ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 7| July 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

THE EFFECTIVENESS OF HAND HYGIENE IN PREVENTING ZOONOTIC DISEASES AMONG ZOO WORKERS: A CRITICAL EVALUATION AND STRATEGIC RECOMMENDATIONS

Vidya Rao
Doctoral Research Scholar, Srinivas University Institute of Allied Health Sciences, Mangaluru, Karnataka, India.

Article DOI: https://doi.org/10.36713/epra17758
DOI No: 10.36713/epra17758

ABSTRACT

Simple yet powerful tool" perfectly describes hand hygiene that involves washing hands with soap and water or using hand sanitizer. Despite its simplicity, it is incredibly effective in preventing the spread of infections and promoting public health. This action significantly reduces pathogen transmission, making it essential in healthcare settings and daily life. This study evaluates the role of hand hygiene in preventing zoonotic diseases among zoo workers, who are in close contact with animals. The objectives are to assess the importance of hand hygiene in reducing disease transmission, evaluate current practices, and propose recommendations for improvement. Effective hand hygiene requires a systematic approach, including education on its significance, training in correct techniques, ensuring access to soap and sanitizers, promoting awareness through campaigns, and continuously refining strategies. For zoo workers, regular hand washing and using personal protective equipment are vital. This proactive approach can limit the impact of outbreaks, aiding global health security. This study underscores the importance of strict hand hygiene protocols to protect zoo workers, animals, and visitors, ensuring a safer environment for all.

KEYWORDS: *Hand hygiene, pathogens.*

INTRODUCTION

Zoos are crucial for conservation, education, research, and recreation. They help preserve endangered species, educate the public about wildlife and conservation, facilitate scientific studies, and provide enjoyable experiences for visitors. Zoos also have significant economic and cultural impacts, promote animal welfare, and adhere to ethical standards, making them valuable institutions for both humans and animals. Hand hygiene in zoos is essential to prevent the spread of zoonotic diseases, protecting both visitors and animals. It ensures public health safety, especially for vulnerable populations, supports educational efforts, helps zoos comply with regulations, maintains operational integrity, and supports conservation efforts by keeping animals healthy.

Hand hygiene was studied in zoos in urban settings. The study was done through blind field observation and a questionnaire after seeking permission from the concerned authorities. Human and animal health are inextricably intertwined. About 61% of known pathogens affecting humans are zoonotic (Anderson, M. E. C., & Weese, J. S. (2012). Widespread infections among humans can be kept at bay by practicing simple, everyday infection control measures, such as hand hygiene, covering a cough, and safe food handling, which will reduce the transmission of pathogens between themselves, their environment, other people, and animals. Hand hygiene is critical to reducing disease risks, especially among younger children and older people because of low immunity in them. The findings suggest that active, rather than passive interventions are more effective in increasing compliance (Anderson, et al (2013). The most common pathogen causing enteric disease is *Escherichia coli* 0157:H7. Since livestock barns have limited hand-washing facilities, it is preferable to have waterless hand-sanitizing gel that animal handlers and visitors can safely use. Both are Simple yet powerful tool" perfectly describes hand hygiene that involves washing hands with soap and water or using hand sanitizer equally effective in reducing the total bacteria and coliform counts on the hands of the participants (Davis, et al, (2006). Hand hygiene practices may be improved in the zoo by having hand hygiene stations at various places in the zoo, particularly on an exit route, hand hygiene reminder signs, and the availability of running water in the tap. (Weese, et al, 2007). Most parents and animal handlers focus on the prevention of physical trauma to animals and children. Young minds should be made to realize the significance of hand hygiene. However, it may be difficult for young children to understand that animal contact is safe and desirable only if proper hygiene is followed (Werden, et al., 2008).

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 7| July 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

REVIEW OF LITERATURE

In open farms and petting zoos, visitors come in direct contact with animals, which is the main cause for the transmission of microbial pathogens from animals to humans. As the Centers for Disease Control and Prevention (CDC, 2001) suggested, visitors should be informed about possible prevention strategies. Visitors should avoid activities like eating, drinking, smoking, or activities involving the hand and mouth interaction. Children below 5 years, the elderly, pregnant women, and immunocompromised individuals should take extra care, as they are at a higher risk of contracting infectious diseases. Hand washing facilities should be available in both animal-contact and animal-free zones, with signboards highlighting the need to wash hands. (Stirling J, et al., 2008).

