

**INTRODUCTION**  
**TO**  
**VACUUM SPLINTS**

**A SUBMISSION FOR THE**  
**REPLACEMENT OF AIRSPLINTS IN THE**  
**VICTORIAN AMBULANCE SERVICE**

28 March 2010

The following submission provides a basic introduction to vacuum splint design & manufacturing.

A cost analysis is provided for the replacement of Airsplints in the Victorian Ambulance Service.

# **VACUUM SPLINT**

## **DESIGN**

The following pages discuss  
important features to consider when  
selecting a vacuum splint

# Materials

Vacuum Splints are made from a number of types of materials.

Disposable splints are usually a rather low cost thin vinyl or PVC that punctures relatively easily thus limiting it's repetitive use.

Reusable splints use a range of materials:

1. Vinyl coated nylon come in a range of grades of quality which can clearly effect the quality of the splint. Cheaper grades leak air faster reducing rigidity, and can be more easily punctured by glass or other sharp objects. Vinyl in general is harder to clean and can be stained by blood and other fluids found in the prehospital environment, especially when not cleaned immediately.
2. PVC also comes in various grades of quality. Whilst the cheaper grades can easily puncture, as well as leak through the fibres reducing rigidity of the splint over a time, high grade PVC is extremely durable and tear resistant. The greatest advantage of PVC is it is extremely flexible and is easy to shape to the limb. Cleaning is also excellent on high grade PVC being easy to wipe down and doesn't stain.
3. Polyurethane is the strongest of current vacuum splint materials providing increased durability over PVC materials with significantly improved abrasion, puncture and tear resistance, and is 100% airtight compared to the slow leaking PVC materials. Two types are in use:
  1. vinyl coated polyurethane which whilst still extremely strong, is harder to clean and will stain, and
  2. the preferred double sided polyurethane which does not stain and wipes down for easy cleaning.



*Vinyl Coated Nylon*



*PVC*



*Double sided polyurethane*

# Chambers

Disposable vacuum splints are a single chamber device with all beads placed into the one chamber. Whilst not an ideal design, it does allow the cost to be kept to a minimum. To ensure the beads are spread evenly during use, the splints need to first be laid on a flat surface, beads spread evenly over the whole splint, and the air partially extracted out of the splint to stabilise the beads in position. The splint is then applied and shaped around the limb, and then the remaining air is removed to form a rigid splint. This will partially limit the ability to mould the splint to the limb.



*With a single Chamber all bead accumulate at the bottom*

Reusable vacuum splints use three general methods to maintain beads evenly in the splint.

1. The first method welds the splint into longitudinal strips forming a number of tunnels. Beads are then inserted into each tunnel. This method is a cheaper process of manufacturing but reduces the flexibility of the splint to mould to the shape of the limb, and is less comfortable for the patient. This is seen in splints such as the Vacuform Splints.

2. A second method is to place beads into a series of netting pouches that overlap each other to overcome gaps in the splinting as found in the first method. Beads will require some spreading before application to ensure even distribution for rigidity, but this requirement is limited in comparison to the single chamber found on disposable splints, and no pre-evacuation of air before application is required. This method allows the most flexible splint on the market for moulding around limbs. This netting system is found in brands such as Germa.
3. The third method used is a new patented inner lining system that provides an overlapping multi-chamber configuration, preventing the beads from moving around and clumping (as found in other vacuum splints on the market), and provides no weak sections. Almost no spreading of beads is required before application due to the unique chamber design. This also provides the most rigid of the vacuum splints on the market for immobilisation, whilst still allowing effective moulding of the splint. This is found in the Medtech Delux and NEANN reusable splints.

## Beads

Two different materials are used for beads within the vacuum splints:

1. The first method uses a standard expanded polystyrene bead (also known as Styrofoam or Styropor granules). Whilst cheaper to manufacture, thus allowing splint manufacturing costs to be reduced, over time these beads do compress and reduce the overall rigidity of the splint.
2. The second type of bead used is a high density polystyrene that prevents collapsing of beads overtime, and improves X-ray translucency.



