# C-Spine Collar Sizing, Fitting and Patient Care Protocol

## Scope
- Emergency Department
- Intensive Care Unit
- All Inpatient areas
- Medical staff
- Nursing staff
- Physiotherapists

## Purpose
- This protocol outlines the methods by which to measure, fit and position patients with a C-Spine Collar in situ. To ensure all patients with suspected or proven cervical spine injuries have their collars fitted and managed by a suitably qualified clinician.

## Policy
- All trauma patients suspected of a cervical spine injury must be managed as per the Bendigo Health [Management of Adult Cervical Spine Assessment and Clearance Policy](#).
- Position requirements outlined in this protocol must be adhered to unless a registrar or consultant from the treating unit documents the specific position restrictions and rationale for the deviation.
- The collar must be removed to inspect the neck for signs of pressure every 4 hours.

## Aims of care
1. Prevention of possible further spinal injury
2. Prevention of complications of immobilisation (e.g. pressure ulcers, pneumonia)
   - Strict collar care
   - Frequent turning
   - Upright positioning as soon as possible (i.e. when thoracolumbar spinal injury has been excluded).
3. Early spinal clearance
   - Timely completion of radiographic procedures
   - Adequate communication at bedside
   - Appropriate documentation
4. Nausea should be actively managed to prevent vomiting as it may pose a threat to the patient airway.

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## Collar Options & indications
**Rigid Cervical Collar ‘Patriot’**
The Patriot collar is a one-piece extrication collar that features a chin support and multi-height adjustability that accommodates most adults. It can be applied in a sitting or supine position. Its...
rigid construction restricts flexion, extension and rotation to immobilize the cervical spine.

Indications:
- Immobilization during emergency transport
- Immobilization in the ED (preferably < 4hours)

**Adjustable Philadelphia Collar**

The Adjustable Philadelphia cervical collar is a soft, contoured reinforced closed cell moulded foam collar. The anterior and posterior foam segments link with lateral loop and hook mechanism.

Indications:
- Provides adequate, cost effective immobilization of trauma patients’ cervical spines.
- Replace the rigid cervical collar used in pre-hospital care (preferably within 4 hours of rigid collar application).
- Promotion of comfort and prevention of pressure injuries

**Individually sized Philadelphia Collar**

A 2 piece contoured foam Philadelphia collar is similar to the Adjustable Philadelphia collar, except that it is produced in specific sizes. Its indication is for use in extra small or extra-large patients that the Adjustable Philadelphia does not accommodate.

### Rigid Collar Sizing and Application

<table>
<thead>
<tr>
<th>Selecting Correct Size &amp; Measurement</th>
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<tbody>
<tr>
<td><strong>Fig 1</strong></td>
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<tr>
<td>Size the collar by estimating the vertical height from the top of the shoulder to the tip of the chin, aligning this with your fingers. (Fig. 1)</td>
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<tr>
<td><strong>Fig 2.</strong></td>
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<tr>
<td>Once the height is measured, find the sizing line on the collar. (Fig. 2)</td>
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<tr>
<td><strong>Fig 3.</strong></td>
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<tr>
<td>Place your fingers above the sizing line and select the size closest to the top of your fingers. (Fig. 3)</td>
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### Rigid Collar Application & Fitting - continued

<table>
<thead>
<tr>
<th><strong>Locking the size &amp; Fitting</strong></th>
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<tr>
<td><strong>Fig 4.</strong></td>
<td>Slide the red indicator to the desired position on both sides of the chin piece. (Fig 4)</td>
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<tr>
<td><strong>Fig 5.</strong></td>
<td>To lock the collar in place, locate the lock tabs on either side of the collar and press the locks until the collar is secure on both sides. (Fig 5)</td>
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<td>- You can unlock the collar by pushing the locks back on the inside of the collar.</td>
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<td><strong>Fig 6.</strong></td>
<td>Fitting of the collar is enhanced by taking the back section of the collar and curling in the blue section. This will assist the collar to contour to the patient’s head and skull. (Fig 6)</td>
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<td><strong>Fig 7.</strong></td>
<td>Roll up the collar and gently squeeze into position (Fig 7), so it takes a more circumferential shape (Fig 8).</td>
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### Rigid Collar Application & Fitting - continued

| Fig 9. | • When fitting the collar, always follow spinal immobilisation guidelines. These specify that one person holds the head and neck, maintaining neutral alignment and a second person fits the collar (Fig 9).
|        | • Once the collar is applied to the patient, check the patient’s spinal alignment is neutral.

