



# User Manual



**READ BEFORE USE**

This manual has been produced by RAPP Australia Pty Ltd for training purposes only and is not for sale.

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This manual is a guide to using the NEANN Vacuum Immobilisation Mattress. (VIM)

If this manual conflicts with your organisations protocols, you should follow those protocols in preference to the guidelines stated in this manual.



# INTRODUCTION

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The management of the trauma patient requires a range of skills including scene management, safe work practices, hazard control, patient assessment and treatment.

## TERMINOLOGY

Prehospital personnel including Paramedics, First-Aiders, Rescue Officers and other persons performing activities in the prehospital setting, will for standardisation, all be referred to as '**Officers**' in this manual.

## TRAINING

Officers should realise that there is no substitute for training and experience in trauma management. Each person must be thoroughly trained in all areas of prehospital trauma care.

The ideal situation is to have all members of the team qualified to manage all the steps presented in this manual. If unqualified members are present at a scene, they must perform under strict supervision of a qualified team member.

Frequent exercises need to be held to ensure that training levels are maintained. Practice will lead to high levels of competence and safety.

RAPP Australia Pty Ltd recommends that initial training of Officers in the use of the VIM is to include:

1. Review of this manual (supplied with each VIM) under direct supervision of an appropriately trained supervisor.
2. Practical hands-on applications of procedures presented in this manual in a training environment under direct supervision of an appropriately trained supervisor before use on actual patients.

RAPP Australia Pty Ltd recommends that ongoing training of Officers is to include:

1. Three monthly practical review in the use of the VIM in its intended environment,.
2. Twelve monthly theoretical & practical review .

Persons using the VIM without proper initial & ongoing training may place the patient and other Officers at risk of injury.

# **FIELD USE OF THE VACUUM IMMOBILISATION MATTRESS**

**The NEANN Vacuum Immobilisation Mattress (VIM) is primarily a full spine / body immobilisation transportation device for multi-trauma patients with suspected spinal injuries, but is also excellent as a transportation splinting device for patients with pelvic, NOF or extremity fractures, and for the intubated patient to prevent airway movement.**

## **INDICATORS OF USE - SPINAL INJURIES**

The VIM is indicated for use as a full spine / body immobilisation device where

1. Signs & symptoms of potential or actual spinal cord / column injury exist  
OR
2. Mechanism of Injury exists without signs & symptoms of spinal cord / column injury  
**AND** the patient has one or more of the following:  
:
  - a. Unconscious or Altered Conscious State
  - b. Alcohol / Drug Consumption
  - c. Distracting Injury or Event
  - d. Modifying Factors (including language barrier, extremes of age, intellectually disabled, bone disorders)

## **LIMITATIONS OF USE**

Vacuum Mattresses made of PVC give only limited durability against glass, metal and other sharp objects found in the prehospital environment. Whilst the VIM provides greatly increased durability over PVC materials, if punctured, a mattress will not maintain its immobilisation ability. To significantly extend the long term life of the VIM, it is best to leave the VIM on the Ambulance stretcher whenever possible, and to take the patient to the VIM, rather than VIM to the patient.

A Vacuum Mattress is of most benefit where the patient will require immobilisation for greater than one hour, or where the patient cannot lay flat on a Long Spine Board or Scoop Stretcher.

Whilst a Vacuum Mattress gives excellent lateral body immobilisation, and greater than that of a Long Spine Board or Scoop Stretcher, a Mattress does not provide the same longitudinal immobilisation that is found with a Long Spine Board or a Scoop Stretcher. It is therefore strongly recommended that if the patient suffering a potential or actual spinal cord injury is to be carried any distance in a Vacuum Mattress, the Vacuum Mattress should be carried on a Long Spine Board or Scoop Stretcher.

