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Dashka Bernard

Massachusetts College of Pharmacy & Health Science

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Public Transportation: Perceptions of Filth Contributing To Poor Health



Dashka Bernard

Massachusetts College of Pharmacy and
Health Sciences

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Professor Gardner

Being a frequent rider of the transit has given me opportunities to make observations of the various passengers that use the service. I noticed that on an average day, millions of people utilize objects such as seats, bars, straps, and strips (to push for stops) one person after the other. In addition, exposure to filth, foul odors, and bodily fluids (as in when one sneezes or coughs) raised an awareness of how unclean the environment was. With these observations, there were certain precautions I felt necessary to take in order to be safe from pathogens. For instance, the thought of sitting on seats with the same pants I wear to sit on my bed or any furniture at home began to draw a picture of how disease could easily be spread. As a result, I adopted the habit of undressing at the entrance of my home and immediately tossing the clothes in the laundry, then washing my hands. This gave me a sense of security that bacteria picked up from riding the bus would not be spread in my living area. Such a concern led me to do some research that enlightened me on the amount of bacteria people are truly exposed to. Surprisingly, it so happens that people are not at high risk of being contaminated by pathogens from fomites¹ alone. A test conducted by the New England Baptist Hospital proved that the amount of bacteria found out fomites in trains and buses is significantly lower than that of the average kitchen sink. However, research done on person to person contact revealed different results. Getting respiratory infections such as ARI (Acute Respiratory Infection), which are very common, have been found to be linked to bus or train use and suggests that occasional bus riders are at greater risk due to undeveloped immunity.

¹ Fomite: an inanimate object

Epidemics such as the plague, smallpox, and tuberculosis have left dark images in history. Fear of having to face another harsh one encourages people to take measures of precaution. For this reason, public health officials undertake the responsibility of making prevention a priority. However, today, one must wonder how effective those measures have become. Cleanliness in the environments is a factor that concerns many due to fear of bacterial or viral contamination in places people are most exposed to. In the case of public transportation, sanitation is often questionable since millions of people use the service daily. With this being said, if a dangerous and extremely contagious epidemic were to break out again, public transportation would perhaps be avoided. However, the question would be: why? Would the trouble lie in the buses and trains not being disinfected or would it lie in person to person transmission? Otherwise, would buses and trains be a culprit at all? The goal of this project is to investigate how proactive public health officials are in this site in terms of prevention and protection of the public, and whether or not public transportations puts people at risk of airborne diseases and other pathogens or is it simply a fear people burden themselves with.

An article released last year described a situation where a woman lost her python in a subway was fined because of possible salmonella traces left behind. The snake was missing for three days and was found in a one of the red line cars and detained by a MBTA employee who had owned a snake herself. The owner of the snake was charged \$650 which constituted for costs of disinfection (CBS Boston). Since disinfection is expensive, it is evident that it is not something that the MBTA does religiously. The mayor affirms this in his later stating:

“...your violation of the MBTA’s pet policy resulted in unanticipated clean-up costs for the MBTA. To rid the subway car of any tiny traces of germs... maintenance crew had to scrub and disinfect the Red Line car...” (Universal Hub)(Patrick)

The snake's owner claimed that this was too much for her to pay because she was on "disability". She quoted "I don't know how I would possibly do it. I really don't". The public responded to the situation with comments such as "why do they not sanitize the trains anyway? I have seen people throwing up on the bus or the train, people bleeding. Do those people get bills too?" (CBS Boston) Such responses demonstrate expectations of the MBTA to clean and disinfect. In other words, they feel it is their duty to do so. The reason being is that people's attitudes towards germs reflect notions of health risks.

Attitudes and expectations of this sort are derivatives of past experiences marked in history. People had predated perceptions of cleanliness indicating good health. During the primitive period of municipal public health services in the 1860s, people were advised to take protective measures at home as in improving ventilation and plumbing, boiling and filtering water, as well as isolating sick ones from the rest of the household (Tomes 506). By the time germ theory was born (in the late 1870s), domestic sanitation had already been instilled in public customs. The theory had agreed with their existing perceptions of filth which made it easy for the public to fathom. As explained by Nancy Tomes in "The Private Side of Public Health: Sanitary Science, Domestic Hygiene and Germ Theory", "the level of popular science, the assimilation of sanitarian theories of infection and contagion paved the way for rapid acceptance of the germ theory" because people were acting on a "framework of older ideas and behaviors" (Tomes 508).

