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**NURSING MANAGEMENT IN RELATION TO BEDS USED WITHIN
THE NATIONAL SPINAL INJURIES CENTRE FOR THE PREVENTION
OF PRESSURE SORES**

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Abstract. A report is given on the various types of beds used to prevent the formation of, and to treat, pressure sores in both new and old lesions.

Key words: Turning; Positioning; Team work.

WITHIN the National Spinal Injuries Centre we use four different types of beds, together with a combination of pillows and other aids, to nurse our patients at all stages of paraplegia and tetraplegia.

During the acute injury stage, pillows are used on beds to: (1) aid postural reduction of the fracture/dislocation and to maintain alignment and stabilisation of the spine; (2) relieve direct pressure over bony prominences—thereby aiding in the prevention of pressure sores; and (3) prevent contractures of limbs by maintaining them in a functional position. In later stages, pillows are used to (1) relieve direct pressure over bony prominences—for the prevention and/or treatment of pressure sores; and (2) prevent and correct contractures of limbs.

The Sorbo-Rubber Pack Bed

For many years the sorbo-rubber pack bed was used in the nursing management of newly injured patients. Today it is mainly used with old lesions receiving treatment for pressure sores. To nurse a patient on these beds, a lifting team, comprising three, four or five people is required to lift, turn and reposition the patient at three or four-hourly intervals.

The bed is constructed as follows: (1) Ordinary bed-frame is covered by a polythene or rubber sheet. (2) Three sorbo-rubber packs for (a) the chest—measuring 3 ft × 20 in. male, 3 ft × 18 in. female; (b) the upper thighs—measuring 3 ft × 1 ft; and (c) the legs—measuring 3 ft × 1 ft. Each pack consists of three sorbo-rubber cushions each, 4 in. thick, firmly bound together by strong polythene or rubber sheets. These are then placed in wooden trays and positioned across the bed-frame. The wooden trays are all $\frac{1}{2}$ in. larger and 4 in. deep. (3) Pillow packs, consisting of six or more pillows bound together in linen sheeting and secured with zinc oxide plaster, are constructed for use at the head and foot of the bed.

Patients on this bed can be nursed in the lateral, supine or prone positions. New lesions suffering from pressure sores and being nursed on the sorbo-rubber pack bed are not nursed in the prone position.

Nursing Management of Patient on Egerton-Stoke Mandeville Bed (Guttman, 1967, 1973)

Thoraco-lumbar Lesions

In preparing the bed for the admission of a thoraco-lumbar lesion, the following procedure is followed: (1) the mattress of the bed is covered with a sheet; (2) a plastic protective sheet and draw-sheet are placed on top of the under-sheet; and (3) pillows are placed as follows:

For head: A double or single—as is found most comfortable for the patient.

Shoulders: Single pillow.

Chest—thoraco-lumbar region: Double pillow. This maintains the natural lumbar curve.

Upper thighs: Single pillow. This will vary according to the patient's weight and bony prominences. If a double pillow is required to keep the sacrum free of pressure, then an additional pillow will be required under the chest to maintain extension of the lumbar curve.

Lower legs: Single pillow under calves extending to Achilles tendon, thus keeping heels free of pressure.

This arrangement of pillows provides the basis of postural reduction of the fracture site and relief of pressure over bony prominences.

To prevent contractures and maintain limbs in a functional position, a single pillow is placed between the legs, which should be in abduction, and sufficient pillows should be placed against the feet to keep the ankles, feet and toes in full dorsiflexion, thereby preventing plantar flexion of the ankle and hammer toes.

Lifting Technique. The method described is used for lifting patients under the following circumstances: (1) from ambulance stretcher to bed; (2) from bed to trolley—for X-ray or operation; (3) to change bed linen; and (4) to change bed—due to mechanical failure.

The same method is also used once daily to remake the whole bed and reposition pillows for patients being nursed on the Egerton-Stoke Mandeville Turning Bed, thereafter their position is changed using the electric turning mechanism.

To lift a patient with a fracture/dislocation of the vertebral column in a safe and satisfactory manner, requires a combined effort from a team of trained lifters under the leadership of an experienced person.

The team leader must always gain the patient's confidence and co-operation by explaining what is happening. Then with maximum support at the fracture site, the patient is lifted simultaneously by the team. The vertebral column is maintained in extension throughout the whole lift. The period of time that the patient is suspended in mid-air should be as short as possible to prevent further displacement of the fracture. Final positioning of the patient after lifting is the responsibility of the team leader.

A team of four people is required—a team leader and three lifters. Clean linen and dusting powder for hands and arms should be at hand. All rings, watches etc. should be removed to prevent skin damage.