*Polystyrene Beads*

## Valves

Disposable splints all use similar cheap tubular valvular systems that is more than adequate for their limited lifespan.

Reusable splints use two main valve systems:

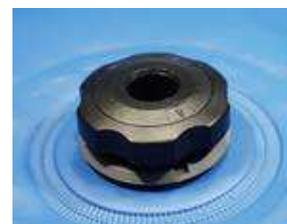
1. Tubular valves whilst effective, repetitively place pressure on the weld where the valve joins the splint, resulting in premature leaks which are difficult, if not impossible to repair.
2. The preferred valve is the plastic 2 way screw valvular system. Whilst more expensive than the tubular valves, the design places no stress on the valve weld and can be easily replaced when damaged or lost. Two styles exist (shown below).



*Tubular Valves*



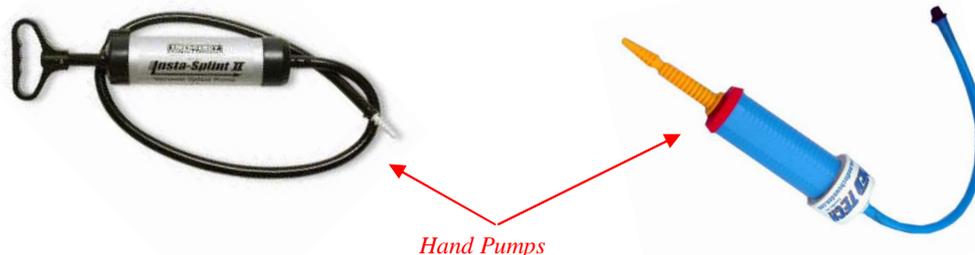
*Plastic 2 way Screw Valves*



*Plastic 2 way Screw Valves*

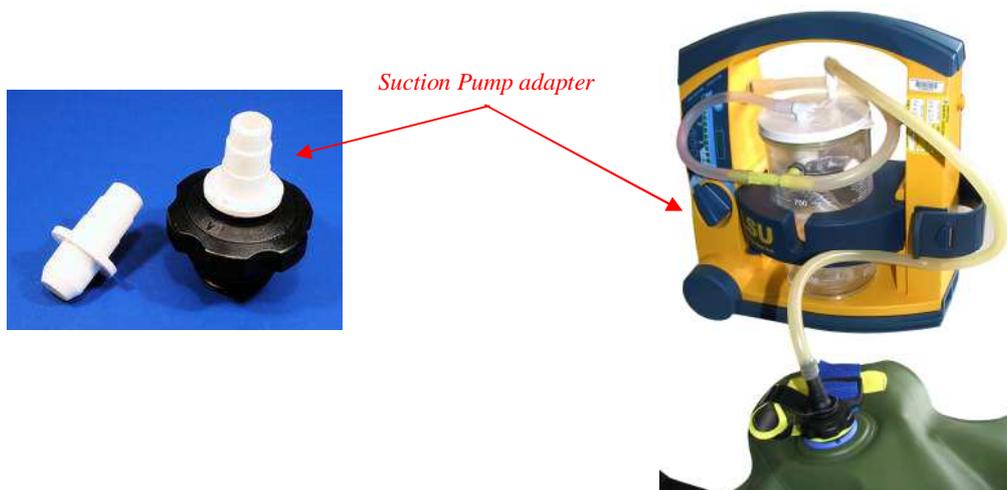
## Pumps

Most Vacuum splints come with hand powered suction pumps designed to remove air from the splint usually within 30 seconds for an arm splint and up to 1 minute for a full leg splint. Whilst there is a great variation in pump price, this is not reflected in the effectiveness and relative durable for long term use. The only comment is that the smaller the pump, the better the storage.