Contact with animals is fun but at the same time risky because it is the main cause for the spread of infections. Frequently observed behaviors among children and adults were: touching faces with hands after animal contact, animals licking hands, eating food, and drinking beverages within animal-contact areas, being careless about hand hygiene. Visitors are seen performing hand hygiene more often in the presence of zoo staff members. Staff members should educate the visitors about the precautions to be taken, signages should be put at regular intervals, videos on hand hygiene should show continuously, taps with running water and hand driers should be installed at all important areas. (Gonzalo Erdozain, 2013)

Conrad, et al., 2017, validated that animal contact as the major source of zoonotic enteric diseases. (Conrad, et al, 2017). The general public does not understand the mode of transmission of pathogens that may increase the risk of infection. These infections may be controlled by adequate hygiene and hand washing. The main objective of the article was to review the main causal organisms responsible for human infections acquired in petting zoos and open farm environments, like Shiga-toxin Escherichia coli, non-typhoidal Salmonella, Campylobacter, and Cryptosporidium. The most effective protective measures against enteric illnesses include educating the public of the risks, and the importance of hand hygiene, and access to hand washing facilities.

Disease transmission from animals and their environment can be prevented by hand washing prevented by hand washing and educating the population about the risks associated with attending animal venues. Physicians should educate patients about the risks associated with attending animal contact and report cases of diseases to health departments. The outbreaks of disease can be controlled in public settings in the future by educating people of the risks. (Angulo F J, et al., 2006).

Transmission of zoonotic diseases may be avoided by following simple measures. The placing of hand-sanitizing gels at convenient places like animal contact areas, exit ways, and at locations where children can easily reach. Zoo staff should encourage the visitors to use sanitizers generously. Eating and drinking should be avoided in animal contact areas. Sign boards encouraging people to use sanitizers should be placed where young and old people can see easily. The implementation of the above measures is significant in reducing zoonotic diseases (M McMillian, et al., 2007).

Transmission of zoonotic infections either by direct or indirect contact with animals or by contact with contaminated surfaces, equipment or supplies. Zoonotic pathogens may be controlled by the purchase of disease-free animals, quarantine of incoming new animals, appropriate treatment of infected animals, or the removal of diseased animals temporarily or permanently from the farms, vaccination of animals and their handlers periodically, use of specialized cages, use of protective clothing by workers, and regular surveillance for the presence of diseases (Fox, et al., 2002).

The results of the study conducted by Ibarra, et al., 2021 highlighted that the vast majority of fair visitors were not utilizing the simple and effective methods of hand washing to reduce the spread zoonotic disease transmission. Therefore, efforts should be made to educate people biosecurity measures, strategically place signage boards and show videos promoting handwashing practices. These measures will be effective in controlling zoonotic diseases. (Ibarra, et al., 2021).

Sarah L Edmonds, et al., 2010, made everyone aware of a novel approach to hand hygiene in the absence of soap and water. The SaniTwice method involves the application of excess alcohol-based hand sanitizer (ABHS), hand washing for 15 seconds, and thorough cleaning with paper towels while hands are still wet, followed by a standard application of ABHS. This study investigated the effectiveness of the SaniTwice methodology as an alternative to hand-washing for cleaning and removal of microorganisms. Implementation of this powerful tool in food handling settings is very effective. (Sarah L Edmonds, et al., 2010).

The goals of the study by George E Fischler et al., 2007 were to evaluate the effectiveness of two hand wash regimens in reducing transient bacteria on the skin. Experiments were conducted to compare the efficacy of plain soap with antimicrobial soap to remove bacteria from hands. Antimicrobial soap was found to be more effective in removing bacteria from hands (Fischler, et al, 2007).

LeJeune, J T et al., 2004, suggested certain measures to reduce the transmission of zoonotic enteric diseases to humans at animal exhibits. Optimal animal density, adequate ventilation of animal farms, feed, and water handling, type of bedding, and manure handling are key areas that can be planned well to reduce outbreaks of enteric diseases. High levels of hand hygiene and signage with the correct messages at the right places will go a long way in containing infectious diseases (LeJeune, et al, 2004).

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 7| July 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

OBJECTIVES

1. Evaluate the importance of hand hygiene in preventing zoonotic disease transmission.
2. Assess the Compliance and Effectiveness of Current Hand Hygiene Practices.
3. Propose Recommendations to Enhance Hand Hygiene Protocols.