## **APPLICATION**

**Before applying the VIM, Officers should undertake the following steps of patient assessment (as appropriate).**

1. The **First Officer** undertakes a full assessment of the patient before application of the VIM. This includes:
  - Check safety, scene, and situation.
2. A **Second Officer** brings c-spine into neutral in-line position (unless contraindicated) and performs manual head stabilisation until Step 14.
3. The **First Officer** continues the assessment by:
  - Perform Primary Survey:
    - i. **Response**
    - ii. **Airway**
    - iii. **Breathing**
    - iv. **Compressions**
    - v. **Major Bleeds**
  - Perform Basic Care:
    - i. **Rest,**
    - ii. **Reassure**
    - iii. **Oxygen**
    - iv. **Position**
    - v. **Pulse Oximeter**
    - w. **ECG Monitor**
  - Perform A Vital Signs Survey:
    - i. **Conscious Status Assessment**
    - ii. **Perfusion Status Assessment**
    - iii. **Respiratory Status Assessment**
  - Perform A Secondary Survey:
    - i. **Motor/Sensory x 4**
    - ii. **Head**
    - iii. **Spine**
    - iv. **Chest**
    - v. **Abdomen**
    - vi. **Pelvis**
    - vii. **Legs**
    - viii. **Arms**



- Check AMPLE:
  - i. **A**llergies
  - ii **M**edications
  - iii. **P**ast medical history
  - iv. **L**ast oral intake
  - v. **E**vents leading up to injury
- Apply Other Spinal Equipment
  - i. Cervical Collar
  - ii Cervical Extrication Device (if indicated)
  - iii. Long Spine Board or Scoop Stretcher
- Apply the VIM
  - 1. Lift the patient on the VIM using Long Board or Scoop Stretcher
  - 2. Immobilise the patient to the VIM.

# COMPONENTS

## **VIM**

**The VIM is the first of the new generation Vacuum Mattresses, utilising the latest materials, technology and manufacturing processes to provide improved durability and immobilisation.**

**Components of the VIM include:**

### **Materials**

The external cover of the VIM is made of a heavy duty, specialised and uniquely manufactured pure reinforced double coated Silik Elastomer™. This material provides a significant improvement over PVC, the standard material used by other Vacuum Mattresses. Improvements of Silik Elastomer™ include:

- *10-15 times more expansive*
- *Significantly improved abrasion, puncture and tear resistance*
- *100% airtight in comparison to the slow leaking PVC materials*

The internal beads are of a newly developed material, offering significant improvements over the standard Styrofoam used in other Vacuum Mattresses including:

- *Higher density material preventing collapsing of beads*
- *Significantly improved X-ray translucency*

The new patented inner lining system provides a 21 multi-chamber configuration preventing the beads from moving around and clumping in comparison to other Vacuum Mattresses on the market.

### **Carry Bag**

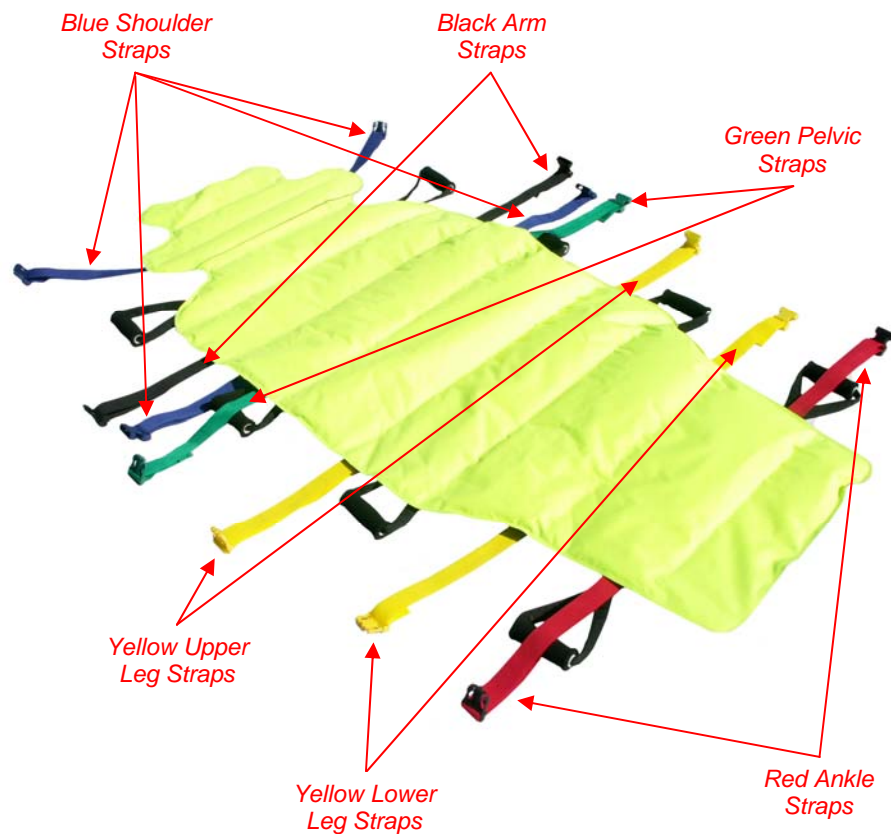
The VIM comes with a simple carry bag that allows for storage in an Ambulance.