## Automated Suction Pump Attachments

For vacuum splints that utilise the plastic two way screw valvular system, an attachment is available which will allow automated suction pumps (battery or air driven) such as the LSU to be used instead of the hand pump. This is especially useful for the vacuum mattresses where a large amount of air is required to be removed, or for situations where both Paramedics are required to gently press the beads against the limb for improved immobilisation when the air is evacuated from the vacuum splint.



## Closures

For disposable splints, there are a number of low cost systems for holding the Vacuum Splint in-situ.

1. Some splints come with low cost disposable strips of velcro.
2. Tape can also be used, but in wet weather, this tends to fail. Tape also leaves a sticky residue that will attract dirt and other substances onto the splint which can limit the reuse of the disposable splint from it's potential 5 uses.
3. The use of 2.5 or 5 cm Coban tape is highly effective. The Coban also leaves no sticky residue on the splint.

Reusable splints use two general methods for holding the Vacuum Splint in-situ:

1. Velcro is the most common form of closure for vacuum splints as it is the most versatile, causes least movement during application, can be adjusted and positioned in multiple places for when the limb is deformed or angulated thus allowing greater limb support. Whilst OH&S issues have been raised with the use of velcro and there is a desire to limit its use in ambulance, it is clearly the preferred method of closure.
2. The use of 25 mm or 50 mm side release clips with webbing straps is available on brands such as the MDI and is optional on the Evacu and NEANN splints. Whilst this reduces OH&S cleaning issues of velcro (although the webbing still poses a cleaning issue), it significantly reduces the splints versatility and limb support as it significantly limits strapping arrangements.



*Velcro Closure*



*Plastic Side Release Buckles*

## **Shaping of the Splints**

Arm splints come in two styles:

1. The standard rectangular design is excellent when the arm is splinted the standard straight arm position. It does however have minor limitations when the arm is bent 90° at the elbow and is not as effective as the second shape below. However, this shape is more effective for leg fractures in children and straight arms.
2. A modified shape is also supplied by some manufacturers for splinting elbows at the 90° by placing a narrow section in the middle of the splint. Whilst very effective for moulding around this angle, it has limited value otherwise and has reduced strength at the narrowed sections when used on straight limbs.



*Type 1 - Standard Arm Shape*



*Type 2: Modified Arm Shape*

Leg splints come in two styles:

1. The standard rectangular design is designed as a low cost option. This shape is found on almost all of the disposable splints and on many reusable splints to reduce manufacturing costs. It fails to give adequate immobilisation to the foot and as a result, allows fracture movement, is less supportive and comfortable for the patient with leg injuries.

2. The second option is the leg splint that provides a support section for the foot. Whilst this design is more expensive to manufacture, it significantly improves comfort and support for the patient with a leg fracture as it prevents the foot from moving.



*Type 1 - Standard leg design without foot support*



*Type 2: Modified leg design with foot support*

## **Costs - Reusables vs Disposables**

The cost of introducing a set of high quality long life reusable vacuum splints (arm splint, leg splint, hand pump & carry bag) can initially be quite expensive with the overall cost of the set from NEANN currently \$990.

High quality splints can have significant durability over many many years resulting in a significantly lower cost per usage than the airsplint (\$15 per use) or disposable vacuum splints (\$14 per use plus pump). However the initial upfront cost of a re-usable vacuum splint can be prohibitive, but re-usables should be the long term goal as costs are recouped within as little as 70 uses (figures based on single volume purchase retail prices).

The introduction of disposable vacuum splints has the advantage of a low up front cost in comparison with reusable vacuum splints. With the ability of the disposable vacuum splints to be used up to five times each, the cost is cheaper than 5 uses of the Airsplint based on single volume purchase retail prices (single use full leg airsplint retails at \$33 whilst Medtech Disposable Vacuum Splint which can be used 5 times plus, retails at \$90), resulting in start-up expenditure being recouped within 3 applications. Other advantages of the disposable vacuum splint include:

- Minimal cost loss if the splint goes missing before it's potential 5 uses.
- Minimises time lost in retrieval of splints.
- Spares can be kept at Branches whilst awaiting return of splint to the station.
- Highly contaminated splints can be disposed of.
- No repair costs if leaks occur.
- Less storage space required than reusable splint.