| Fig 10. | Place the collar in position and ensure firm circumferential pressure (Fig 10).

| Fig 11. | A well fitting collar should have:
|        | - The chin positioned centrally in the chin piece (Fig 11).
|        | - The chin overhanging the chin piece by approximately 1cm (Fig 12).
|        | - There should be no gaps between the collar and the patient.

| Fig 12. |
### Rigid Collar Application & Fitting - continued

<table>
<thead>
<tr>
<th>Fig 13.</th>
<th>Fig 14.</th>
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<tr>
<td>• If the collar is too low – pressure is exerted on the neck, and the chin protrudes excessively over the chin piece (Fig 13).</td>
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<tr>
<td>• If the collar is placed too high you will notice the neck is placed in an extended position (Fig 14).</td>
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### Adjustable Philadelphia Collar

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<th>Sizing an Adjustable Philadelphia Collar</th>
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<tr>
<td><strong>Sizing</strong></td>
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<tr>
<td>• Before sizing, remove and discard the separator between the front and the sternum collar pieces.</td>
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<tr>
<td>• Always maintain the patient's head in neutral alignment.</td>
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**Neck Height:**

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<td>• Place the chin-cup of the front of the patient's chin and slide the lower front down to the patient's sternum (Fig 15).</td>
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<tr>
<td>• Lift the front away from the patient, remove clear tape, and push the two tabs to</td>
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lock the size (Fig 16).

Circumference:
Identify your patient's profile type according to the chart (Fig 17). Adjust the circumference by tearing away sections of the back piece foam to change to a smaller circumference (Fig 18).

Collar sizing guide, inclusive of:
Neck height and circumferential adjustment must be verified by the clinician for each patient individually.

Adjustable Philadelphia Collar (Continued)

Application of an adjustable Philadelphia collar

1. Proper application of the collar is as important as proper sizing. The two-piece design consists of a FRONT piece and a BACK piece, packaged as a set. After adjusting the size of the collar, apply the back piece of the collar to the back of the patient's neck. Centre the collar (Fig 19). The arrow on the back should point upward.

2. Apply the FRONT piece of the collar with the chin secured in the recess. Centre the collar to secure neutral alignment. The front piece OVERLAPS the back piece to ensure effective immobilisation and comfort (Fig 20). The arrow on the front should point upward.

3. With hook and loop fasteners, tighten the collar...
with a bilateral adjustment (Fig 21). This will secure the patient's cervical region in neutral alignment

**Individually sized Philadelphia Collar Application**
Fitting of the Philadelphia collar should be done with two people at all times. The first person, the 'head holder', is to hold the head, maintaining neutral alignment throughout the whole procedure. The second person, the collar ‘fitter’, is to measure and apply the collar.

**Measuring**

**Height**
- Using a measuring tape and measuring in *inches*, measure from the tip of the patient's chin to the top of the sternum
- This measurement will correspond to the height of the collar. If the measurement falls between two consecutive sizes, always apply the SMALLER size.

**Circumference**
- Measure around the patient’s neck, using a measuring tape and measuring in *inches*.
- This measurement will correspond to the circumference of the collar. If the measurement of the collar falls between two consecutive sizes, always apply the LARGER size first.

**Fitting**

**Posterior Section**
- After selecting the correct size, apply the posterior piece first. The back arrow should point upward.
- Place the posterior section on the bed adjacent to the nape of the patient’s neck. Fold the Velcro strap in half under the posterior section of the collar to protect the patient and place one hand on the centre of the inside of the collar.
- Press down on the collar, compressing the mattress, and slide under the patient’s neck until the collar is centred. Ensure that the collar has not doubled over and is sitting smoothly against the patient’s skin. Using the side sections as a guide, ensure that the collar is centred properly – the head holder may be in a better position to ascertain the degree of alignment of the collar.

**Anterior Section**
- Place the anterior section on the patient’s neck, ensuring that the chin is located in the moulded chin support. The anterior section must overlap the posterior section.
- Attach the posterior Velcro straps firmly to the anterior Velcro section. If the collar is fitted correctly, the Velcro straps should be symmetrical. If one strap appears to be longer than the other, the posterior section of the collar will
need to be adjusted.

1. **Chin**
The patient's chin should be sitting in the moulded chin support of the anterior section. To check, roll back the lip of the chin section.

