all samples were negative for MRSA.
Watts and Dall (1986)[2]	*Pseudomonas* folliculitis	4	- During a 3-week period, four patients presented to hospital with similar infections; - All had received waxing services at the same establishment within the previous 36 hours; - Infections were attributed to use of contaminated moisturizer between clients; service provider was also reusing melted wax between clients; - Site visit conducted; shop described as dirty and untidy.
Case Reports			
Dendle et al. (2007)[16]	Streptococcus pyogenes; Herpes simplex	1	- 20-year old female presented at emergency department with infection; - Had poorly controlled Type 1 diabetes; - Had received a Brazilian wax 2 weeks prior.
Mimouni-Bloch et al. (1997)[17]	Folliculitis	2	- 2 adolescent females developed folliculitis after receiving waxing treatment of legs; both developed a rash; - Treated with systemic and topical antibiotics.
Woollons and Price (1997)[18]	N/A	2	- Patients 1 and 2 (28 and 30 years of age) taking acne medication (Roaccutane) at time of waxing treatments; - For both, waxing procedure resulted in removal of hair and large areas of skin on legs and lip area.

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400 East Tower
555 W 12th Avenue
Vancouver, BC V5Z 3X7

Tel.: 604-707-2445
Fax: 604-707-2444
contact@ncceh.ca

National Collaborating Centre for Environmental Health

Centre de collaboration nationale en santé environnementale

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