## **X-ray Translucent**

All vacuum splints are both x-ray and MRI translucent. The expanded polystyrene beads will leave some additional shadows on x-ray compared to the high density polystyrene beads, but both provide adequate viewing in most cases. The outer cover materials used on the splints also will cause shadows on x-ray where ever a fold or crease in the vinyl or PVC material occurs, but again this has only minimal impact on x-rays.

# Cleaning

Vinyl type nylon, PVC and polyurethane materials are harder to clean and can easily stain if not cleaned immediately (a problem due to delays in retrieving equipment from Hospitals and therefore delayed cleaning). Staining can be quite dramatic in the short term making the splints look dirty and unprofessional. Considering the splints will remain on the patient for extended periods, ability to clean is often delayed until fluids such as blood have dried, with such fluids generally resulting in residual brown stains. Vinyl coatings also take some time to dry post washing, placing the splint out of service for a period of time.

High grade PVC and double sided polyurethane materials are fluid repellent and require minimal effort to clean even if blood is left on the splint for days. Wiping with a damp soapy cloth will quickly remove fluids such as blood, and leave no residual stains. The use of an anti-bacterial solution such as *Virkon™* should also be used to meet O&S standards. The polyurethane can also be towel dried allowing the splint to re-enter service immediately after cleaning. An additional wipe with a cleaning fluid such as *Spray & Wipe™* gives the material a shine making even old splints look new and more professional to the patient and bystanders.

# Storage of the Vacuum Splints

For the storage in Ambulances such as the current Mercedes Sprinter Vacuum Splints are able to be stored in line with current OH&S requirements.



*Vacuum Splint Storage*



# RE-USABLE VACUUM SPLINTS

The following pages provide a range  
of the more common re-usable  
vacuum splints currently  
available

Vacuum Splint prices quoted are retail prices and are  
for single purchase volumes only.

Airsplints purchased in single volumes retail for:

- Hand/Wrist - \$21
- Half Arm - \$24
- Full Arm - \$29
- Foot & Ankle - \$24
- Half Leg - \$29
- Full Leg - \$33
- Complete set - \$151**

# Ferno Vacuum Splints

The Ferno Vacuum Splints are made under licence by Germa, but to a lesser standard than the Germa standard of design and manufacturing.

The material used on the outer surface is a lightweight reasonably durable PVC coated fabric that can be punctured by sharp objects, but is easy to clean, and provides excellent moulding ability around limbs especially when angulated through dislocation or significant deformity.

The internal beads are held in place using the overlapping polyester netting system which in conjunction with the lightweight PVC fabric provides excellent moulding of the splint to fit any shape. The splint will however require some preparation to provide even distribution of the beads.

The Ferno Splints use small expanded polystyrene beads which have limited compression during storage and use.

The splints provide good MRI compatible and X-Ray translucency.

Closure of the splint by the use of velcro is clearly the better method over plastic side release clips, but Ferno provides less velcro than supplied on the Germa and NEANN splints, and attachment of the velcro is not to the Germa or NEANN splint standard. Again some OH&S cleaning issues have been raised within Ambulance with the use of velcro.

The 2-piece valve used by Ferno is a high quality valve being very durable, does not leak, and is easy to operate. Air is evacuated by use of a hand pump which is less than comfortable to use.

Length of vacuum hold is up to 12 hours .

To compete commercially with other Vacuum splints on the market, the leg shape deign fails to provide a foot support section which does reduce comfort and support for the patient with a leg fracture as it fails to adequately immobilise the foot from moving.

Cost of the splints set (1 x arm splint, 1 x leg splint short, 1 x leg splint long, 1 x hand pump, and carry bag) is approx \$1100. Costs are recouped within approx 73 airsplint uses.