2. **Shoulders and Back**
The posterior section of the collar should be centred so that it is symmetrical, not rotated and the Velcro straps are even. The centre of the posterior section should be aligned with the patient's spine. The Velcro strap should be positioned midway between the patient's ears and shoulders. Ensure that the flared rim is in even contact with the patient's scapulae and is not inadvertently folded underneath the posterior section.

3. **Chest**
The bottom of the anterior section should sit on the chest, and the rim should not be flared or flattened. If so, the collar may be too long. If the chin is in the chin support and the collar does not make contact with the chest, the anterior section may be too short.

4. The anterior section overlaps the posterior section.

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<tr>
<th>Immobilisation Techniques: Spinal position Restrictions</th>
<th>Head Holding while collar is temporarily off:</th>
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<tr>
<td></td>
<td>- Prior to spinal clearance, the patient's head must be supported during position changes, collar care and under any circumstances in which the collar is removed (e.g. CVC insertion).</td>
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<td>- Once the cervical spine is cleared, head holding is no longer required. However, care must be taken to ensure that the patient's head remains in anatomical alignment on turning and lateral positioning.</td>
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<tr>
<th>Communication with Patient</th>
<th>1. Explain the procedure to the patient regardless of conscious state and ask the patient to lie still and to refrain from assisting.</th>
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<td>2. Ensure that the collar is well fitting prior to commencement.</td>
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<td>3. If applicable, ensure that devices such as indwelling catheters, ventilator tubing etc. are repositioned to prevent possible dislodgement during repositioning.</td>
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<td>4. The designated head holder stands at the head or side of the bed with the bed at a comfortable height.</td>
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<tr>
<th>A. For head holding from the top of the bed</th>
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<td></td>
<td>One hand is placed around the patient's jaw with fingers spread (for a ventilated patient, the ETT may be stabilised with the thumb and index finger). The forearm is used to stabilise the lateral aspect of the head. The other hand is positioned under the patient's neck with fingers spread. Firm pressure must be</td>
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applied to restrict the possibility of flexion, extension and lateral tilting (Fig 22).

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<th>B. For head holding from the side of the bed</th>
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<tr>
<td>The head holder stands on the side of the bed towards which the patient will be rolled. One hand is placed under the patient’s neck with fingers spread. The other hand is placed over the patient’s jaw (for a ventilated patient, the endotracheal tube may be stabilised with the thumb and index finger). Firm pressure must be applied to restrict the possibility of flexion, extension and lateral tilting (Fig 23)</td>
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<th>C. Head Holding Without Collar</th>
<th>D. Head Holding Without Collar</th>
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<td>Under some circumstances, a cervical collar will be removed temporarily or contraindicated (e.g. intubation, inspection of back and neck in a log roll examination). In these cases, the head must be held until completion of the procedure and reapplication of the collar, or in therapeutically paralysed patients, until the patient’s head is safely immobilised using sandbags. <strong>Do not turn the patient without first reapplying the collar.</strong></td>
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<tr>
<td>1. The bed is moved to the horizontal position (i.e. no tilt)</td>
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<tr>
<td>2. The head holder’s hands are placed over the patient’s shoulders with thumbs superior and splayed fingers inferior (beneath the shoulders). The lateral aspects of the patient’s head can be supported with the head holder’s forearms, with firm pressure applied to prevent movement. Alternatively, if access to the neck is specifically required for a procedure, the</td>
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head holder’s hands may be positioned directly onto the lateral aspects of the patient’s head over the ears. As this alternate method is less stable, care must be taken to ensure that the patient is either fully co-operative or adequately sedated.

3. The head holder must continue to support the patient’s head until the cervical collar has been reapplied or the sandbags are in place either side of the head.

Log Rolling

- The log rolling procedure is implemented prior to thoracolumbar spinal clearance for examination of the patient’s back, cervical collar care, pressure care, to facilitate chest physiotherapy etc.
- The main principle underlying the log rolling procedure are the strict adherence to correct anatomical alignment in order to prevent the possibility of further, catastrophic neurologic injury and the prevention of pressure injuries.

Performing the Log Roll

1. When performing a procedure, four staff members are required to assist in a log roll:
   - 1 to hold the patient’s head and direct the procedure
   - 2 to support the chest, abdomen and lower limbs
   - 1 to carry out the planned activity i.e. pressure care etc.
   In some cases, (e.g. morbidly obese patients or patients with lower limb traction) three assistants may be required to support the chest, abdomen and lower limbs).

2. Explain the procedure to the patient regardless of conscious state and ask the patient to lie still and to refrain from assisting.

