

Subject:	Policy – Liquid Nitrogen Safe Handling	Date Approved:	September 5, 2018
Approved by:	Executive Director	Date Revised:	
Specific to:	All Staff, Board of Directors and Volunteers	Next Review Date:	September 2021

Purpose:

The purpose of this policy is to create an awareness of the common hazards and potential injuries that can occur when transferring liquid nitrogen from the storage tank to the Brymill Cryogenic Systems dispenser (dispenser). Liquid nitrogen is a compressed gas and a hazardous material. Proper procedure and safety precautions are to be followed, otherwise an injury could occur.

Policy Statement:

It is the policy of the North Huron Family Health Team to follow safe procedure every time liquid nitrogen is transferred from the storage tank to the dispenser.

Scope:

NHFHT Nurse Practitioners that have undergone an orientation session.

Roles and Responsibilities of Workplace Parties:

- 2.0 General Duties of the Employer
- 2.1 Ensure the health and safety of workers is protected.
- 2.2 Ensure that all equipment, materials and protective devices are provided and maintained in good condition.
- 2.3 Provide information, instruction and supervision to a worker to protect the health and safety of the worker.
- 2.4 Assist in a medical emergency by providing any information, including confidential business information, to a qualified medical practitioner who requests the information in order to diagnose or treat any person.
- 2.5 Inform workers of any possible hazard in the workplace and in the handling, storage, use, disposal and transport of any article, device, equipment, etc.
- 2.6 Assist and cooperate with Health and Safety representative in the carrying out of their functions.
- 2.7 Post, in the workplace, a copy of the Occupational Health and Safety Act and any explanatory material prepared by the Ministry, outlining the rights, responsibilities and duties of workers.

- 2.8 Review annually a written occupational health and safety policy and develop and maintain a program to implement that policy.
- 2.9 Post, in the workplace, a copy of the “company” health and safety policy.
- 2.10 Provide the health and safety representatives with the results of any occupational health and safety report that the employer has.
- 2.11 Advise workers of the results of such a report.

3.0 General Duties of Supervisors /Executive Director

- 3.1 Ensure workers comply with the Act and its regulations.
- 3.2 Ensure that all equipment, materials and protective devices are provided and maintained in good condition and ensure required protective devices/clothing is worn by workers.
- 3.3 Inform workers of any possible hazard in the workplace and in the handling, storage, use, disposal and transport of any article, device, equipment, etc.
- 3.4 Ensure the health and safety of workers is protected.

4.0 General Duties of Workers

Workers have several general duties under the Act. A worker must take responsibility for personal health and safety insofar as he or she is able.

Under the “Act:

- 4.1 All workers shall work in compliance with the Act and Regulations (Section 28(1) (a)).
- 4.2 All workers shall use or wear any equipment, protective devices or clothing required by the employer (Section 28(1) (b)).
- 4.3 All workers shall report to the employer or supervisor any known missing or defective equipment or protective device that may be dangerous in writing (Section 28(1) (c)).
- 4.4 All workers shall report any known workplace hazard to the employer or supervisor in writing (Section 28(1) (d)).
- 4.5 All workers shall report any known violation of the Act or regulations to the employer or supervisor in writing (Section 28(1) (d)).
- 4.6 No worker shall remove or make ineffective any protective device required by the employer or by regulations (Section 28(2) (a)).
- 4.7 No worker shall use or operate any equipment or work in a way that may endanger any worker (Section 28(2) (b)).

- 4.8 No worker shall engage in any prank, contest, feat of strength, unnecessary running or rough boisterous conduct (Section 28(2)).
- 4.9 All workers shall report all work related illness and injuries to the Joint Health and Safety Committee.
- 4.10 All workers shall review the NHFHT Occupational Health and Safety policy as posted.

Procedures:

Safety Precautions:

- Caution – When handling liquid nitrogen ensure you are familiar with the information contained on the SDS for liquid nitrogen and that you are wearing the appropriate recommended personal protective equipment.
- Cryo-gloves and a face shield are to be worn to provide protection. Closed toe and heel shoes are to be worn.
- The Brymill Cryogenic Systems dispenser is easily filled warm or refilled cold after prolonged use.
- Liquid nitrogen may be carefully poured into the bottle (slowly when warm) or by any standard LOW pressure withdrawal device from a liquid nitrogen storage Dewar.
- The volume of liquid nitrogen needed for adequate functioning is from 33% to 70% full.
- It is recommended that for 3-6 hour duration of intermittent use that the cryosurgical unit is 70% filled. The provider will find that if the unit is filled approximately 40%, it will be lighter in weight and the top will remain slightly warmer for further comfort in continued handling.
- Before replacing the top, ensure that the rubber gasket is still in place inside the cap. If it is missing the cryosurgical unit may not pressurize correctly and the top may become stuck. In this event the cryosurgical unit must be returned to an authorized repair centre for proper removal.
- After filling a warm cryosurgical unit, allow 30 to 60 seconds for the initial boiling of the liquid nitrogen to subside before attempting to replace the cover. If a large number of cryosurgery procedures are scheduled, the reservoir of liquid nitrogen may be topped off after the first boiling, and the unit has cooled off.
- Caution – To refill a cryosurgical unit after it has been in use you must ensure that the unit is depressurized before removing the top. To depressurize the cryosurgical unit, unscrew the top quarter to a half turn only. The pressurized gas inside will begin to vent from the hole situated in front of the valve body. Once the hissing has stopped the top can be unscrewed and removed.
- Liquid nitrogen is an extremely cold substance, i.e. -196 degrees Celsius, and should be treated with extreme caution at all times. For full details regarding liquid nitrogen you

should contact your supplier of liquid nitrogen and obtain a copy of the Safety Data Sheet (SDS).

