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ORIGINAL ARTICLE

Rodent management issues in a Solomon Islands healthcare setting: an infection prevention and control response and preliminary findings

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Abstract

***Background*:** The National Referral Hospital (NRH) in Honiara, Solomon Islands has faced a large-scale rodent infestation for decades posing significant risks to patient safety, infrastructure, and healthcare delivery through issues such as patients receiving bites and medical stores being contaminated.
***Aim*:** This study aimed to implement and evaluate a comprehensive rodent management programme to reduce rodent populations and associated infection risks at the NRH.
***Methods*:** A two-phase approach was adopted:

1. Meeting pre-conditions identified through consultation with hospital staff and an external pest control company.
2. Implementation of rodent extermination using brodifacoum bait stations throughout the NRH.

The programme's effectiveness was assessed through monitoring bait consumption rates and counting collected deceased rodents.
***Findings*:** Following implementation, a significant decrease in rodent populations was observed:

- A total of 110 deceased rodents were recorded in the initial 1-month period.
- Bait consumption decreased from an average of 29 blocks per day 3 weeks post-implementation to 3.57 blocks per day after 6 months.
- No further rodent bites to patients or damage to medical equipment were reported after March 2024.

***Conclusion*:** The rodent management programme demonstrated substantial success in reducing rodent populations at the NRH, improving patient safety and healthcare delivery. However, long-term commitment and resource allocation are necessary to maintain these improvements.

Keywords: *rodents*; *vectors*; *infection prevention and control*; *hospital*; *pest management*; *Solomon Islands*

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The National Referral Hospital (NRH) in Honiara, Solomon Islands has been subject to a large-scale rodent infestation for decades. Rodent populations have been estimated to be in the thousands, if not higher. Many years of uncontrolled rodent breeding has created a multifaceted issue with far-reaching consequences. Implications include disease transmission, bites to patients, physical damage to infrastructure, chewing of electrical wiring causing fires, destruction of medical equipment and consumption of medication and other supplies (Table 1). The NRH Infection Prevention and Control (IPC) unit found that rodent infestation of this magnitude significantly threatened the health and well-being of patients, visitors, and staff. In addition, the damage caused by rodents created an economic burden for the hospital facility.

Available knowledge

Limited literature exists regarding rodent infestations in healthcare settings from an IPC perspective. Dehghani, Bidgoli (1) suggest that up to 66% of hospitals and 23.5% of healthcare centres may be contaminated by rodents in Iran, predominantly by *Mus musculus* and *Rattus rattus*, both of which serve as vectors for zoonotic diseases. It is also reported that rodents contribute to the spread of many other infectious diseases including

Table 1. Hospital stock damaged by rodents in the National Referral Hospital Pharmacy from December 2022 to August 2021

Items	Estimate quantity damaged	Unit cost (SBD)	Total Cost (SBD)
1. Water for injection	2 cartons (2,000 bottles)	$26.20/box	$1,048
2. Normal Saline (1 L)	50 cartons (500 bottles)	$11.04/bottle (1 L)	$5,520
3. Dextrose Saline (1 L)	40 cartons (400 bottles)	$14.06/bottle (1 L)	$5,624
4. Ultrasound Gel – 5 L	10 plastic bottles	$85.17/5 L	$851.70
5. Rebreather/non-rebreather mask	100	$15.67/pc	$1,567
6. Nasal prong (adult & child)	100	$30.17/pc	$3,017
7. Oral rehydration salt	5 cartons	$56.10/pk(100)	$2,805
8. Picoprep™ powder	100 sachets	$11.80/each	$1180.00
9. Multivitamin drops	30 bottles	$66.78/each	$2993.40
10. Hydrocortisone cream	50 tubes	$5.84/each	$292
11. Electrocardiograph gels (5 L)	5 bottles	$169.07/5 L	$845.35
12. Sodium lactate infusion (1 L)	20 ctns (200 bottles)	$14.06/bottle (1 L)	$2,812
13. Ferrous sulphate solutions	30 bottles	$16.91/each	$507.30
14. Polygeline (Haemacel™) infusion 1 L	20 cartons (200 bottles)	$35.18/bag	$7,036
15. Frusemide injection	50 ampoules	$3.98/amp	$199
16. Potassium chloride injection	50 ampoules	$8.10/amp	$405
17. Emergency pills 1.5 mg tab	50 packets	$42.24/pkt (1 tab)	$2,112
18. Therapeutic milk for malnutrition F75™	10 cartons	$86.03/pkt (24)	$860.30
19. Therapeutic Milk for Malnutrition F100™	10 cartons	$91.72/pkt (24)	$917.20
20. Ready to use therapeutic food (peanut)	50 cartons	$2.08/sachet	$15,375
Total		***$55,967 SBD***	