*VIM Carry Bag*



## **IMMOBILISATION STRAPS**

The VIM comes with a range of straps which meets the latest requirements in spine immobilisation and include:



Straps are colour co-ordinated to assist in the application process using the following order: Green, Yellow, Red, Blue, Black.

## **Strap Attachment**

Straps are attached with a Tri-Glide adapter to allow easy removal and replacement of straps when contaminated. It is recommended that a second set of straps be purchased for rapid changeover for cleaning purposes, and to allow for the rapid return of the VIM to service.

Tri-Glide Strap Attachment



## **CARRY HANDLES**

The VIM comes with 4 carry handles down each side for moving the VIM.

The handles should not however be used for carrying spinal injury patients. In these cases, the VIM should be carried on a Long Spine Board or Scoop Stretcher.



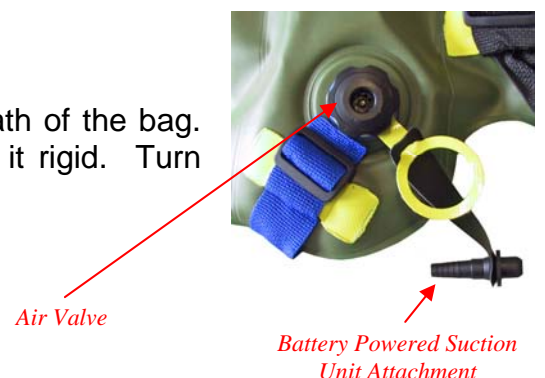
## **FOREHEAD STRAP**

A uniquely designed forehead strap is supplied with VIM.



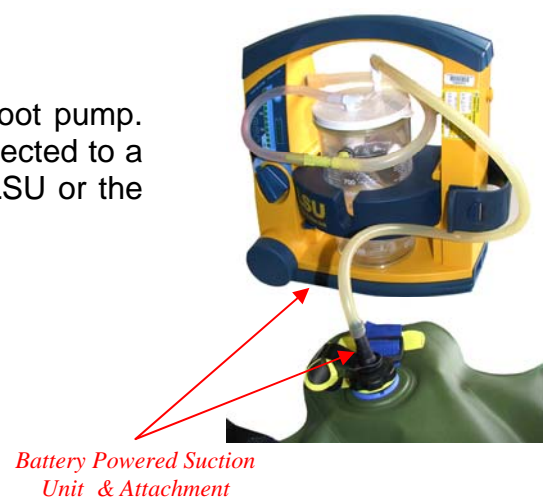
## **AIR VALVE**

The Air Valve on the VIM is found on the underneath of the bag. Turn clockwise to close and seal the VIM to keep it rigid. Turn anticlockwise to allow air to enter the VIM.



## **VACUUM PUMPS**

The VIM has 2 pumps available, either a hand or foot pump. An attachment is also provided to allow it to be connected to a battery powered suction unit including the Laerdal LSU or the Hospital's suction equipment.