Evidently, cleanliness and filth is the root of concern when it comes to health, particularly because cleanliness has had a large contribution to improved health in cases involving infectious diseases. One example is the case of Chicago's water sewage being a source of disease due to random waste disposal methods in the early 1850s. A student by the name of Ellis Sylvester Chesbrough undertook this project in order to ameliorate Chicago's sewage system from a

sanitary approach. He proposed a series of plans to purify the water that resulted in both removal of surface water and household waste which served as protection of the city's natural water supply source (Cain)(p.531-532). With this, people were less prone to catching illnesses from contaminated water in urban growing areas. Another situation that exemplifies sanitation as helpful is the typhoid outbreak in the early twentieth century where many people of the upper class were diagnosed with the disease. Typhoid fever was caused by *Salmonella typhi* which was a pathogen that was usually "isolated from blood during the first week of sickness and in the urine or feces later on. Carriers transmitted the disease through water or food contaminated by their feces or urine" (Leavitt) (p.558) It was found that the cook in the victims' homes (Mary Mallon) was the source of illness, and it was evident that she did not practice good sanitary routines during trips between the bathroom and the kitchen, which left her hands to contaminate the food she cooked for her clients. Condran, Williams, and Cheney who wrote "The Decline in Mortality in Philadelphia from 1870 to 1930: The Role of Municipal Charters" provided statistics of death rates that illustrated a mortality decline between 1900 and 1930 which was due to less people dying from infectious diseases (Gretchen A. Condran)(p.456). Since germ theory had already blossomed, the evidence implies that people had adopted better ways of maintaining good personal hygiene. Also, sanitation systems such as sewage had been maintained which led to a healthier public in general. Therefore, sanitation not only had a positive and helpful effect on health, but also on peoples' perceptions due to the results.

When looking back at history, it is logical to say that assumptions of filth had gained reason to affiliate itself with disease. However, there were cases where the image did not fit. For instance, it was thought that people who were poor immigrants who lived in filthy conditions were more likely to be sick. Such a false idea had developed stereotype and influenced the

strategies of epidemiologists to trace diseases in the process. In the case of polio, scientists chose to “reinterpret the appearance of cases in clean suburban homes as random, and sought additional factors such as infected milk, insect vectors, and individual sanitary carelessness to reinforce their belief in the relationship between filth, poverty, and disease.” This was because the filth and poverty image deviated from what was said to be unhealthy. Polio victims were actually not immigrants that were poor and lived in unclean environments. Instead, they were children from clean middle-class homes (Rogers)(p.544). Similarly to the typhoid outbreak, upper class families were the ones affected by the disease. At this point in history, such a contradiction made it difficult to link the appearance of disease with the lack of cleanliness.

The idea of filth and poverty being tied to poor health is often manipulated and instilled in the brains of others due to the benefit of financial success of commercial products. What may seem clean and safe is questionable. However, one must wonder how influential the image of cleanliness became in terms of culture. The media tends to play a significant role in doing so. An example is the first germ panic known as the “print revolution” in the mid nineteenth century that persuaded many not to buy newspapers because of the possibility of presence of bacteria on them, according to other companies that had new technologies such as steam rotary press paper pulp manufacture. This resulted in significant price reduction of newspapers and books. Furthermore, films such as melodramas of anti-TB by Thomas Alva Edison exemplified the influence of germ consciousness persuasion. Advertisements also provided an incentive to produce a widespread interest in germs that would give rise to a public fear. Doctors who had not even fully agreed with the germ theory at the time found it to be a great opportunity to manipulate the fear and utilize it for profit. According to the article “Public Health Then and Now”, it is stated that “Germ-conscious campaign became a powerful educational force that

invoked scientific authority yet often kept alive discredited disease beliefs, such as the dread of sewer gas, simply because they served to sell products” (Tomes)(p.193). Therefore, it is evident that manipulation is a contributor of germ panic.

