Wildlife Health Australia

PERSONAL PROTECTIVE EQUIPMENT (PPE) INFORMATION FOR BAT HANDLERS

This document provides information on personal protective equipment (PPE) aimed at preventing the transmission of ABLV and other bat-borne pathogens through bat bites and scratches, or via contact with infected urine, faeces, saliva or aerosols. It is intended to provide information for vaccinated bat rehabilitators, researchers, ecologists, veterinarians and associated workers. Use of appropriate PPE will also help prevent disease transmission from the person to the bat. For more information on biosecurity measures for working with Australian wildlife, see the National Wildlife Biosecurity Guidelines.

Only people who are appropriately vaccinated and maintain ongoing immunity should handle bats. If you are unvaccinated and find an injured or sick bat, do not handle the bat and contact a wildlife care organisation or your local veterinarian.

Bat-borne zoonotic pathogens circulate in Australian bat populations, meaning there is always some risk of transmission from bats to people. Risk is best minimised via a combination of appropriate PPE and manual handling techniques. PPE that allows for a good feel of the bat and its body parts is essential for reducing handling stress, getting the job done well and quickly and staying in control of the bat with a minimum of force. These factors combine to keep the bat calm and so help to avoid bites and scratches.

This document provides generic, helpful principles and examples; however, bat handlers may be required to adapt this information according to their expertise, experience and the task at hand. The appropriate level of PPE will vary under specific circumstances (Table 1). For example, risk may be increased in an individual bat demonstrating neurological signs or abnormal behaviour or decreased in healthy bats that have been handled intensively in care for long periods of time (e.g. months). Events preceding handling may be an important consideration. Handlers dealing with sick and injured bats are more likely to encounter an ABLV infected bat than those working with wild-caught healthy bats. Microbats being taken from harp traps are generally calmer than those being untangled from mist nets, and handling microbats requires a greater feel of the bat than handling flying foxes, and so lighter and thinner gloves are required. Bats in care generally humanise quite quickly, are much calmer and their behaviour more predictable. Many flying foxes in care are orphans and so much smaller and easier to handle; while orphaned microbats in care are so small that other challenges exist. Risk will vary according to individual bat temperament.

Each organisation and individual must assess the risk of each situation and apply the level of risk mitigation appropriate to that situation.

Table 1. Factors contributing to the risk spectrum

Lower risk scenario	Higher risk scenario
Healthy / normal behaviour	Unhealthy / abnormal behaviour
Bat has been handled in care for an extended period (e.g. months)	Wild-capture
Experienced handler	Inexperienced handler
Pups	Older juveniles, subadults, adults
Anaesthetised	Conscious
Calm capture (harp traps)	Entanglement (nets and barbed wire)

Types of PPE

Types of PPE included in this document are discussed below. Individuals will need to identify their own preferred brands of glove depending on fit, ease of cleaning, thickness, cost and availability.

General protection

- Long sleeved shirt and pants
- Covered boots
- Evaporative cooling vests

Hands/skin

- Heavy duty/thick Nitrile gloves
    - Nitrile is a chemical resistant, puncture resistant material, which is a synthetic reprocessed (and much stronger) version of latex. Nitrile gloves vary greatly in thickness and cuff length, and so cost.
    - *Latex gloves or thin nitrile gloves should not be used alone for handling bats* (Photo 1). Thin nitrile gloves are often blue and the typical thickness is ~0.1mm or ~4 Mil[1].
    - "Heavy duty" nitrile gloves are thicker (Finger thickness > 0.19mm, >7 Mil) and are often purple or black. The thicker the nitrile, the more resistant to punctures they are. Thicker nitrile is designed to stretch rather than split with punctures/scratches.
    - In the event of a scratch or bite, checking the gloves for any breach allows the carer to know that no exposure has occurred. Immediately use a pen to mark the glove where bite occurred, then remove and hold up to the light to see if glove was penetrated.
    - Some nitrile gloves are available with long cuffs, which provide extra protection for wrists from scratches (Photo 2).
    - In text below, we have not always recommended thick or thin nitrile gloves. This decision is best guided by the situation.
- Fingerless gloves - Provide additional protection to the hands, over thick nitrile gloves (Photo 3)
- Gardening gloves or golf gloves - Provide additional protection to the hands (Photos 4 & 5)
- TurtleSkin gloves - TurtleSkin is an expensive patented fabric similar to Kevlar and is almost impenetrable
- Neoprene armbands - Provide additional protection to the arms, over thick nitrile gloves (Photo 6)
- Leather gauntlets with a long cuff (gardening gauntlets, welder's gloves) (Photo 7)
- Towel (different thicknesses and sizes depending on species and situation)

Other protection

- N95 mask
- Safety glasses

[1] Note that glove thickness is often measured in "Mil" which is equal to one thousandth of an inch (.001 inch). To convert mil to mm, take mil and divide by 39. To convert mm to mil, take mm and multiply by 39.