antimicrobial-resistant organisms (2–5). Effective IPC strategies must address multiple factors contributing to infestations, including building conditions, food storage practices, waste management, and structural vulnerabilities. Successful mitigation requires a collaborative approach involving IPC teams, environmental services, facilities management, and administration (1, 6). Key interventions include regular surveillance, prompt reporting of sightings, enhanced cleaning protocols, proper food storage, structural repairs to prevent entry, and targeted use of traps and baits (6, 7).

Rationale

Rodents pose significant public health risks as reservoirs and vectors for numerous pathogens. Research indicates at least 35 diseases can be transmitted by rodents through direct and indirect means, including bites, scratches, exposure to body fluids, and contact with their ectoparasites (8, 9). Of particular concern in this context is *Rattus rattus*, implicated in the transmission of several serious zoonotic infections. Notable diseases associated with rodents include Rat Bite Fever, caused by *Streptobacillus moniliformis* or *Spirillium minus*; Hantavirus Pulmonary Syndrome, with a mortality rate of 30–40%; Leptospirosis, spread through contaminated water or food; Toxoplasmosis, caused by the protozoan *Toxoplasma gondii*; and Angiostrongyliasis, a neurological condition resulting from infection with the nematode *Angiostrongylus cantonensis* (10–14).

Beyond their role in zoonotic disease transmission, rodents contribute to the global issue of antimicrobial resistance (AMR). These animals can harbour various antibiotic-resistant bacteria, including strains of *Escherichia coli*, *Klebsiella spp*., *Pseudomonas spp*., and *Staphylococcus aureus* (2). The potential for these resistant organisms to spread to humans through environmental contamination or direct contact presents a significant challenge to public health efforts and clinical treatment options (5). As rodent populations increase in urban and rural settings, the risks associated with both zoonotic infections and AMR transmission are likely to escalate, underscoring the need for robust pest control measures and continued surveillance of rodent-associated pathogens.

As the rodent population increased the impact on the safe provision of healthcare grew, with healthcare-associated infections of critical concern. In response a comprehensive evidence-based rodent management plan was designed and implemented by the NRH IPC unit with support of an external professional pest management company over the course of 2023–2024.

Aims

The rodent management programme was designed to reduce the infestation rates of rodents and associated infection risks in the NRH in Honiara, Solomon Islands. The programme also aimed to reduce the economic burden experienced by the hospital facility.

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Methods

Context

The Solomon Islands, an archipelagic nation in the Melanesian region of the South Pacific, comprises six main islands and nearly 1,000 smaller islands, atolls, and reefs. With a land area of 28,466 square kilometres, it supports a population of approximately 650,000 people (15). The NRH is the country's primary healthcare facility in the capital city, Honiara. As the sole tertiary care centre in the Solomon Islands, the NRH provides the highest level of medical care available in the country, with a fluctuating capacity of 300–400 beds (16). It serves as the regional hospital for Guadalcanal province and receives specialist care referrals from other provinces. In 2022, the hospital recorded 11,454 admissions, highlighting its crucial role in the nation's healthcare system (17).

The South Pacific region, including the Solomon Islands, faces significant challenges related to rodent populations. More than 80 rodent species inhabit the area, with three predominant species: the black rat (*Rattus rattus*), brown rat (*Rattus norvegicus*), and Pacific rat (*Rattus exulans*) (18). These rodents, believed to have been introduced during European colonial exploration in the 18th and 19th centuries, have since proliferated throughout the region. Their presence has had detrimental effects on human livelihoods, native biota, and ecosystems (19). Given the widespread distribution of rodents in the South Pacific and their potential impact on public health, there is a pressing need for research and interventions to mitigate the risks associated with rodent-borne diseases and environmental damage.