# **FULL BODY IMMOBILISATION**

## FULL BODY IMMOBILISATION

*The following section is a detailed photographic guide to Full Body / Spine Immobilisation using the VIM. These techniques offered are based on current research and x-ray studies and offer the most up to date teaching.<sup>1-5</sup>*

*There is increasing questioning by some of the need to immobilise the full spine, with suggestions that immobilisation does not prevent further cord injury, but may actually cause such injuries.<sup>6</sup> Whilst a Medline literature search failed to find any studies supporting the theory that correctly applied immobilisation causes secondary cord injury, a number of studies have shown that failure to identify and immobilise patients with unstable fractures do acquire secondary cord deterioration.<sup>7</sup> Recent studies looking at prehospital spinal cord injuries & field clearance failed to establish any secondary cord injury on any patients correctly immobilised during transport.<sup>8-9</sup>*

*A number of studies in the literature do present complications when **POOR STANDARDS** of immobilisation are performed. Issues include occipital, lumbar and sacral pain development when padding is inadequate or absent,<sup>10-14</sup> increased respiratory compromise with incorrect chest strapping,<sup>15-16</sup> pressure sore development due to inadequate padding<sup>2-4</sup> and spinal miss-alignment again due to inappropriate padding.<sup>2, 14, 17</sup> When proper consideration is given, such complications are significantly reduced or avoided.<sup>1-5</sup>*

### Training Requirements:

2 x Staff  
1 x Patient  
1 x Cervical Collar  
1 x Scoop Stretcher  
1 x VIM and Pump  
1 x Stretcher Canvas  
1 x Towel  
1 x Combine Pad  
1 x Hand / Wrist Airsplint  
1 x Head Strap

## Procedure



*Place VIM on Ambulance Stretcher*

### Step 1

Place the VIM on the Ambulance Stretcher.

Undo straps on VIM and lay all straps to the side.

Ensure no carry handles are caught under the VIM.

Ensure beads are spread evenly and appropriately.



*Place Canvas Sheet on the VIM*

## **Step 2**

Place a sheet down the full length of the VIM.

This will ease removing the patient off the VIM, and helps prevent sweating and heat loss when lying on the VIM.



*Position Hand/Wrist Airsplint*

## **Step 3**

A *Hand / Wrist Airsplint* fully opened should be placed under the lumbar spine of the patient to fill the gaps formed by the anatomical curvature of the spine, as the VIM does not always fill this gap.<sup>12</sup> It should be placed with the bottom of the airsplint level with the green pelvic strap.

The hand / wrist airsplint should only be inflated once the air has been evacuated from the VIM (Step 16).



*Position patient's shoulders level with shoulder marking*

## **Step 4**

Place the patient onto the VIM using a Long Spine Board or Scoop Stretcher.

Position the patient ensuring that the top of the patient's shoulders are level with the shoulder line marking. Once the shoulders are correctly positioned, remove the Long Spine Board or Scoop Stretcher.





## **Step 5**

In adults, place adequate padding under the head section of the VIM to maintain the head in the neutral in-line position. Firm padding using a *Folded Towel* or similar (**NOT A PILLOW**) is generally required under the head section of the VIM in an adult to prevent hyperextension of the cervical spine.<sup>14, 17</sup> A small number of adults will however require no padding.

A 20 x 20 cm *Combine Pad* can be placed between the patient's head and the VIM to improve the long term comfort for the patient and to help prevent headaches developing.<sup>12</sup>

## **Manual Head Stabilisation**

In a suspected spinal injury, one person should also continue holding the head to maintain head alignment until the head is immobilised to the VIM (Step 14). A Cervical Collar alone has been shown in numerous studies to be ineffective in maintaining adequate cervical spine immobilisation.<sup>21-24</sup>

## **Tightening The Straps**

Straps should be tightened with a '*feed and pull*' method to prevent twisting of the patient. If a bystander is available, pushing laterally inwards on the sides of the VIM will also greatly assist in tightening the straps.



## **Step 6**

Place the *Green Pelvic Strap* across the pelvic bone or iliac crest and tighten. Ensure that the strap goes over the bone rather than the soft abdomen otherwise abdominal organ damage may occur.