- The provider should always maintain a clean supplier of liquid nitrogen. To help ensure the liquid nitrogen remains free of particulate matter, such as ice crystals, carbon dioxide slush, lint, etc., the storage Dewar used should be completely emptied at least 4 times a year just prior to having it refilled. This is accomplished by vigorously agitating the residual amount of liquid nitrogen in the Dewar and discarding it in a safe, outdoor area.
- Maintenance: When the cryosurgical unit is warm and dry, the top centre valve stem should be lubricated with a DROP of silicone lubricant or WD-40. Lubrication should be carried out every 3-6 months. CAUTION: If excessive amounts of lubricant are applied, the trigger mechanism could freeze open.

Operating instructions:

- Caution: When using the cryosurgical unit ensure unit is kept upright as possible to prevent purging of liquid nitrogen from the relief valve. The 20g bent spray supplied with each unit allows open spraying in any position through 360 degrees and eliminates the need to tip the unit.
- The cryosurgical unit is designed only for use with other Brymill manufactured products.
- Your unit is supplied with 4 different sizes of open spray apertures and a 20g bent spray. The full range of open spray or contact probe will depend upon the size and type of lesion being treated
- Spray tips and probes must be secured to the permanently affixed knurled nut with finger tight firmness.
- When the patient treatment is complete, set the cryosurgical unit gently on a table. The bottom of the unit may be damaged if it is dropped or repeatedly brought in contact with a hard surface.
- At the conclusion of an office day, the cryosurgical unit should be stored in a CLOSED position (with the top on) whether or not there is a residual amount of liquid nitrogen left in it. This is extremely important in order to eliminate the potential build up of condensation within the unit and tubing.

Decontamination:

- It is recommended that the cryosurgical unit be cleaned between episodes of patient care. Since the cryosurgical unit when operating in the “spray” mode do not come in contact with the patient then the infection risk is classified as “Low” and therefore the unit only requires periodic disinfection using alcohol wipes.
- When the cryosurgical unit is used in conjunction with a contact probe the same “Low” infection risk applies since there is no breach of the patient’s dermis.
- However, through cleaning and then disinfection of the contact probe using alcohol wipe prior to the use is recommended between patient episodes.
- Cleaning – Non-immersion method – equipment required: A warm water/detergent solution at the correct dilution, a clean, disposable, absorbent, non-shedding cloth for

application of the detergent solution. A clean, disposable, absorbent, non-shedding cloth or mechanical drying facility. An appropriate chemical neutralizer, first aid kit and eyewash bottle, in case of splashing with detergent.

Cleaning – Non-immersion method:

- Wearing appropriate protective clothing, immerse the cleaning cloth in the detergent solution and wring thoroughly. Ensure that all outer surfaces are thoroughly wiped. Periodically rinsing the cloth in clean water and repeat the above steps until all surfaces have been cleaned. Ensure all surfaces are carefully handled using a dry cloth or industrial hot-air dryer. Safely dispose of cleaning materials.
- Recommended disinfectant: - Alcohol Wipes. Safety note: Always refer to the Safety Data Sheet for appropriate protective clothing before using any disinfectants.
- Procedure for Cryosurgical Unit - Wearing appropriate protective clothing ensure that all outer surfaces are thoroughly wiped using an alcohol wipe. Ensure all surfaces are carefully handled using a dry cloth or industrial hot-air dryer. Safely dispose of alcohol wipes.
- Procedure for contact probes: Wearing appropriate protective clothing ensure that all outer surfaces are thoroughly wiped using an alcohol wipe. Ensure all surfaces are carefully handled using a dry cloth or industrial hot-air dryer. Safely dispose of alcohol wipes.
- Procedure for sterilization of contact probe: IN the event of a contract probe breaches the patient's dermis it is recommended that the contact probe be sterilized. Cleaning – follow the procedure detailed recommended disinfectant – alcohol wipes. Sterilizing – Remove the silicon vent tube from the contact probe. Place the contact probe into a vacuum steam sterilizer and process at 134 degrees Celsius (270 degrees Fahrenheit) for a period of 3 minutes.

Spills

In the event of a spill, evacuate everyone from the area of the spill and keep the area unoccupied for 30 minutes. As the spilled nitrogen evaporates, it will displace oxygen and it will take time for the ventilation system to return oxygen concentration to normal.

Hazardous Atmosphere

Immediately stop what you are doing and leave the room if you begin to experience any symptoms of oxygen deficiency such as dizziness, seeing spots, rapid breathing, poor coordination, giddiness or altered judgement.

Skin or Eye Contact

Skin – immediately flush the area with warm (not hot) water. Remove any saturated clothing and if injury has occurred, seek help.

Eyes – immediately seek help, flush the eyes for 15 minutes.

First Aid

- Where inhalation has occurred, the victim (who may be unconscious) should be removed to a well-ventilated area.
- Keep the person warm and comfortable; obtain medical attention if necessary.
- If breathing has stopped, resuscitation should be commenced by trained personnel.
- Where contact has occurred, the aim should be to slowly raise the temperature of the affected area back to normal. If the injury is minor, loosen clothing and keep the person comfortable. Do not pull clothing away from burned or frozen skin. Douse the affected area with copious quantities of tepid water for at least 15 minutes. If necessary, apply a sterile dressing to protect the injury and transfer person to the emergency department of the nearest hospital.

Liquid nitrogen storage tank location

One 20 litre storage tank is located in the second floor soiled utility room in secured cupboard

Policy Review:

This liquid nitrogen safe handling policy and procedure will be reviewed annually by the Joint Health and Safety Committee.

References:

Brymill Cryogenic Systems Instructions for Use manual
Brymill Cryogenic Systems, Ellington CT. USA, January 2009

Brymill Cryogenic Systems, www.brymill.com, resources, accessed July 9 2018