Photo 1: Thin nitrile gloves

Photo 2: Thick/Heavy duty long cuff nitrile gloves

Photo 5: Golf gloves

Photo 6: Neoprene armbands and thick nitrile gloves used to handle an orphan

Photo 3: Fingerless gloves (e.g. cycling gloves)

Photo 4: Gardening gloves

Photo 7: Long-cuffed leather gauntlets/ welder's gloves

Photo 8: Double layer nitrile gloves taped to the cuff of a long-sleeved shirt

FLYING FOXES Situation	**Suggested PPE for BAT REHABILITATORS, RESEARCHERS, ECOLOGISTS, VETERINARIANS AND ASSOCIATED STAFF**
General considerations for people in close proximity to bats being handled	For people not vaccinated against rabies/ABLV: As long as bats are under control, for most situations a verbal briefing about staying more than 1.5 metres away is sufficient. To protect against viral transmission via aerosols or droplets, some universities/facilities require all those working within a 2 metres radius of bat activities (e.g. catching and processing) to cover all mucous membranes (e.g. lining of the mouth, nose, eyes). This is achieved by wearing safety glasses and surgical mask protection at all times. In general, long sleeved shirts/pants and sturdy covered shoes or boots should be worn to protect against scratches. Ideally, the outer long-sleeved shirt should be removed when leaving the field site/after handling to avoid transferring pathogens across different environments.
In care: Restraining, handling and catching a flying fox in care for examination, treatment, weighing, measuring	*Pups to 300g:* On admission, all pups should be handled with armbands, thick nitrile gloves and a small towel for catching. Many pups readily accept a dummy and will then immediately relax, making handling infinitely easier. Orphaned bats require daily wing cleaning, feeding, etc. and so they very quickly get used to their carer in the majority of situations. Their behaviour becomes more predictable and lighter PPE will then usually be an option e.g. long-cuff gardening gloves. Beware: There have been numerous atypical cases of ABLV in orphans where neurological signs are not immediately apparent. *Adults and subadults:* Best for a calm approach by one person who avoids eye contact with the bat. Ideally capture the bat when its wings are folded by its sides in a towel that is 2-3 layers thick. If the wings are folded this can create difficulties in handling if wishing to examine the wings, but fine for weighing and measuring. PPE includes neoprene armbands and thick nitrile gloves. See Photo 6.
Restraining and removing flying foxes entangled on barbed wire fences or in fruit netting	Entangled bats are likely to be dehydrated and in pain. Entanglement may be severe, and require complex handling. Best for a calm approach by one person who captures the bat in a towel that is 2-3 layers thick. If a second person is available, they then approach. PPE includes neoprene armbands and thick nitrile gloves for both people. See Photo 6.
Restraining and removing flying foxes captured in mist nets	Removing flying foxes from mist nets should involve two people: one to restrain the bat and the other to untangle the bat. PPE for the Restrainer is a double layer of heavy-duty nitrile gloves under welding gloves with a long cuff; PPE for the Untangler is a double layer of thick nitrile gloves under thick fingerless gloves (e.g. cycling or rose pruning gloves). Long sleeved shirt cuffs may be taped to the nitrile gloves to prevent scratches to exposed skin. See Photo 8.
Examination and treatments with anaesthesia	Prior to anaesthesia, capture and handling requires two handlers with neoprene armbands and nitrile gloves, with primary handler also wearing welding / gardening gloves. Armbands and welding gloves can be removed for longer procedures once bat is fully anaesthetised, but replace PPE during recovery. For juveniles over 300g: Thick nitrile gloves and armbands – may need two handlers depending on temperament.
Working underneath colonies, collecting samples but no handling expected	People undertaking prolonged work underneath a flying fox roost, including collection of samples, should follow the information in the general considerations, including covering of mucous membranes. Long sleeved shirts/pants and covered boots + carry PPE in case handling is required.

Heat stress events[#] - Picking up adults and young for taking into care; also spraying with water and no handling	Neoprene armbands and thick nitrile gloves. These will get hot and sweaty very quickly but cotton gloves underneath can help. Good quality gardening gauntlets may be adequate for young orphans. PPE during a heat event involves protection from the heat as well as bats e.g. evaporative cooling vests, clothes made from cool materials, hats, backpack water bladder.

[#] Heat Stress

Refer to various publications and documents available through carer networks

- *Flying Fox Heat Event Response Guidelines SEQ* Bishop, Lyons 2018, p19
- *Managing Heat Stress in Flying Fox Colonies* Stanvic, McDonald, Collins 2013, p19
- *Safe work practices during heat stress events* Tim Pearson 2019
- Mo M & Roache M (2020). A review of intervention methods used to reduce flying-fox mortalities in heat stress events. *Australian Mammalogy,* https://doi.org/10.1071/PC20031

MICROBATS Situation		**Suggested PPE for BAT REHABILITATORS, RESEARCHERS, ECOLOGISTS, VETERINARIANS AND ASSOCIATED STAFF**
Examination, measuring, sexing etc	Microbat ≤ 10g	One glove and a cloth/pouch. • Glove is nitrile or a supple, close-fitting glove with nylon/nitrile protected palms and fingertips. Personal choice to use thick or thin nitrile based on species and experience. It can be hard to find gloves close-fitting around finger tips. e.g. gardening gloves like Showa grip lite, Cyclone Invisigrip, Golf gloves. • Cloth or pouch (prefer flannelette or polar fleece) helps to surround the bat giving it a sense of safety rather than exposure. Cotton gloves are worn by some rehabilitators but are often not close-fitting enough and claws can get caught.
Removing from mist nets		Nitrile gloves, thin leather gloves, also TurtleSkin gloves.
Removing from harp traps		Nitrile gloves.
Removing from barbed wire fences, nets, treatments and examinations	Diadema, Ghost bats, Syconycteris	Thick leather gloves, well- fitting work gloves, nitrile under thin leather.

This document was written by Tania Bishop, Jenny Mclean and Alison Peel, with input from the Wildlife Health Australia Bat Health Focus Group.

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