# Germa Vacuum Splints

The Germa Vacuum Splints are the original vacuum splints which are now part of the Ferno chain of companies. Germa has been the brand that for many years, companies aspired to meet.

The material used on the outer surface is a lightweight but highly durable PVC coated fabric that is very hard to puncture, is relatively easy to wipe clean, and provides excellent moulding ability around limbs especially when the limb is angulated through dislocation or significant deformity.

The Germa Splints use small expanded polystyrene beads which have limited compression during storage and use.

The internal beads are held in place using the overlapping polyester netting system which in conjunction with the lightweight PVC fabric provides excellent moulding of the splint to fit any shape. The splint will however require some preparation to provide even distribution of the beads.

The splints provide good MRI compatible and X-Ray translucency.

Closure of the splint by the use of an excellent array velcro attachments which is clearly the better method over plastic side release clips, although some OH&S cleaning issues have been raised within Ambulance with the use of velcro.

The 2-piece valve used by Germa is a high quality screw type valve, this being very durable, does not leak and is easy to operate. Air is evacuated by use of a hand pump which is less than comfortable.

Length of vacuum hold is guaranteed for 24 hours.

The leg shape design also has the advantage of providing the foot support section which significantly improves comfort and support for the patient with a leg fracture as it prevents the foot from moving but the small leg splint is often too short and the large leg splint is often too long for most patients. An in between splint would negate the need for two legs splint, saving storage space and money.

Germa provides one arm splint and two sizes of leg splints for versatility. Estimated cost of the set (3 splints, pump and carry bag) is approx \$1200. Whilst being the most expensive vacuum splints on the market, Costs are recouped within approx 80 airsplint uses.



# Hartwell Evacu Splints

The Hartwell Evacu Splints are low cost re-usable vacuum splints utilising a budget range of manufacturing materials.

The outer materials utilise a lightweight vinyl coated nylon laminate that is prone to staining and harder to clean than the PVC and polyurethane materials. The material is also less durable and is more prone to puncturing.

The Evacu Splints also use small expanded polystyrene beads which will compress during storage and use over a period of time.

The splints provide good MRI compatible and X-Ray translucency.

Closure of the splint offers two options:

1. the use of velcro is clearly the better method over plastic side release clips, although some OH&S cleaning issues have been raised within Ambulance with the use of velcro.
2. 25 mm plastic side release clips with standard webbing.

The Evacu Splints also use the Maxi-Valve which again is inferior to the 2 way screw valve systems and is more prone to leaking where it joins the splint. Air is extracted by use of an oversized hand pump, or by use of a automated suction pump using a special attachment.

To compete commercially with other vacuum splints on the market, the leg shape design fails to provide a foot support section which does reduce comfort and support for the patient with a leg fracture as it fails to adequately immobilise the foot from moving.

Cost of the splints set (1 x arm splint, 1 x leg splint short, 1 x leg splint long, 1 x hand pump, and carry bag) is approx \$900. Costs are recouped within approx 60 airsplint uses.



# MDI Immobile-Vac Splints

The MDI Immobile-Vac Splint uses a lightweight but highly durable PVC coated fabric that is hard to puncture, is relatively easy to clean, and provides excellent moulding ability around limbs especially when angulated through dislocation or significant deformity.

The MDI Immobile-Vac splints use small expanded polystyrene beads which have limited compression during storage and use.

The internal beads are held in place using a range of internal chambers which in conjunction with the lightweight PVC fabric, provides excellent moulding of the splint around a limb.

The splints provide good MRI compatible and X-Ray translucency.

Closure of the splint is by use of 50 mm side release clips with webbing straps. Whilst this removes OH&S cleaning issues of velcro, it reduces the splints shaping versatility and limb support, and the webbing straps still raise cleaning issues.

The 2-piece valve used by MDI Immobile-Vac splints is the highest quality valve available for vacuum technology being very durable, does not leak and is easy to operate. Air is extracted by use of a hand pump.