METHODOLOGY

To understand hand hygiene practices in a zoo located in an urban area, a combination of blind field observation and a structured questionnaire was employed. This mixed-methods approach provided a comprehensive understanding of both the actual practices and the underlying knowledge, attitudes, and beliefs of the zoo staff regarding hand hygiene.

RECOMMENDED HAND HYGIENE PROTOCOLS FOR ZOO SETTINGS

Hand hygiene in a zoo is highly recommended to prevent the transmission of diseases between humans and animals. A comprehensive protocol that has to be typically followed in an urban zoo is as follows:

Handwashing stations should be strategically placed at the entrance, and exit, near the animal enclosures, and eating joints. These stations should be well-equipped with running water, liquid soap, and paper towels. When running water is unavailable, soap should be replaced with alcohol-based hand sanitizers. Animal workers and visitors should be encouraged to use the hand-washing facilities generously. The high-touch areas like railings, door handles, and interactive displays should be cleaned and disinfected periodically. The restrooms should be cleaned well and stocked with soap and paper towels. The workers should be provided with face masks, gumboots, and gloves while handling animals and cleaning the zoo premises.

FINDINGS

The ground realities in the zoo are different. There are certain deviations from the protocol. Wash stations are present in some places in the zoo that have running water, but soap and disposable hand towels are not provided. Alcohol-based sanitizers are rarely seen on the zoo premises. The restrooms in the zoo that are used by visitors are cleaned twice a day with water and disinfectant. Running water and liquid soap is available in the wash stations. When there are more visitors to the zoo, it is difficult to maintain the cleanliness in the washrooms.

The workers are either illiterate or less qualified. Therefore, they do not understand the importance of using personal protective equipment (PPE) during their working hours. Their carelessness leads to contact with zoonotic diseases. Ill health among the workers leads to economic losses. Workers do use gumboots and gloves while handling the animals in the zoo and during the cleaning of zoo premises. Masks are rarely used by the workers. Hand washing with soap and water is done only before meals. The use of antimicrobial soap among workers is rarely seen. Extra hand hygiene practices are usually followed when diseased animals are handled by the workers. When there are cuts or abrasions in the hands of the workers, they are immediately treated in the clinic by qualified doctors and provided with medicines free of cost. They are vaccinated periodically for major zoonotic diseases. The deworming process is done both for animals as well as workers. The workers are not well informed about the risks involved due to close contact with the animals. Hand-to-mouth contact is seen among workers in animal contact areas. They are seen smoking, drinking water, and eating without washing their hands.

RESULTS AND DISCUSSION

Table 1 Table Summarizing the data on hand hygiene practices and preferences among animal workers in an urban zoo:

Category	Percentage / Finding
Staff following hand hygiene protocol after animal contact	60%
Staff careless about hygiene levels	40%
Potential improvement in hygiene compliance with regular training and strategic signage	Up to 80%
Staff preference for constant reminders on hand hygiene	High
Preferred solution for remote areas without water access	Alcohol-based hand sanitizers

A study on hand hygiene among animal workers conducted at an urban zoo found that 60% of the staff followed the protocol on hand hygiene after animal contact, while 40% of the staff were found to be careless about their hygiene levels. Regular training of staff at regular intervals and strategic positioning of signage may be effective and improve hygiene compliance by up to 80%. The staff preferred constant reminders on hand hygiene periodically, and alcohol-based hand sanitizers in remote areas of the zoo where there is no access to water.

The results indicate that clear signage, regular training, and gentle reminders will improve hand hygiene compliance in zoo settings. This suggests that visual clues may not be sufficient, but must be tagged with regular training. The preference for hand sanitizers in remote places of the zoo highlights the vigilant mind of the

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 7| July 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

workers. Despite the interventions, a notable number of workers still do not comply with hygiene standards. This calls for the need to enhance education and accessibility. Continuous monitoring, targeted interventions, and possibly more stringent enforcement of hygiene practices could further improve compliance rates.

CONCLUSION

Hand hygiene is a crucial practice to prevent the transmission of zoonotic diseases. Since the zoo workers work in close association with animals for long hours, they should compulsorily adhere to hand hygiene protocols to protect themselves as well as the animals under their care. Regular hand washing either with soap and water or hand sanitizers, and wearing personal protective equipment are vital practices. Strategic placement of hand hygiene signages, video displays of correct practices, regular training sessions by professionals, provision of running water with liquid soap at the entrance, and exit, animal contact areas, maintaining high levels of hygiene in the washrooms, gentle reminders for maintaining rigorous hand hygiene standards can significantly reduce the risk of disease outbreaks and ensure a safer environment for both zoo staff and visitors.