3. Ensure that the collar is well fitting prior to commencement.

4. If applicable, ensure that devices such as indwelling catheters, intercostal catheters etc. are repositioned to prevent overextension during repositioning.

5. If the patient is intubated or has a tracheostomy tube, airway suctioning prior to log rolling is suggested, to prevent coughing which may cause possible anatomical misalignment during the log rolling procedure.

6. The bed must be positioned at a suitable height for the head holder and assistants.

7. The patient must be supine and anatomically aligned prior to commencement of log rolling procedure.

8. The patient’s proximal arm must be adducted slightly to avoid rolling onto monitoring devices (e.g. intravenous lines). The patient’s distal arm should be extended in alignment with the thorax and abdomen (Fig 24), or bent over the patient’s chest if appropriate (if the arm is uninjured). A pillow should be placed between the patient’s legs.

9. Assistant 1, the assistant supporting the patient’s upper body, places one hand over the patient’s shoulder to support the posterior chest area, and the other hand around the patient’s hips (Fig 24).
10. Assistant 2, the assistant supporting the patient’s abdomen and lower limbs, overlaps an arm with assistant 1 to place one hand under the patient’s back, and the other hand over the patient’s thighs (Fig 24).

Fig 24

11. On direction from the head holder, the patient is turned in anatomical alignment in a smooth action (Fig 25).

Fig 25
(Note: spinal alignment indicated by black line)

12. On completion of the planned activity, the head holder will direct the assistants to either return the patient to the supine position or to support the patient in a lateral position with wedge pillows. The patient must be left in correct anatomical alignment. **Log rolling is no longer required if the thoracolumbar plain x-ray images are clear.**

**Lateral Positioning (Side lying)**
The patient may be positioned laterally prior to spinal clearance to assist with chest physiotherapy and reduction of collar-related occipital pressure. Exceptions may include unstable thoracic, lumbar or pelvic fractures. In this case, clarification of position restrictions needs to be obtained from the treating unit and documented on the Spinal Management Chart (MR 2D). The patient must be well supported in the lateral position. The patient’s head and body must be kept in anatomical alignment at all times. Padding may be required between the cervical collar and the bed to prevent lateral tilting of the patient’s head.
### Cleaning and Drying Skin & Collar

1. Every 4 hours, the collar should be removed to inspect the neck for signs of pressure. The patient’s head and neck must be held in anatomical alignment by another staff member until the cervical collar is replaced (refer to section on head holding without a cervical collar).

2. The collar should be washed in warm, soapy water and dried with a towel. The closed cell foam does not absorb water. Heavy soiling which is unable to be removed may necessitate a replacement collar.

3. The patient’s skin must be washed and dried thoroughly and inspected for signs of pressure. The collar must be replaced prior to log rolling for removal of the posterior section and inspection of the occiput.

4. The patient’s hair may be washed with the head held in anatomical alignment. Matted or knotted hair or road grime beneath the collar may cause increased skin pressure, therefore hair must be combed or trimmed. Hair may need to be clipped beneath the collar around wounds and to view the occiput.

5. Reapply collar following neck care, posterior section first, then anterior section as previously outlined.

### Allied Health Referral

The primary contact physiotherapist is integral in the:

- Assessment of ill fitting collars
- Complications related to collar fit
- Collar modification
- Referral to the orthotics team
- Education of the patient and their family, and
- Discharge planning.

- Where issues related to collar fit are recognised, they must be documented and addressed as a matter of urgency.
- The senior physiotherapist working in the Emergency Department can be contacted via switchboard between the hours of 0900-2100 daily, or on pager 218. If the ED physiotherapist cannot be contacted, call the Senior Orthopaedic Physiotherapist on pager 240.
- In some cases, the senior physiotherapist may refer to an orthotists.
- Emergency Department or ICU nursing staff may also be able to assist with advice. At all times, notification to the relevant medical officer is required.

### Troubleshooting Pressure Areas

- The Philadelphia collar has been shown to exert a significant amount of pressure on the occiput, mandible and chin. As a result, use of the collar for periods longer than 48-72 hours has been associated with increased pressure injury / ulceration rates.

- Causes of Collar-Related Pressure Ulceration
  - Collar-related pressure ulcers are formed when unrelieved pressure on poorly oxygenated tissue results in tissue ischaemia.
Supine patients are particularly at risk of pressure ulcers over bony prominences, particularly the occiput. Other susceptible sites include the chin, mandible, ears, laryngeal prominence, sternum, clavicles and shoulders.