Length of vacuum hold is up to 24 hours.

To compete commercially with other Vacuum splints on the market, the leg shape design fails to provide a foot support section which does reduce comfort and support for the patient with a leg fracture as it fails to adequately immobilise the foot from moving.

Cost of the splints set (1 x wrist/ankle splint, 1 x arm splint short, 1 x leg splint , 1 x hand pump, and carry bag) is approx \$1100. Costs are recouped within approx 74 airsplint uses.



# MedTech Delux Low Budget Extremety Splints

Medtech Delux Vacuum Splints utilise a newly developed multi-overlapping bead chamber system with eight chambers in the arm splint, and eleven chambers in the leg splint which has the best design of all chamber designs tested to keep beads evenly spread throughout the splints for maximum rigidity and without pressure points against the limb.

The material used on the outer surface is a heavy duty, specialised and uniquely manufactured pure reinforced vinyl coated polyurethane. This material is claimed to provide a significant improvement over PVC, the standard material used by most other quality reusable vacuum splints on the market. Improvements of polyurethane over PVC are said to include 10-15 times more expansive, significantly improved abrasion, puncture and tear resistance, and 100% airtight in comparison to the slow leaking PVC materials.

The nylon coated polyurethane™ which whilst also providing excellent moulding of the splint around limbs and fractures, can stain if not cleaned immediately after use (a problem when the splint is left on the patient for a period of time and/or not retrieved and cleaned immediately). This material is a serious concern and the major drawback for prehospital use.

The bead design used by Medtech is a new high density compact polystyrene which means the beads don't compress during storage and use. As a result, this lengthens the life of the splint, The bead design also appears to improve MRI compatible and X-Ray translucency compared to non-compressed beads.

Closure of the splint by the use of velcro is clearly the better method over plastic side release clips, although some OH&S cleaning issues have been raised within Ambulance with the use of velcro.

The 2-piece valve used by Medtech is the highest quality valve available for vacuum technology and is very durable. An adapter allows for either the hand pump or an automated suction unit to be used.

Medtech guarantees to hold a vacuum for at least 24 hours.

To compete commercially with other Vacuum splints on the market, the leg shape design fails to provide a foot support section which does reduce comfort and support for the patient with a fracture as it fails to adequately immobilise the foot from moving.

Cost of the splints set (1 x wrist/ankle splint, 1 x arm splint, 1 x leg splint, 1 x hand pump, and carry bag) is approx \$1000. Costs are recouped within approx 67 airsplint uses.



# NEANN Reusable Vacuum Splints

The NEANN Reusable Vacuum Splints are an upgrade and redesign to the Medtech Delux Reusable splints to improve comfort, limb support, cleaning issues and a shape redesign so that it only requires one leg splint instead of two (needed by other brands) thus reducing cost and bulky storage requirements.

The NEANN Vacuum Splints are made under licence by Medtech Sweden, and utilises all the high standard Medtech features including:

- Latest and most advanced multi-overlapping chamber system.
- High density compact polystyrene beads.
- Two-piece highest quality screw valve.
- An adapter allows for either the hand pump or the automated suction unit to be used .
- Velcro closure (although plastic side release clips with urethane coated webbing are available if requested for OH&S, but not recommended).
- Holds vacuum for 24 hours plus.

Design improvements to the Medtech Delux Splints include:

- Improved leg shape resolves the need for two leg splints, and saving storage space.
- Velcro strap arrangement and strap lengths have also been modified for improved attachment and flexibility for larger patients.
- The leg splint has added a foot support to improve the comfort and fracture stability.
- Improved velcro arrangement which is welded to the splint for greater long term durability.
- To overcome the cleaning issues found with the Medtech Delux Splints, the Neann Splints use the heavy duty double sided polyurethane to prevent issues of staining and to greatly improve cleaning of the splints.

Cost of the splints set (1 x arm splint, 1 x leg splint, 1 x hand pump, and carry bag) is approx \$990. Costs are recouped within approx 70 airsplint uses.