REFERENCES

1. *Anderson, M. E. (2013). Video observation of infection control practices in veterinary clinics and a petting zoo, emphasizing hand hygiene and interventions to improve hand hygiene compliance (Doctoral dissertation, University of Guelph).*
   Google Scholar
2. *Anderson, M. E. C., & Weese, J. S. (2012). Video observation of hand hygiene practices at a petting zoo and the impact of hand hygiene interventions. Epidemiology & Infection, 140(1), 182-19*
   Google Scholar
3. *Angulo, F. J., Steinmuller, N., Demma, L., Bender, J. B., Eidson, M., & Angulo, F. J. (2006). Outbreaks of enteric disease associated with animal contact: not just a foodborne problem anymore. Clinical Infectious Diseases, 43(12), 1596-1602.*
   Google Scholar
4. *Conrad, C. C., Stanford, K., Narvaez-Bravo, C., Callaway, T., & McAllister, T. (2017). Farm fairs and petting zoos: a review of animal contact as a source of zoonotic enteric disease. Foodborne pathogens and disease, 14(2), 59-73.*
   Google Scholar
5. *Davis, M. A., Sheng, H., Newman, J., Hancock, D. D., & Hovde, C. J. (2006). Comparison of a waterless hand-hygiene preparation and soap-and-water hand washing to reduce coliforms on hands in animal exhibit settings. Epidemiology & Infection, 134(5), 1024-1028.*
   Google Scholar
6. *Edmonds, S. L., Mann, J., McCormack, R. R., Macinga, D. R., Fricker, C. M., Arbogast, J. W., & Dolan, M. J. (2010). SaniTwice: a novel approach to hand hygiene for reducing bacterial contamination on hands when soap and water are unavailable. Journal of Food Protection, 73(12), 2296-2300.*
   Google Scholar
7. *Erdozain, G. (2013). Best practices for designing and planning events where human-animal interactions are encouraged, based on observations of risk behaviors and hand hygiene at such events (Doctoral dissertation, Kansas State University).*
   Google Scholar
8. *Fischler, G. E., Fuls, J. L., Dail, E. W., Duran, M. H., Rodgers, N. D., & Waggoner, A. L. (2007). Effect of hand wash agents on controlling the transmission of pathogenic bacteria from hands to food. Journal of Food Protection, 70(12), 2873-2877.*
   Google Scholar
9. *Fox, J. G., Newcomer, C. E., & Rozmiarek, H. (2002). Selected zoonoses. Laboratory animal medicine, 1059.*
   Google Scholar
10. *Ibarra, M. T., Meehan, C., Daniels, M., Smith, W. A., & Smith, M. H. (2021). Low prevalence of handwashing and importance of signage at California County Fair animal exhibits. California Agriculture, 75(3).*
    Google Scholar
11. *LeJeune, J. T., & Davis, M. A. (2004). Outbreaks of zoonotic enteric disease associated with animal exhibits. Journal of the American Veterinary Medical Association, 224(9), 1440-1445.*
    Google Scholar
12. *McMillian, M., Dunn, J. R., Keen, J. E., Brady, K. L., & Jones, T. F. (2007). Risk behaviors for disease transmission among petting zoo attendees. Journal of the American Veterinary Medical Association, 231(7), 1036-1038.*
    Google Scholar
13. *Stirling, J., Griffith, M., Dooley, J. S., Goldsmith, C. E., Loughrey, A., Lowery, C. J., ... & Moore, J. E. (2008). Zoonoses associated with petting farms and open zoos. Vector-Borne and Zoonotic Diseases, 8(1), 85-92.*
    Google Scholar
14. *Weese, J. S., McCarthy, L., Mossop, M., Martin, H., & Lefebvre, S. (2007). Observation of practices at petting zoos and the potential impact on zoonotic disease transmission. Clinical Infectious Diseases, 45(1), 10-15.*
    Google Scholar
15. *Werden, K. E., & Bartlett, P. C. (2008). Compliance with Hygiene Recommendations for Human-animal Contact at Petting Zoos. Michigan Journal of Public Health, 2(2), 6.*
    Google Scholar