Intervention

The IPC unit completed a consultation process with NRH staff to understand the magnitude of rodent infestation. This included nurses, doctors, cleaners, kitchen staff, and various heads of department. Pest management company 'Pink South Pacific' undertook an external review of the NRH complex and advised the necessary pre-conditions required in preparation for rodent extermination. Funding for the project was provided by the New Zealand High Commission to the Solomon Islands.

The rodent management programme consisted of two phases:

- Meeting all the identified pre-conditions. If not completely met, an acceptable level of progress had to have been made.
- Rodent extermination by installing brodifacoum bait stations around the NRH complex.

External review

Professional pest management company 'Pink South Pacific' completed an external review of the NRH complex that identified the scale of infestation, the extent of the associated threat to health and well-being of patients, families and staff, and recommended strategies for a rodent management programme (Table 2).

Pre-conditions

In preparation for rodent extermination, pre-conditions describing issues, rationales, and required actions were identified by the IPC unit in conjunction with the professional pest management company (Table 3).

Rodent extermination

Deceased rodents

NRH staff observed rodent populations to significantly decrease following the installation of brodifacoum bait stations. Brodifacoum is a second-generation anticoagulant rodenticide with a well-established effectiveness in the Pacific and was the only rodenticide offered by the pest management company (20, 21). NRH cleaning and groundskeeping staff kept a record of the quantity of deceased rodents collected. A total of 110 deceased rodents were recorded in the initial 1-month period. These results are believed to be a conservative estimate, as only those who died in visible locations could be recorded. Deceased rodents were suspected and found in hard-to-reach places such as ceiling and wall cavities, as hospital staff alerted the IPC team to offensive odours.

Levels of bait consumption over time

As discussed above the counting of deceased rodents was not thought to be completely accurate. As an indicator of programme progress the consumption of bait was recorded. Pink South Pacific reported a significant

Table 2. Extracts from the Pink South Pacific External Review Report

Observations:

- There was widespread evidence of an extremely severe infestation by the commensal pest rodent Rattus rattus, commonly known as roof or ship rat. There were obvious rub marks to both interior and exterior of many of the buildings and rodent droppings were sighted in various areas.
- This pest rat is a serious health threat globally and, among others is responsible for the transmission of; hantavirus, bubonic plague, salmonella, rat bite fever, leptospirosis, typhus.
- It is not possible to accurately determine the rat population, however, we are confident that the number of rats is in the thousands, if not higher.

Recommendations:

- The only control method that will reduce the rat population significantly while avoiding huge labour costs is the implementation of a professional rodent management program using tamper-resistant, lockable rodent bait stations.

Table 3. Pre-conditions to rodent extermination

Issue	Rationale	Actions undertaken
Safe Food Storage	Safe food storage practices discourage rodents from entering the hospital buildings seeking food.	• The IPC unit recommended that food be stored in robust, airtight containers – preferably metal, glass, or hard plastic. • The IPC unit delivered education to nursing staff, who were responsible for implementation. • Posters encouraging safe food storages practices were displayed around the hospital in Solomon Islands Pijin.
Adequate Waste Management	Improper rubbish disposal encourages rodents indoors scavenging.	• The IPC unit recommended that more wastebins should be available in hospital inpatient departments. • Volunteer Services Abroad (VSA) provided funding for 30 x 80 litre waste bins. These were purchased and distributed around the hospital by the IPC unit.
Secure Water Sources	Rodenticides such as brodifacoum make rodents thirsty and seek water. Hospital water sources must be secured to prevent rodent contamination.	• Hospital plumbing staff and Pink South Pacific technicians secured 47 water tanks with mesh netting around the inlets or lids.
Pharmacy Supply of Appropriate Reversal Agent	The hospital pharmacy requires sufficient stock of reversal agent in case of accidental ingestion by a 'non-target' species.	• The IPC unit performed a visual inspection of Vitamin K stock and found the NRH pharmacy to have sufficient quantities.
Facilities to Monitor Prothrombin Time	If accidental ingestion takes place, the patient's prothrombin time must be monitored frequently.	• The IPC unit discussed with hospital laboratory staff and found that prothrombin time testing is possible at NRH.
Elimination of External Harbourages	External harbourages become a refuge for rodents to hide and seek shelter.	• External harbourages include piles of rubbish, organic material, and discarded hospital equipment. • The IPC unit identified external harbourages around the NRH and delegated groundskeeping staff to assist with tidying up.
General Maintenance of Hospital Buildings	Exit and entrance points are sealed to prevent rodents from gaining access to hospital buildings.	• The IPC unit found that the NRH has a construction plan in place with many hospital buildings already being renovated.
Public Awareness	All patients, visitors, and staff must be aware of rodent extermination activities.	• The IPC unit hung informative posters around the NRH complex. • Messages regarding rodent management activities were announced on the hospital PA system. • NRH staff were informed of rodent management activities via email. • Rodent management activities were discussed with leaders of communities that are residing next to the NRH complex.