Companies did more than advertise and promote products. They “...emerged with promises to keep you clean, destroy germs, assure economic advancement and social desirability, assuage guilt, and uphold morality”. When good personal hygiene developed a link to good health in the early 18th century, a moral and civilizing issue came about: cleanliness had gained social importance through cultural values that were integrated in society. Therefore, anything that or anyone who appeared filthy was frowned upon. Since people of lower economic status had little to maintain good hygiene and a clean environment, cleanliness became a matter of class. With this, complex judgment had commenced to overrule social status (Tebbe-Grossman)(p.1-3).

One example of germ panic today concerns interpersonal contact from public transportation, particularly because of the possibility of vast spreading of infectious diseases. Immigrants have been feared for this reason. Historians have implied that suspicions of immigrant hygiene practices existed in the past as it does now. For instance, when new forms of transportation, industrial production, and economic organization came about, America became integrated with other countries. This stirred a fear of “steamship-borne” epidemics from long or short distance travel. In a more recent period, AIDS became the panic because it was perceived as the possible factor of AIDS epidemic as international travel increased. However, when it was noted by public health authorities that the spread of HIV infection had been traced by truck routes in Africa, India, and Southeast Asia, people felt compelled to worry (Tomes)(p.195). As a result, immigrants in general were feared due to lack of familiarity of their immunization and

hygiene practices. In addition, they were labeled as “aliens”, which led to difficulty of assimilation (Tomes) (p.195). An example explained by Nancy Tomes in “Public Health Then and Now” is when the mayor of New York City, Rudy Guiliani, crusaded against street vendors because of recurrent *E.coli* and *Salmonella* outbreaks. She stated: “immigrant-run street markets and fruit walls... were condemned as germ-ridden threats to the public health” (Tomes)(p.195). This suggests that an accusation had been made of the immigrants to have possibly imported diseases from their homeland and passing them on to the American public. It also poses for discrimination on behalf of the American public. Furthermore, such a situation correlates with society’s complex judgment previously described. A victim of such discrimination is Mary Mallon often referred to as “Typhoid Mary” who was an Irish born immigrant. Her story had engraved fear in Americans and led her to change her identity due to inhumane treaty. Kraut, author of “Silent Killers” argues that “...the diversity and complexity of how Americans perceived and responded to immigrants who were alleged public health threats” as shaped by a number of factors such as “preexisting prejudices, immediate political rivalries, jurisdictional disputes among local, state, and federal authorities, and social perceptions of scientific medicine played roles in shaping public reaction to the interconnection of public health and the foreign-born” (Kraut) (p.79). Consequently, travelling has stirred the development of new germ panics today as it did then due to fear of pathogenic spreading.

On a more local level, fear of pathogenic travel lies in riding the bus or train, but may not be something to be afraid of. Similar to my experience mentioned before, knowledge of methods of bacterial contamination and transmission has allowed individuals to make assumptions of what to avoid in order to keep one safe. However, assumptions may not suffice when drawing conclusions, thus it is logical to question them. According to a conducted study,

there is a great chance that many of our assumptions are wrong. The Boston Channel explains that despite the thousands of people that use public transportation, the probability of coming into contact with infectious pathogens is surprisingly low. The New England Baptist Hospital proved this by collecting bacteria from objects on buses and trains that riders hold on to, which were said to have a low count of bacteria. In fact, they mentioned that a higher number of bacteria were found on seats. Furthermore, kitchen sinks in homes exceed these numbers (TheBostonChannel.com). The irony of these findings not only contradicts the concept of filth correlation to health, but also proves that germ consciousness still lives among us. Overall, assumptions people make on what to avoid in order to be safe, may simply be extra work.

Additionally, a medical student by the name of Joy Troko at the University of Nottingham conducted study on the risk factor for ARI; he and his colleagues discovered a significant association between ARI and bus or train use. They questioned seventy two patients with ARI about their bus or train travel within the five days leading up to onset of their illness. They also questioned sixty more patients at the same Nottingham General Practice who were consulting doctors for other non-respiratory conditions to form a control group. The results exhibited recent bus or train use within five days of symptom onset correlated with an increased risk of consulting a doctor for ARI. The risk appeared to be greater in occasional transit riders, but is not considered statistically significant due to additional factors such as co-morbidity, socioeconomic status, and age. These potential cofounders construct a difficulty in identifying the main cause (Joy Troko). Troko's findings can be explained by another test that was done in Arizona involving isolation of viruses proved that respiratory infections are likely to be spread via aerosol² transmission. In addition, the study implies that fomites play an important role in the