This strap will help prevent lateral movement of the spine.



*Apply Yellow Upper Leg Strap*

### **Step 7**

Place the *Yellow Upper Leg Strap* across the upper legs and tighten. If the legs are able to move laterally, spinal column movement, including the cervical spine can still occur.<sup>25</sup>



*Apply Yellow Lower Leg Strap*

### **Step 8**

Place the *Yellow Lower Leg Strap* across the lower legs and tighten. Again, if the legs are able to move laterally, spinal column movement, including the cervical spine can still occur.<sup>25</sup>



*Apply Red Foot Strap*

### **Step 9**

Using the *Red Foot Strap*, apply a 'Figure Of Eight' around the patient's ankles and tighten. This strap will prevent downward sliding of the patient on the VIM that may occur if the foot end of the VIM is tilted downwards, or when the Ambulance accelerates. This strap will also help prevent lateral movement of the legs.



*Apply Blue Chest Straps*

### **Step 10**

Apply both *Blue Shoulder Straps* across the chest in a crossing application and tighten. Following application of the straps, there should be just enough slack to allow one hand to be placed between the chest and the strap. Over tightening may compromise respiratory effort.<sup>15-16</sup>

These two blue straps will prevent upward sliding of the patient's body when the VIM is tilted head down, or when the brakes of the vehicle are applied during transport. They will also help prevent lateral movement of the torso if the VIM needs to be tilted sideways (vomiting patient).<sup>26</sup>



### **Step 11**

Apply the *Black Arm Strap*, encompassing the arms to prevent the upper arms of the patient from moving around; to help prevent lateral movement;<sup>9</sup> and to help prevent the upper arms from moving above shoulder height. Raising the arms above the shoulder level as required for such manoeuvres as the Canadian Log-Roll is in general CONTRA-INDICATED in spinal injuries, as studies have shown this to cause sagging of the thoracic and lumbar spine.<sup>26-27</sup>

### **Step 12**

Recheck all the torso straps before immobilising the patient's head to the VIM.



### **Step 13**

Once the patient's body is secured properly to the VIM, **ONLY THEN** is the patient's head secured to the VIM. Ensure the correct amount of firm padding remains is under the head section of the VIM (step 5) to maintain the patient's spine in the neutral in-line position (generally around 2 - 7 cm in most adults).

Wrap the head section of the VIM around the patient's temporal region. Continue to hold this section firmly against head until air is evacuated (Step 14).

Apply the 25mm *Forehead Strap*. Tighten strap ensuring foam pad is centered on the patient's forehead. Place thumbs on the center of forehead, and pull both ends with equal pressure. Velcro into place.





*Evacuate air from VIM until solid*

### **Step 14**

Once all the strapping is applied, attach the hand pump, foot pump or battery powered suction pump, and evacuate all the air out of the VIM until it feels solid.

Ensure patient's upper arms are against the VIM during air evacuation to prevent build up of a beads under the armpits (as this may cause discomfort).

To ensure beads remain close to the body to improve immobilisation, three bystanders can be used to push the beads in against the patient's body down the full length of the VIM.

### **Step 15**

Re-adjust straps following evacuation of the air out of the VIM as the straps will loosen off.



*Inflate the Air Splint*

### **Step 16**

If a gap develops under the lumbar spine when the air is evacuated out of the VIM, inflate the *Hand / Wrist Airsplint* to fill this void so as to improve long term comfort.<sup>12</sup>



*Apply Stretcher Harness*

### **Step 17**

Secure the VIM to the stretcher ready for Ambulance transport. The VIM allows for the current 20G stretcher restraints to be effectively used.