decrease in bait consumption rates from February to August 2024 (Table 4). This indicates a reduction in rodent population over the course of the programme.

Discussion

Summary

Preliminary observations suggest that the implementation of the rodent management programme at NRH was largely successful in its first year. The decreasing quantities of poison consumed by rodents over time indicates decreased demand, suggesting fewer numbers of rodents in the NRH complex. Between August and October 2024, the average amount of poison consumed per day has remained consistently the same. Partnership with a professional pest control company, together with meeting identified pre-conditions were critical to the reduction of rodent populations.

Table 4. Levels of rodent bait consumption provided by Pink South Pacific

Month, year	Time since programme commencement	Number of blocks of poison consumed per day (average)
February, 2024	Three weeks	29
May, 2024	Four months	4.16
August, 2024	Six months	3.57
October, 2024	Eight months	3.57

Note. Table 4 data provided by Mr Rik Trotter, Managing Director of Pink South Pacific (Personal Communication, 2024).

Interpretation

Rodent extermination began on Monday the 29th of January 2024, with the installation of 200 bait stations around the NRH complex. Bait stations are tamper-resistant, lockable plastic boxes that house wax blocks of the rodenticide brodifacoum. Pink South Pacific technicians

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attended the NRH daily for the initial 3-month period, to service the bait stations. Technicians replenished bait blocks that had been consumed, monitored rates of consumption, and identified 'high traffic' areas around the hospital. Less poison was consumed over time, which consequently meant that technicians serviced bait stations less frequently – weekly and then fortnightly.

While it is unlikely to achieve complete eradication of rodents, the implementation of a rodent management programme based on the recommendations of the External Review (Table 1) has drastically reduced rodent populations at NRH, creating a safer environment for patients, visitors, and staff. The observations of reported reduction in rodent numbers were supported by the indirect evidence of a parallel reduction in the consumption of bait over time. Decreased populations of rodents have improved the quality of care delivered, and since March 2024 there have been no further reported bites to patients. There has also been nil further reported damage to medical equipment, medications, or consumables in this time.

These achievements were founded on the satisfactory resolution of the issues and necessary actions detailed in Table 2. This required a hospital-wide collaborative approach and interventions across several domains within hospital services and infection prevention praxis.

Brodifacoum is well-known to be an effective rodenticide and is widely used in a range of pest control settings (21). The reduction of rodent populations was an expected outcome following the installation of bait stations. The uniqueness of this case study lies in both the magnitude of rodent infestation and being in a hospital context, with increased risk of adverse events to affect patients, visitors, and staff. Furthermore, NRH often suffers from resource shortages making the implementation of such a programme challenging.

Large quantities of rodents dying simultaneously could have severe negative unintended consequences on the hospital environment (21). The programme's success in reducing populations was for the most part without any major detrimental events. This demonstrates the importance of meeting the identified pre-conditions to ensure any poisoning takes place in a safe and effective manner.

This article has described preliminary observations made during a two-phase approach to rodent management. However, provision for a maintenance phase must be made to ensure the long-term sustainability of the project. If any of the identified pre-conditions are not maintained, or brodifacoum poisoning ceases, rodents will breed, and populations will potentially rapidly grow to detrimental levels again.