# DISPOSABLE VACUUM SPLINTS

The following pages provide a range of the more common disposable vacuum splints currently available

Vacuum Splint prices quoted are retail prices and are for single purchase volumes only.

Airsplints purchased in single volumes retail for:

- Hand/Wrist - \$21
- Half Arm - \$24
- Full Arm - \$29
- Foot & Ankle - \$24
- Half Leg - \$29
- Full Leg - \$33
- Complete set - \$151**

# MULTIPLE USES OF A DISPOSABLE VACUUM SPLINT

Disposable vacuum splints have the potential to be used a few times based on numerous factors including general care, storage conditions, the harshness of the environment it is used in, as well as fluids that may contaminate the outer splint material.

Therefore most disposable splints made out of vinyl and PVC have the potential to be used up to three times, whilst the polyurethane's additional strength allows it to be used up to five times. Costs are therefore competitive to the airsplints, with the start-up changeover costs potentially recouped within a matter of 14 uses (including splints and pump), especially when compared to reusable vacuum splints, that whilst cheaper in the long term, takes between 25 to 70 uses before seeing a full return of your investment.

## DISPOSABLE VACUUM SPLINT APPLICATION

The application of the Disposable Vacuum Splint require a modification to applying a reusable Vacuum Splint, as to keep costs to a minimum, all beads are stored in a single chamber. To ensure the beads are spread evenly for splinting, the following are the recommended steps of application:

1. Place the desired vacuum splint on a flat surface; distribute the beads evenly throughout the vacuum splint.
2. Apply the small hand vacuum pump, open the valve, and pump out some air, making the splints rigid enough to prevent the beads from shifting when applying to the extremity.
3. Close the valve, disconnect the vacuum pump and apply the splint to the extremity.
4. Form the splint around the limb and use medical tape or similar to hold it in place.
5. Reconnect the vacuum pump, open the valve and withdraw the air fully.
6. Close the valve and retighten the splint with some more tape or similar, if necessary.

## EP&R Insta-Splint II™ (Disposable)

The Insta-Splint II Disposable Vacuum Splint set are a single chamber low cost disposable vacuum splint that can be used up to 3 times.

The material used on the outer surface is a lightweight vinyl PVC which can be easily wiped down for cleaning and is extremely flexible for moulding around limbs.

The Insta-Splint II use small expanded polystyrene beads which will compress during storage and use over a period of time, but due to the short life of the product, this will have little effect on the devices splinting ability.

The splints provide good MRI compatible and X-Ray translucency.

Closure of the splint by the use of disposable strips of velcro supplied with the kit, although medical tape or Coban (preferred) can also be used.

The valve is a very low cost design that should last the 3 applications before failing. Air is extracted by use of the supplied hand pump.

To assist in the application, instructions of use are printed on the splint.

Length of vacuum hold is for up to 12 hours.

To compete commercially with other Vacuum splints on the market, the leg shape design fails to provide a foot support section which does reduce comfort and support for the patient with a leg fracture as it fails to adequately immobilise the foot from moving.

Individual items retail for approx - arm splint \$35, leg splint short \$50, leg splint long \$70, and hand pump \$70. With up to 3 uses of the splints, these prices are \$17 per use for a vacuum splint verses \$15 per use of an airsplint, plus the cost of the vacuum pump. Cost of a re-usable vacuum splint set could be recouped in approximately 58 uses.



## Hartwell Fasplints (Disposable)

The Hartwell Fasplint Disposable Vacuum Splints are a single chamber low cost disposable vacuum splint that can be used up to 5 times.

The material used on the outer surface is a lightweight vinyl which can be easily wiped down for cleaning and is extremely flexible for moulding around limbs.

The Hartwell Fasplint use small expanded polystyrene beads which will compress during storage and use over a period of time, but due to the short life of the product, this will have little effect on the devices splinting ability.

The splints provide good MRI compatible and X-Ray translucency.