- Shearing forces may also contribute to ulcer formation i.e. an ill-fitting collar may cause friction between the skin and collar surface.
- The presence of moisture (e.g. sweat, blood etc) may soften the skin, causing maceration.
- The presence of matted hair or foreign bodies (e.g. road grime) beneath the collar may result in uneven pressure.
- Signs of pressure ulcer formation include reddened skin, particularly over bony prominences, ‘boggy’ areas, blisters and grazing.

**Do not place any padding between the collar and patient’s skin, as this may increase pressure.**

**Swelling**
Post trauma oedema of the patient’s head and neck will sometimes cause a previously well-fitting collar to become tight, requiring re-sizing.

**Redness**
Isolated areas of redness may require collar modification. Regular position changes to the left and right lateral positions must be made to reduce occipital pressure.

**Neck Moisture**
- Excessive moisture from secretions, sweat or blood beneath the collar will require more frequent collar care.
- The primary contact physiotherapist can obtain a cotton jersey garment from the orthotics team, or where long term wear is required, or to determine if a different style of collar with absorbent fabric is required (e.g. Miami J collar)

**Rashes**
Allergic reactions are uncommon with the Philadelphia collar and must be referred to the Primary Contact physiotherapist. Heat rashes are more common and may be alleviated with more frequent collar care, or a cotton jersey garment to keep the area dry.

**Elevated Intracranial Pressure (ICP) in the Critically Ill Trauma Patient**
Persistently elevated ICP may be partly attributable to the cervical collar. If this is suspected and the patient is heavily sedated or chemically paralysed, the collar may be removed while the patient is in the supine position and sandbags positioned in place of the collar to stabilise the head.
Collar Modification

- The patient’s head must be held in anatomical alignment whilst collar modifications are being made.
- Collar modification should be avoided if possible, as it may result in reduction of the collar stability. However, if the collar fit is appropriate, but pressure on isolated areas is causing reddening, some modification may be necessary.
- The Primary Contact physiotherapist should be contacted prior to any modifications being made between 0900 and 2100. Outside of these hours, contact ED or ICU nursing staff for advice.

Troubleshooting Philadelphia Collar Fit

Should signs of pressure develop, the Orthotic Department is able to perform significant collar modification or refitting if required. The primary contact physiotherapist should be contacted for referral. In the event that formal collar modification is delayed, slight collar modification may be performed by the nursing staff as stated below.

The following modifications should only be made by staff members who are experienced in fitting Philadelphia collars:

- A scalpel blade should be used to trim troublesome areas. On the back section, only the lateral sides may be trimmed; the superior and inferior borders of the back section should not be modified as this may affect the stability of the collar. Trimming should never be deep enough to expose the rigid plastic collar supports.
- If the collar is in contact with the larynx, a small, symmetrical channel may be carved to reduce pressure.
- A small modification can be made to alleviate pressure over the clavicle or around central venous catheter sites.
- The orthotist may suggest occipital modifications which are made on the equipment in the Orthotic Department. The occipital area of the collar back may be ground out to relieve pressure and buffed to create a smooth surface.

Action required if a pressure ulcer develops

- Contact the orthotist to review or modify the collar.
- Dress the ulcer appropriately.
- Notify the treating unit, as open pressure ulcers will often
preclude surgery. If the patient is an ICU inpatient, notify the ICU registrar or HMO
- Document the ulcer’s existence and proposed treatment in the nursing care plan, progress notes and on Riskman / VHIMS

### Related Bendigo Health Documents
- Management of Adult Cervical Spine Assessment and Clearance

### References and Associated Documents
- State and Commonwealth Legislation, Standards / Codes of Practice / Industry Guidelines
- Emergency and Trauma Care for Nurses and Paramedics. 2011 Curtis and Ramsden Eds. Sydney
- Trauma Nursing Core Course Provider Manual. Australian College of Emergency Nursing

**MANDATORY INCLUSION**

Personal information and health information as defined in the relevant Victorian law, which is required to be collected, used, disclosed and stored by BHCG in order to achieve the Purpose of this policy, will be handled by the Group and its employees in accordance with their legal obligations.

When developing this policy, BHCG has taken all reasonable steps to make its content consistent with the proper discharge of its obligations under the Charter of Human Rights and Responsibilities Act 2006

### Responsible Department
Emergency Department

### Approved By
- Medical Surgical Clinical Standards Committee
- Nurse Credentialing Committee
  - 03/02/2015

### Authorised By
- Group Clinical Standards Committee
  - 17/02/2015