For long-term maintenance of the rodent control programme, the commitment and support of the national government, hospital management and international partners is critical. For this programme the collaboration of staff across NRH was required to prepare for and operationalise the baiting. External support from partners was also critical with Pink South Pacific donating servicing costs, Volunteer Services Abroad donating rubbish bins to help prepare the environment for the programme, and the New Zealand High Commission to the Solomon Islands donating the remaining costs of the programme. To maintain the programme, ongoing supports will be required. At the national level, budget lines for expanded rodent-associated infection control are required. At the facility level, allocation of budget funds to the rodent control programme must be embedded in hospital policy and at the international level, donors will be required to take a multi-year approach to supplementary funding for the programme. This will ensure that rodent populations are kept at a safe and manageable level for years to come.

Limitations

One major limitation of the report is the lack of quantitative data – this was due to a lack of material resources and understaffing within the IPC unit. Data are unavailable to illustrate the detrimental effects of rodent infestation such as disease transmission, quantity and severity of rodent bites and the amount of medical equipment, medications and consumables damaged by rodents.

The economic burden of rodent infestation on NRH is expected, however the qualitative data to accurately express this was difficult to source with some quantification available through lost stock in pharmacy (Table 1). Rodent infestation has cost the NRH a substantial sum of money in terms of replacing damaged medical equipment, repairing infrastructure, disposing of medications and consumables. Moreover, patients being bitten by rodents often develop infections, requiring antibiotics and longer hospital stays causing further hospital expenditure (22).

It was not possible to measure the total number of rodents that were killed, as only those who died in visible locations within the hospital compound could be accurately counted.

Ethical consideration

Research ethical approval was not required for this quality improvement project. Due to the risk to human health Hospital Executive approved the method of rodent control with oversight from a professional pest management company utilising a proven control method.

Conclusions

Rodent infestation is a significant public health concern in hospitals globally. The NRH in Honiara, Solomon Islands is not alone in its struggles to control this pest. Due to the

perceived negative connotations associated with rodent infestation, healthcare facilities often do not receive the support to tackle such an issue.

The NRH has demonstrated that substantial reductions in rodent populations are possible, while making the case for long-term commitment to the programme. Learnings from the experience of the hospital's IPC unit can potentially be adapted for other contexts that may be facing similar issues.

Authors' contributions

KC: conceptualisation, methodology, formal analysis, validation, data curation, writing – original draft, writing – review and editing, project administration. MK: conceptualisation, writing – original draft, writing – review and editing. MM: conceptualisation, methodology, writing – original draft, writing – review and editing, supervision.

Conflict of interest and funding

No conflicts of interest are declared by the authors.

Implementation of a rodent management programme at the National Referral Hospital was made possible with the funding from several organisations.

Professional Pest Management Organization 'Pink South Pacific' committed a significant donation in servicing costs for the programme.

Volunteer Services Abroad (VSA), a New Zealand based Non-Government Organisation, funded 30 × 80 L rubbish bins to ensure adequate waste management as a precondition to rodent extermination.

The New Zealand High Commission to the Solomon Islands donated the remaining costs of the programme.

Ethics

There were no ethics requirements for this quality improvement project. Permission for publication was provided by the National Referral Hospital, Honiara, Solomon Islands.