Closure of the splint is by use of medical tape or Coban (preferred).

The valve is a very low cost design that should last the a number of applications before failing. Air is evacuated by use of the supplied hand pump.

To assist in the application, instructions of use are printed on the splint.

Length of vacuum hold is for up to 12 hours.

To compete commercially with other vacuum splints on the market, the leg shape deign fails to provide a foot support section which does reduce comfort and support for the patient with a leg fracture as it fails to adequately immobilise the foot from moving.

Individual items retail for approx - arm splint \$53, leg splint short \$68, leg splint long \$90, and hand pump \$140. With up to 3 uses of the splints, these prices are very competitive with costs of \$14 per use for a vacuum splint verses \$15 per use of an airsplint, plus the cost of the vacuum pump. Cost of a re-usable vacuum splint set could be recouped in approximately 70 uses.



## MDI Econo Splint (Disposable)

The MDI Econo Vacuum Splints are a single chamber low cost disposable vacuum splint that may be used up to 5 times, but the use of the attached white velcro may limit this due to contamination.

The material used on the outer surface is a lightweight vinyl which can be easily wiped down for cleaning and is extremely flexible for moulding around limbs.

The MDI Econo Vacuum Splints use small expanded polystyrene beads which will compress during storage and use over a period of time, but due to the short life of the product, this will have little effect on the devices splinting ability.

The splints provide good MRI compatible and X-Ray translucency.

Closure of the splint is by use of a T-lock velcro strapping system. Once this fails after a couple of uses, medical tape or coban can be substituted.

The valve is a very low cost design that should last the 5 applications before failing. Air is extracted by use of the supplied hand pump.

Length of vacuum hold is up to 12 hours.

To compete commercially with other vacuum splints on the market, the leg shape design fails to provide a foot support section which does reduce comfort and support for the patient with a leg fracture as it fails to adequately immobilise the foot from moving.

Individual items retail for approx - arm splint \$58, leg splint short \$65, leg splint long \$86, and hand pump \$140. With up to 5 uses of the splints, these prices are very competitive with costs cost of \$14 per use for a vacuum splint verses \$15 per use of an airsplint, plus the cost of a very expensive vacuum pump. Cost of a re-usable vacuum splint set could be recouped in approximately 70 uses.



## Medtech LBEVS (Disposable)

The Medtech Disposable LBEVS (Low Budget Economy Vacuum Splints) are a single chamber low cost disposable vacuum splint.

The material used on the outer surface is a lightweight polyurethane which is the strongest of all the disposable splint materials in use, thus giving greater durability than other disposable splints and potentially making it the most economical splint available. Polyurethane also wipes down easily for cleaning and is extremely flexible for moulding around limbs.

The Medtech LBEVS use small compressed polystyrene beads which will not compress during storage or use, so hold their immobilisation ability better than other disposable splints.

The splints also provide excellent MRI compatible and X-Ray translucency due to the compressed beads.

Closure of the splint is by use of medical tape or Coban (preferred).

The valve is a very low cost design that should last a number of applications before failing. The tape opening system on the valve also holds up better than clamps used on other splints. Air is evacuated by use of the supplied hand pump.

Length of vacuum hold is for 24 hours, double the length of other disposable splints, again due to the use of the polyurethane rather than vinyl or PVC.

To compete commercially with other vacuum splints on the market, the standard leg splint fails to provide a foot support section which does reduce comfort and support for the patient with a leg fracture as it fails to adequately immobilise the foot from moving. However, an optional leg splint with foot support is available and recommended despite the extra cost.

Individual prices retail for approx - wrist splint \$54, arm splint short \$75, standard leg splint \$78, foot support leg splint \$90, and hand pump \$95. With up to 5 uses of the splints, these prices are very competitive with costs cost of \$14 per use for a vacuum splint versus \$15 per use of an airsplint plus the cost of a vacuum pump. Cost of a re-usable vacuum splint set could be recouped in approximately 70 uses.