The following procedure is followed:

1. Apply brakes to bed wheels.
2. Return bed to supine position.
3. Remove bedclothes and pillows, except those the patient is lying on.
4. Assess if any bedding requires changing and have the same near at hand.
5. Assemble lifters on opposite side of bed to the team leader opposite the patient's shoulders, waist and thighs.
6. Straighten the bottom sheet by simultaneously pulling in opposite directions—to remove creases.
7. Team leader notes site of bony injury and may mark the patient's skin at this point.
8. The patient is instructed to cross his arms across his chest and whilst being lifted to keep his head flexed forward on to his chest.
9. Team leader applies dusting powder to hands and forearms of the lifters.
10. The team leader instructs lifters the order in which to insert hands and arms under the patient. As each set of hands are placed under the patient, the team leader applies counter-pressure to the patient's body thus preventing lateral movement and twisting of the vertebral column.
With the lifters standing on the patient's left-hand side, hands are inserted in the following order:
First set of hands: Left hand of First lifter and the right hand of Second lifter are placed one on either side of the fracture site.
Second set of hands: Left hand of Second lifter placed under buttocks; right hand of First lifter placed under chest at level of axilla.
Third set of hands: Right hand of Third lifter placed under thighs; left hand of Third lifter placed under lower limbs.
11. When the leader is satisfied that the whole team is ready, the command to LIFT is given at which the patient is lifted in one piece with the spine and limbs fully supported in extension. The lifters raise the patient off the bed until, at chest height, they place one foot behind the other—at the same time hyperextending their lumbar spine. They tilt the patient towards them; by doing this correctly back strain is avoided.
12. Whilst the patient is being supported, the team leader turns and shakes the pillows the patient was lying on, ensuring they are free from creases and crumbs. A clean paper sheet is placed on top of the buttock pillow if so required.
13. When the bed is ready the leader places her hands on the lifter's hands and guides the patient down into the correct position on the pillows. The lifters must not withdraw their hands until the leader is satisfied that the patient is correctly positioned and lying in the centre of the bed.
14. The lifters withdraw their hands in the following order: (a) Lifter 2, (b) Lifter 1, (c) Lifter 3. The team leader places her hands across the patient's body to apply counter-pressure, thus ensuring there is no unnecessary movement of the vertebral column. The team leader finally checks the position of the patient in relation to: (a) correct spinal alignment; (b) the support of the fracture site; (c) prevention of pressure, particularly over bony prominences; and (d) the prevention of contractures.

Support of Fracture: The pillow under the fracture site is maintaining the degree of flexion, extension or hyperextension required. To prevent the chest pillow becoming flat and not supporting the fracture, the team leader and one

lifter, positioned on either side of the bed, simultaneously place a hand on the patient's shoulder, the other hand on the lower lip of the chest pillow—turning it under. This provides a firm supportive edge to the pillow. Whilst doing this, to prevent the vertebral column telescoping, the patient's shoulders are firmly held.

Prevention of Pressure: To prevent pressure:

1. Bony prominences—*i.e.* posterior iliac spines, sacrum, heels—are positioned in gaps between pillows.
2. Ensure that indwelling catheters (if used), condom attachments and urine drainage tubes are lying freely across patient's thighs.
3. Pads for female patients (if used) should be smoothly positioned over the perineum. Avoid pressure over the scrotum and insides of thighs for male patients using glass, plastic or other urinals.
4. Bed cradle may be required over lower limbs to avoid pressure from heavy bedclothing.

Prevention of Contractures: Legs must be maintained in abduction and extension when lying in supine position. Feet must be maintained in dorsiflexion and sufficient pillows placed behind the feet to keep them in dorsiflexion when the leg is extended.

Operating Electric Turning Bed: To turn a patient from the supine to the lateral position using the electric turning mechanism, the following procedure should be followed: (1) raise the side of the bed 5 degrees that the patient is going to be turned on to; (2) raise the opposite side of the bed to an angle varying between 45 and 60 degrees; (3) check the patient's position has not altered; and (4) ensure urine drainage system is functioning correctly. The patient now remains in this position for 2 or 3 hours. After this period the patient is turned on to his back using a reverse procedure. Again after another 2 or 3-hour period, the patient is turned on to his other side for the same length of time. Between every turn the patient's position, linen, urine drainage devices and spinal alignment are checked and corrected if necessary.

Cervical Lesions

For the admission of a cervical lesion, the bed is prepared in the following manner: (1) the head of the bed is removed; (2) the Guttman skull traction tray unit is inserted; (3) the mattress of the bed is prepared as for a thoraco-lumbar lesion; and (4) pillows are placed as follows:

For head: Single pillow.