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References

1. Dehghani R, Bidgoli MS, Takhtfiroozeh S, Amini N, Behrozi L, Chimehi E. Contamination status of hospitals and health care centers by rodents (Rodentia: Muridae) in Iran. J Commun Dis 2018; 50(2): 11–6.
2. Islam MM, Farag E, Hassan MM, Enan KA, Mohammad Sabeel K, Alhaddad MM, et al. Diversity of bacterial pathogens and their antimicrobial resistance profile among commensal rodents in Qatar. Vet Res Commun 2022; 46(2): 487–98. doi: 10.1007/s11259-021-09876-2
3. Cowie RH. Angiostrongylus cantonensis: agent of a sometimes fatal globally emerging infectious disease (rat lungworm disease). ACS Chem Neurosci 2017; 8(10): 2102–4. doi: 10.1021/acschemneuro.7b00335
4. Samsudin S, Saudi SN, Masri NS, Ithnin NR, TZMt J, Hamat RA, et al. Awareness, knowledge, attitude and preventive practice of leptospirosis among healthy Malaysian and Non-Malaysian wet market workers in selected urban areas in Selangor, Malaysia. Int J Environ Res Public Health 2020; 17(4): 1346. doi: 10.3390/ijerph17041346
5. Uea-Anuwong T, Byers KA, Wahl LC, Nekouei O, Grohn YT, Magouras I. Antimicrobial resistance in bacteria isolated from peridomestic Rattus species: a scoping literature review. One Health 2023; 16: 100522. doi: 10.1016/j.onehlt.2023.100522
6. Desoky AE-ASS. Rodent control strategies in hospitals. Int J Res Agric For 2019; 6(3): 7–8.
7. Staubitz L, Hilken L, Bryan K. Rats! Infection prevention's journey during a hospital kitchen infestation. Am J Infect Control 2023; 51(12): 1441–3. doi: 10.1016/j.ajic.2023.06.009
8. Krawczyk AI, van Duijvendijk GL, Swart A, Heylen D, Jaarsma RI, Jacobs FH, et al. Effect of rodent density on tick and tick-borne pathogen populations: consequences for infectious disease risk. Parasit Vectors 2020; 13: 1–17. doi: 10.1186/s13071-020-3902-0
9. Meek F. Rodent infestations and the spread of infectious diseases 2023. Available from: https://www.infectioncontroltoday.com/view/rodent-infestations-spread-infectious-diseases [cited 25 October 2024].
10. Abbasi M, Kowalewska-Grochowska K, Bahar MA, Kilani RT, Winkler-Lowen B, Guilbert LJ. Infection of placental trophoblasts by Toxoplasma gondii. J Infect Dis 2003; 188(4): 608–16. doi: 10.1086/377132
11. Strand TM, Lundkvist Å. Rat-borne diseases at the horizon. A systematic review on infectious agents carried by rats in Europe 1995–2016. Infect Ecol Epidemiol 2019; 9(1): 1553461. doi: 10.1080/20008686.2018.1553461
12. Centers for Disease Control and Prevention. Leptospirosis 2024. Available from: https://www.cdc.gov/leptospirosis/about/index.html [cited 25 October 2024].
13. Centers for Disease Control and Prevention. Symptoms for angiostrongylus 2024. Available from: https://www.cdc.gov/angiostrongylus/causes/index.html [cited 25 October 2024].
14. Centers for Disease Control and Prevention. Symptoms for toxoplamosis 2024. Available from: https://www.cdc.gov/toxoplasmosis/symptoms/index.html [cited 25 October 2024].
15. Solomon Islands Government. Solomon Islands: National Health Strategic Plan 2022–2031. 'A Healthy Future for All'. Ministry of Health and Medical Services, editor. Honiara: Solomon Islands Government; 2022.

16. World Health Organization. Regional Office for the Western Pacific. Solomon Islands health system review. Manila: WHO Regional Office for the Western Pacific; 2015.
17. National Referral Hospital. Monthly bed statement report. Department of Medical Records, editor. Honiara: Ministry of Health and Medical Services; 2024.
18. Brown PR, Aplin KP, Hinds LA, Jacob J, Thomas SE, Ritchie BJ. Corrigendum to: rodent management issues in South Pacific islands: a review with case studies from Papua New Guinea and Vanuatu. Wildl Res 2018; 45(2): 193. doi: 10.1071/WR17104_CO
19. Shiels AB, Pitt WC, Sugihara RT, Witmer GW. Biology and impacts of Pacific island invasive species. 11. Rattus rattus, the black rat (Rodentia: Muridae). Pac Sci 2014; 68(2): 145–84. doi: 10.2984/68.2.1
20. Sran SPK, Gartrell BG, Fisher P, Armstrong DP. Apparent resistance to brodifacoum in *Rattus rattus* in a New Zealand site with no history of anticoagulant-based rodent control. Wildl Res 2023; 50(1): 28–38. doi: 10.1071/WR21064
21. Pitt WC, Berentsen AR, Shiels AB, Volker SF, Eisemann JD, Wegmann AS, et al. Non-target species mortality and the measurement of brodifacoum rodenticide residues after a rat (*Rattus rattus*) eradication on Palmyra Atoll, tropical Pacific. Biol Conserv 2015; 185: 36–46. doi: 10.1016/j.biocon.2015.01.008
22. Abbas Z, Lutale J, Archibald L. Rodent bites on the feet of diabetes patients in Tanzania. Diabet Med 2005; 22(5): 631–3. doi: 10.1111/j.1464-5491.2005.01488.x

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