# **IMMOBILISATION ACCESSORIES**

## ACCESSORIES FOR THE VIM

To assist with Full Body Immobilisation, additional equipment to the VIM is required. It is also helpful if all this additional equipment is prepared and stored in a kit near the VIM, so that the accessory items can be easily carried to the patient and no time is wasted searching for the equipment. The following equipment & spinal immobilisation accessories listed below, should be considered:

### **VIM CARRY BAG**

Containing the following items:

- \* VIM
- \* Forehead Strap
- \* Foot Pump

### **SPINAL IMMOBILISATION CARRY BAG**

Containing the following items:

- \* 1 x Towel
- \* 1 x Combine Pad (20 x 20 cm)
- \* 1 x Stretcher Canvas or Sheet
- \* 1 x Hand / Wrist Airsplint with Hand Pump

*VIM Carry Bag*



# CLEANING



## CLEANING THE VIM

**Ensure Valve is always closed before cleaning to prevent water entering the VIM.**

All fabrics used in the VIM are designed to comply with the **Australian Standards on Laundry Practice (AS 4146-1994)** for the removal and killing of HIV, Hepatitis B and Vegetative Organisms. For those wishing to undertake in-house cleaning (at your own risk, including risk to warranty), some basic guidelines are listed below:

- *The cleaner in keeping with normal practices should put on personal protection barrier equipment such as gloves, safety glasses, face masks, etc..*

- **Small areas of contamination:**

Blood - Soak by placing a wet sponge on stain immediately after contact. If available, an antibacterial solution (Milton's or similar) should be added to the water. Repeat as necessary, then gently clean off residual stains with light spray of Nifty. Allow to dry thoroughly before re-use.

Vomit - Gently sponge with hot water immediately after contact. If available, an antibacterial solution (Milton's or similar) should be added to the water. Repeat as necessary, then gently clean off residual stains with light spray of Nifty. Allow to dry thoroughly before re-use.

- **Larger areas of contamination:**

Blood - Soak by placing effected panels in cold water. An antibacterial solution (Milton's or similar) should be added to the water. Let effected part soak for 20 minutes. Using Nifty, gently sponge off residual stains. Allow to dry thoroughly before re-use .

Vomit - Soak by placing in hot water. An antibacterial solution (Milton's or similar) should be added to the water. Using Nifty, gently sponge off residual stains. Allow to dry thoroughly before re-use.

*In very heavy saturation, soak the VIM in cold water with an antibacterial solution (Milton's or similar) for 2 hours, rinse and then emerge again and bring up to a temperature of 90 degrees Celsius and maintain for 10 minutes. Using Nifty or an equivalent gently sponge off residual stains. Dry thoroughly before re-use.*



# **SPECIFICATIONS**

## SPECIFICATIONS

### DIMENSIONS

Dimension of the VIM opened:	<u>Adult 6 Ft</u>
Length	190 cm
Thickness	5 cm
Width	84 cm
Weight	6 kg

Dimension of the VIM stored:	<u>Adult 6 Ft</u>
- Length	-
Height	84 cm
Width	40 cm
Weight	6.3 kg

### SAFE WORKING LOAD

The safe working load of the Adult VIM is 160 kg

### PARTS SUPPLIED

Part	..... Carry Bag
Part	..... VIM - Adult 6 ft
Part	..... Foot Pump
Part	..... Set Of Straps

Spare parts are available on request by contacting RAPP Australia Pty Ltd.

### WARRANTY

RAPP Australia Pty Ltd warrants to the purchaser that the VIM is free from defects in material and workmanship for a period of 2 years from the date of purchase by the original user.

During this period, RAPP Australia Pty Ltd will upon receipt of the product found to be defective due to materials or workmanship from the purchaser and notification in writing of the defect at its option repair or replace any parts found to be defective.

# **TRAINING EVALUATION FORM**

## TRAINING EVALUATION FORM

Organisation: .....

Officer's Name Undertaking Training: .....

### **INITIAL TRAINING**

Powerpoint Presentation Reviewed

Instruction Manual Reviewed

5 x VIM Training Applications

Date Completed	Supervisor

### **THREE MONTHLY REVIEW**

1 x VIM Training Application

Date Completed	Supervisor

### **TWELVE MONTHLY REVIEW**

Powerpoint Presentation Reviewed

Instruction Manual reviewed

1 x VIM Training Application

Date Completed	Supervisor

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