Chest—thoraco-lumbar region: Single pillow.

Upper thighs: Single pillow—may be increased according to patient's size and weight.

Lower limbs: Single pillow as for dorso-lumbar lesion.

Feet: As for thoraco-lumbar lesion.

Between legs: As for thoraco-lumbar lesion.

Arms: Single pillow placed under each arm with shoulder in abduction—elbow in extension—hand in dorsiflexion. This position prevents contractures and aids postural drainage of extremities.

Neck roll: A neck roll, made of non-absorbent cotton wool and firmly bound together with soft linen or tube-gauze, measuring 9 in. long × 4 in. diameter approx., is placed under the neck in extension. Hyperextension of the cervical

spine can be achieved by increasing the size of the neck roll, or by placing a double pillow under the chest and shoulders. This allows the occiput to be lower than the shoulders—thus achieving hyperextension of the cervical spine.

Patients requiring skull traction will also require: (a) nylon traction cord and metal clip to attach cord to weight holder; and (b) flat metal weights and holder. (These are designed to be flat, thus preventing fouling against the bed when in position.)

Lifting technique: Many of the points already covered in the lifting and positioning of a thoraco-lumbar lesion, equally apply to injuries of the cervical spine. However, an extra experienced person is required to support the cervical spine and maintain traction on the skull calipers (if in use), as part of the lifting team. This person is referred to as the 'head nurse'.

The following procedure is followed:

1. Head nurse supports the patient's head as the bed is returned to the supine position.
2. Head nurse, standing at the head of the bed looking down the patient's body, removes the neck roll whilst maintaining support of the neck with her hand. Her hand should be positioned well down the cervical spine, feeling for the 7th vertebra, thus ensuring the whole cervical spine is well supported. If the patient is in skull traction, the head nurse's second hand is placed on the skull calipers and a gentle traction is applied after another member of the lifting team has disconnected the weights and traction cord from the traction tray unit. Should the patient not have skull traction, then the head nurse should place her second hand over the first.
3. The patient's hands and arms are crossed over the chest. The order for insertion of hands to lift is:
Right hand of First lifter is placed under shoulders.
Second set of hands: Left hand of First lifter and the right hand of Second lifter are placed under chest and waist.
Third set of hands: Left hand of Second lifter and the right hand of third lifter are placed under buttocks and thighs.
Fourth hand: Left hand of Third lifter is placed under lower limbs.
6. When the team leader is satisfied that the whole team is ready, she asks the head nurse to give the command to LIFT.
7. The team leader replaces the neck roll on top of the head pillow.
8. The distance between the patient's skull calipers and the wheel of the traction unit must be sufficient to avoid fouling.
9. When the team leader is satisfied with the patient's position, the head nurse removes her hands after ensuring the neck roll is in the correct position. With a patient that is in skull traction, the 'head nurse' maintains a gentle pull until the leader has replaced the cord and weights.
10. The lifters should withdraw their hands as described for thoraco-lumbar lesions.

Support of Fracture: The neck roll provides a degree of extension or hyperextension as required. If flexion is required, this can be achieved by placing a small pad or pillow under the occiput; at the same time a neck roll, sufficient to maintain the normal cervical curve, should also be used.

Traction: The pull from the skull calipers should be straight and level with the circular friction disc on the traction tray unit. The weights should not foul on the bed-frame. The pull-weight is prescribed by the medical officer in charge of the case individually.

Prevention of Pressure: Care must be taken to ensure that additional pressure points are kept free, *i.e.* the shoulders, elbows, hands. This can be achieved by placing arms on pillows, or by gapping bony points between pillows. The ear and occiput are also prone to pressure. This can be relieved by placing a small pad of wool or sorbo-rubber on either side of the ears and under the occiput.

Prevention of Contractures: Contractures which must be avoided are (a) adduction of shoulders in lesions above C6, (b) flexion of elbow and abduction of the arms in lesions below C6 and (c) flexion of wrist and fingers. These are avoided by placing a single pillow under both arms, position shoulder in abduction, elbow in extension and hands and fingers in dorsiflexion or neutral position. The most dangerous contractures are the flexion contractures of the elbow. The tendency of the patient in lesions below C6 to keep the arms in flexed in the elbow and adducted in the shoulder must be avoided and the patient bereminded continuously.