² Aerosol: a system of colloidal particles dispersed in a gas

spread of respiratory viruses. It is stated that “By using an aerolized source, HP1V1 was found to infect only 2 of 40 children at a distance of 60cm” at a school setting which suggests that surface contamination or close contact is the culprit. (Gerba) (p. 1689-1690) Therefore, despite surface contaminations of fomites, the spreading of pathogens may truly lie in person to person contact. Moreover, the findings do reveal a correlation between the usage of transit and respiratory infections.

Although fomite transmission may push for an increase of cleaning routines, disinfection can only do so much. A conducted study on pagers of employees in a hospital revealed that fomites are indeed covered with a diversity of bacteria and may be a danger to the people in the setting such as patients. However, only certain bacteria were able to survive because living conditions apply. In other words, different bacteria live and grow differently, thus they have different living environments. In addition, disinfection has been proven to be useful, but only to an extent. This is because of the frequency at which the pagers are being touched and re-contaminated, which may suggest a similar situation to that of fomites on public transportation such as trolley straps, bars, stop strips, or seats (Pyrek). Cleaning and disinfecting the transit would only be convenient for the length of time that it is clean and actually not being used; therefore, regardless of the amount or types of bacteria found on transit fomites, increased or changed cleaning routines would be ineffective in protecting the public.

Although the amount of exposure to pathogens in the transit or other public areas has raised fears, it would be insightful to consider the benefits it provides, such as building immunity. Being exposed to pathogens allows the body to build antibodies for future attacks, and there are different ways in which that can happen such as naturally acquired active immunity and artificially acquired active immunity. Naturally acquired active immunity develops when a

person is exposed to antigens³, becomes ill and then recovers. In contrast, artificially acquired immunity involves injection of antigens such as killed or living microorganisms, or attenuated⁴ bacterial toxins which are known as vaccines. The optimal method is naturally acquired immunity, because once the person recovers from the sickness, they are most likely never to get it again. (Cummings)(p. 494-495) Thus, the more antibodies we have, the more protected the body is from becoming ill; while, the less exposed the body is, the less resilient it is. In the case of polio outbreak in the 1900s, children were protected from the virus by their mother's antibodies during their first year (naturally acquired passive immunity). Children needed to be exposed to the virus in order for their own body to build protection, but as people were disinfecting their homes more often during that period of time (after germ theory), the children were growing more susceptible to catching the disease (Rogers 549-551). This exemplifies the concept where "cleaner is not better". Hence, riding the bus or train frequently leaves opportunity for a more resilient immune system.

Overall, perceptions of filth have overruled society and constituted a natural tendency to favor cleanliness because of the positive effects it has had. People have constructed stereotypes of people who were poor or immigrants based on their attitudes of cleanliness and health. Such complexes have posed issues in society that are caused by fear of foreigners with the help of stories such as that of Mary Mallon, suggesting that enlightenment has its shortcomings. In other words, knowledge of the existence of germs and practices to prohibit their spreading has also created a misunderstanding of disease infrastructure and caused judgment in the process. In conclusion, our attitude towards filth still exists today but requires better understanding.

³ Antigens: foreign molecules

⁴ Attenuated: weakened

Furthermore, realities and perceptions defer greatly with the help and influence of companies' financial success, in addition to other factors such as politics.

In addition to perceptions of filth, cases like Polio outbreak proved that cleanliness has not always been helpful. What evidence did exhibit was that cleanliness was most effective in preventing infectious diseases, but is not a universal preventive measure. In cases where immunity is acquired, it is necessary to expose oneself to pathogens even if one becomes ill from it in order to gain a resilient immune system. Therefore, public transportation and other public areas that bring fomites as well as direct contact of individuals to immediate reach may be beneficial. Germ outbreak is not limited to transit; it can take place in any public setting such as schools, restaurants, or even a local fitness center. To answer the question of whether or not the transit places us at great health risks, I would reply "yes" but so do all other public settings as it comes with the opportunity of building immunity.

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