Operating Egerton-Stoke Mandeville Turning Bed: The procedure is the same as for a thoraco-lumbar lesion with additional use of a face-piece. This is necessary to support the patient's head on the side, towards which they are turned. It maintains correct spinal alignment in the lateral position. The face-piece is mounted on an adjustable arm and should be positioned just in front of the ear. The face-piece is removed when the patient is being nursed in the supine position. *The lateral position* is used in the nursing management of all patients for the following procedures: (1) to facilitate access for bowel management, usually once every other day; (2) to facilitate hyperextension exercises of the hip by the physio-therapist; (3) to relieve pressure continuously from the posterior aspect of the patient's body when pressure sores are present, or other skin blemishes, *e.g.* urine rash. *Support of fracture* is achieved by placing two large sandbags underneath the chest pillow, firmly maintaining extension of the spine in lateral position and avoiding reclining.

SUMMARY

There is no known method of nursing a paralysed patient that totally obviates the need to lift the patient clear of the bed at regular intervals.

Newly injured patients, nursed on the Egerton-Stoke Mandeville electrically controlled turning bed, are only lifted by the full lifting team once in 24 hours. Thereafter turning is carried out using the bed's mechanical means.

Until an alternative method of nursing patients with spinal cord injuries can be found, lifting must be strictly limited. When it does become necessary to lift a patient, great care must be taken to maintain even traction, support and alignment of the fracture/dislocation.

Old lesions with sores are nursed on sorbo-rubber pack beds. When being lifted and turned by hand at regular 2-4 hourly intervals, they are not at risk in relation to their original spinal injury. However, great care must always be taken in positioning, to prevent pressure sores and contractures of limbs.

Lifting and positioning of new and old lesions requires a combined effort from a team under the control of a leader, who should be an experienced and skilled nurse. Final position is maintained with the aid of pillows, which assist in preventing pressure and contractures.

RÉSUMÉ

Nous ne connaissons pas de manière de soigner un paralysé qui permet d'éviter tout soulevement régulier du malade de son lit.

Les cas aigus qui sont soignés sur un lit électrique du type Egerton-Stoke Mandeville ne sont levés qu'une fois dans 24 heures par l'équipe entière. Le reste du temps on les tourne en se servant du système électrique du lit.

Jusqu'à ce qu'une nouvelle façon de soigner les malades avec lésion de la moelle épinière soit trouvée tout soulèvement doit être limité au minimum. S'il devient inévitable de soulever un malade il faut prendre garde à maintenir la traction, l'appui et l'alignement de la lésion vertébrale.

Les lésions anciennes avec des escars sont soignées sur les lit de sorbo rubber pack. Quand elles sont tournées et soulevées manuellement tous les 2-4 heures il n'y a plus de risque pour la colonne vertébrale. Mais il faut bien faire attention à les poser d'une façon qui soulage les points de pression et qui évite le développement de contractions.

Les soirs des paraplégiques aigus et anciennes demandent les efforts d'une équipe entière guidée par un commandant qui doit être une personne experte et vassée. La position définitive du malade est maintenue par des coussins qui ainsi assistent à éviter le développement des escars et des contractions.

ZUSAMMENFASSUNG

Es ist keine Methode bekannt, einen gelähmten Patienten zu betten, bei der vollständig vermieden werden kann, dass der Patient in regelmässigen Zeitabständen vom Bett abgehoben werden muss.

Frisch Verletzte, die in einem elektrischen Egerton-Stoke Mandeville Drehbett gepflegt werden, werden nur einmal pro 24 Stunden von einer vollzähligen Pflegeeinheit abgehoben. In der übrigen Zeit wird das Drehen der Patienten mit Hilfe des elektrischen Mechanismus des Bettes besorgt.

Bis eine andere Pflegemethode für Patienten mit Rückenmarksverletzungen gefunden werden kann, müssen Hebemanöver strengstens eingeschränkt werden. Ist Heben des Patienten unvermeidlich, muss unbedingt darauf geachtet werden, dass Zug, Unterstützung und Ausrichtung der Wirbelverletzung gewährleistet und beibehalten werden.

Aeltere Läsionen mit Druckgeschwüren werden auf Sorbo Rubber Pack-betten gelagert. Wenn sie in 2-4 stündigen Abständen vorsichtig mit Händen gehoben und gedreht werden, besteht keine Gefahr für die Verletzung der Wirbelsäule. Jedoch muss streng darauf geachtet werden, dass die Patienten so gelagert sind, dass die kritischen Druckpunkte freigelagert sind und Kontraktionen vermieden werden. Heben und Lagern von alten und frischen Läsionen verlangen die Zusammenarbeit des ganzen Teams, unter der Führung eine Person mit viel Erfahrung. Die Position, in welcher ein Patient gelagert wird, wird mit Hilfe von Kissen beibehalten, die dazu beitragen, Druckgeschwüre und Kontraktionen zu vermeiden.

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